Mode L Activity Level Rises

AMS has recently received several encouraging reports about Mode L activity around the world. Notes have been received from W4FJ, K9RZ, JR1SWB and JA1SYK. Thanks to them for the following items.

- December 19, 1983 Mode-L Activity: Report Number 4 by K9RZ:
  
  My AO-10 Mode-L station is as follows: The 436 antenna is a NBS Tech Note 688, 8x15 element Yagi array (measured gain is 22 + dB) with a GaAsFET preamp at the antennas. On 1269 I am using a 2x38 element loop Yagi array (measured gain is 22 + dB) with about 120 watts of rf. This with feed line losses should give me about 20 kW EIRP. All antennas are horizontally polarized.

  With this setup, I am capable of receiving my own signal about 18 dB above the noise. I receive the Beacon about 30 dB above the noise. The Beacon shows both intermod and crossmod of signals in the transponder downlink.

  Most of the activity is between 436.45 and 436.55. So far I have worked the following stations:

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F9FT</td>
<td>150W, 4x23 Yagi</td>
<td>VE7CLD</td>
<td>Unknown</td>
<td>25el loop yagi 2x2C39</td>
<td>4x21el yagi</td>
</tr>
<tr>
<td>DJ5BV</td>
<td>400W, 16x23 Yagi</td>
<td>W0HHE</td>
<td>100W, 6 ft. Dish</td>
<td>2m Dish 2C39</td>
<td>4x21el yagi</td>
</tr>
<tr>
<td>VE7BBG</td>
<td>2.5W, 20 ft. Dish</td>
<td>DL7YC</td>
<td>70W, 3 mtr. Dish</td>
<td>2x21el yagi 10W</td>
<td>2x23el yagi</td>
</tr>
<tr>
<td>K5MYC</td>
<td>20W, 16 ft. Dish</td>
<td>PA4SSB</td>
<td>2W, Single Yagi</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>W8YO</td>
<td>150W, 4 ft. Dish</td>
<td>G3WDG</td>
<td>100W, 5 ft. Dish</td>
<td>8x25el loop yagi 2C39</td>
<td>2x21el yagi</td>
</tr>
<tr>
<td>DJ3OS</td>
<td>5000W ERP</td>
<td>JA3JUP</td>
<td>Unknown</td>
<td>40el loop yagi 10W</td>
<td>2x21el yagi</td>
</tr>
<tr>
<td>DJ8QL</td>
<td>20W, 16 ft. Dish</td>
<td>OE9XK</td>
<td>50W, 26 ft. Dish</td>
<td>2x34el yagi 10W</td>
<td>2x21el yagi</td>
</tr>
<tr>
<td>JR4BRS</td>
<td>5.5W, 3 mtr. Dish</td>
<td>DJ8PC</td>
<td>200W, 3 mtr. Dish</td>
<td>2x25el loop yagi 10W</td>
<td>?</td>
</tr>
<tr>
<td>VK5QR</td>
<td>90W, 2 mtr. Dish</td>
<td>OE9FK1</td>
<td>50W, 2.6 mtr. Dish</td>
<td>4x26el yagi 10W</td>
<td>2x21el yagi</td>
</tr>
<tr>
<td>ZS6AX</td>
<td>100W, 16EL Quagi</td>
<td>DL1BU</td>
<td>100W, 2 mtr. Dish</td>
<td>3m Dish 2C39</td>
<td>4x21el yagi</td>
</tr>
<tr>
<td>KL7NO</td>
<td>1000W ERP</td>
<td>DK2LR</td>
<td>60W, 4x10 E1 + Refl.</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>HB9CAI</td>
<td>50W, 4x23 (F9FT)</td>
<td>GW3XY</td>
<td>75W, 6 mtr. Dish</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>OE1VKK</td>
<td>50W, 16EL Helix</td>
<td>OE1HAB</td>
<td>7W, 4x23 (F9FT)</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>JA4TT</td>
<td>20W, 100E1 Yagi</td>
<td>JA1SYK</td>
<td>30W, 2 mtr. Dish</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>JA1UHY</td>
<td>10W, 2x24 Yagi</td>
<td>JA1SYK</td>
<td>30W, 2 mtr. Dish</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

  In addition to these 29 stations listed above, the following stations have been active on Mode-L as reported by DJ9PC, OE9FK1, OE9XX1, and VE7BBG. In total there have been 45 stations reported to have made two contacts through AO-10 Mode-L.

  OSCAR 10 Mode L continues to perform as it has since its turn on. The CW Beacon continues to modulate the downlink signals. VE7BBG and I have experimented with biasing the transponder by VE7BBG transmitting a strong carrier off frequency, and observing that the CW Beacon modulation on my signal and other signals in the pass band all disappeared. The transponder receiver continues to be sensitive as indicated by the uplink powers for some of the stations I have worked. In summary, the secret to successful Mode L operation is in the downlink antenna and receiving system.

- The following is from JA1SYK via JR1SWB

  Did you work W5LFL? Check the list on page 4!
Recent UoSAT-OSCAR 9 Telemetry Block

Decode per ASR 43/44.

Austria
OE1TKV 16ft helix 50W
OE9XII 7.6m Dish L.P 50W
OE1HAB 4x23el yagi 7W
OE9FKI 3m Dish 50W
OE1ERC1 ?

Switzerland
HB9C8T 4x23el yagi 50W
HB9MKQ 16ft dish 2x2C39

England
G3WDC 5ft Dish 100W
GW3XYW 6m Dish 75W
G4KGC ?

Netherlands
PA0SSB single yagi 2W

Italy
ISCTE ?
I7UCO ?

Czechoslovakia
OK1KIR ?

Canada
VE7BBG 6m Dish 2.5W
VE7CLD ?
VE4MA ?

U.S.A
W1IR ?
K6MYC 16ft Dish 20W
W4HHK ?
K6H2O ?
W8YIO 4.2ft Dish 10W
K0RZ 2x36el loop yagi 2x4x15el yagi
W0HHE 20ft Dish 100W

Alaska
KL7NO 1000W EIRP

Australia
VE5QR 2m Dish 90W
South Africa
ZS6AXT 16el quagi 100W

- Additional reports on Mode L operations are solicited.

Ops Schedule Summary:

AO-10: Mode-B from Mean Anomaly 40 to 220 except when in Mode L.
Mode L on UTC Saturday and Wednesday from one hour prior to until one hour subsequent to apogee time.
Monday is QRP day; less than 100 watts ERP please.

UO-9
Sat: 1200 baud bulletin, telemetry, digtalalker, 21 MHz beacon
Sun: 200 baud bulletin, telemetry, digtalalker, 21 MHz beacon
Mon: Whole orbit, fast-scan radiation data
Tue: Check-summed telemetry data
Wed: CCD imager data
Thu: Whole orbit telemetry data scan
Fri: Load bulletin, digtalalker, telemetry schedule

The 2.4 GHz beacon is being activated on alternate weekends. On these occasions the precision magnetometer and radiation detectors are powered down for power balance.

UoSAT Bulletin-55
16th December 1983

UoSAT-B Spacecraft Status

Construction of the UoSAT-B prototypes and flight components continues apace at the University of Surrey, in the USA, Canada, etc! All prototype PCBs have now been laid out and most outstanding boards have now been returned for population. Both CAD stations at Surrey are in 24-hour continuous operation to apply modifications in order to get as many flight boards produced before Christmas as possible. The effects of the Christmas holiday at many of our suppliers could delay the final construction of a number of boards.

Detailed specifications of the UoSAT-B spacecraft will not be posted until they have been finalized in flight versions; data on the primary systems will appear first sometime in January, followed by the experimental systems as our workload permits. The primary spacecraft systems will, however, be nearly compatible to those on UoSAT-1, so little work will need to be done on existing ground hardware for the new craft. The telemetry format, while similar, will have changed channel allocations and calibration equations, so software modifications will be necessary.

Fifty NiCd battery cells have been delivered to AMSAT-CANADA for evaluation, a flight pack and a flight spare pack of 10 cells each have been selected from the set following exhaustive tests and matching. The initial labeling and x-raying are already completed; this was followed by a battery of automated electrical tests to select a matched group of 10 flight cells and 10 flight spares. The flight spares will be cycled after launch to simulate the cells on the spacecraft and to allow experimental measurements to be made. The flight cells are currently being shipped to Surrey for mounting in a pack and integrating with the spacecraft framework.

Artwork for the CCD and radiation/particle detector memory boards is complete, and boards are working. The particle wave counter/correlator board has also been tested. Complete testing awaits the memory readout boards, which have been laid out.

The 1802 computer is progressing well. The CPU and main I/O board are running and the 4116 memory board is under test. The Digitalker speech synthesizer board
layout is also complete. Software production has now begun, using an in-circuit emulator with memory-map facilities to replace the 4116 board. Minor complications with some of the I/O ports when driven by the emulator have held up some of this development.

The CCD camera analogue and digital PCBs have been laid out. Both analogue and digital sections have been tested separately and the two sections are now being connected.

The command system prototype testing is complete, with the demodulator board populated and added. The receivers are now awaited for full uplink simulation and test.

Layout of all 4 telemetry system boards is complete. All four have been populated and are working well, with the minor exception of part of the frame header. The initial two boards contain a basic telemetry system, with the third adding frame headers and the fourth a programmable channel dwell facility.

**UoSAT-1 QSL Cards and UoSAT-B Stickers**

At last long, the UoSAT-1 QSL cards have been received. We will attempt to send one to all individuals who have sent us a report over the past two years, however the clerical task at this time is somewhat daunting, so for a faster service, please send the UoSAT team a stamped, addressed envelope or an IRC.

A number of colored UoSAT-2 vinyl stickers have also been produced. These will be sent to all individuals who are involved directly with the project. Others may request a sticker with their QSL card, although a second IRC or similar donation would be appreciated to cover the printing costs.

**Short Bursts**

- A new software publication for use with personal computers designed for orbital tracking of satellites is being offered by AMSAT. The author is GM41HHJ. Call or write AMSAT HQ for info.
- N5AHD reports his station at Corpus Christi University (Texas) now includes fully automatic UoSAT tracking including antenna pointing, polarization switching, Doppler shift frequency correction and other unique features. Bob plans to publish details of this superior station soon. QRX!
- VE5XU reports keen interest in the STS-9/W5LFI mission; says CBC came by his QTH for TV interview.
- ASR is interested in running an AO-10 DX scorecard by country. We believe there are more than 100 prefixes that have been on at least once. Send in your validated list so we can compile a master list. We'll run it periodically so everyone can keep track of the fantastic DX now appearing.
- High school students from Alabama will have a Get Away Special aboard a future Shuttle. One of the experiments will include an amateur radio transmitter. This will mark the first time a "GAS" will be allowed to radiate RF. It also breaks other new ground that will make easier AMSAT's future prospects for PACSAT and other future missions on the Shuttle. Hams at the Marshall Space Flight Center (NASA) are helping the students.
- The membership recruitment drive ended 31 Dec. 83. It brought in hundreds of new members and rewarded well the top recruiters. Watch the next ASR for the list of prize winners.
- The AO-10 eclipse season ended last month so energy available is up a bit. AO-10 is off-pointed from geocenter by about 7 degrees now. This angle and the operating time may be adjusted after DJ4ZC returns from his EA8 holiday. Presently AO-10 is off from MA220-040, or about 30% of each orbit.

**New Packet Sounds Heard on AO-10**

W3IWI reports packet experiments on Special Service Channel L1 have now evolved to PSK (phase shift keyed) signals from the formerly employed FSK mode. W0PN exchanged 512 byte blocks with VE1SAT. The successful transmission of packets was increased from about 60% to about 90% (first transmission) using PSK. The theoretical advantage of using PSK over FSK (non-coherent) is several dB for a constant error rate. The W0PN-VE1SAT experiments suggest a confirmation. W3IWI monitored the QSO and suggests future HDLC packeters may want to move to PSK earlier than planned despite the somewhat more complex equipment required with PSK compared to FSK. FSK has been used by amateurs for decades (RTTY) and has recently been used by computer buffs for audio cassette data storage. The so-called Kansas-city standard uses FSK. UoSAT-Oscar 9 uses FSK at 1200 baud. For signal to noise margins of only a couple of decibels, however, PSK proves superior; yields a lower error rate for most types of noise environments.

**From KA9Q**

Satellite: oscar-10  
Catalog number: 14129  
Epoch time: 84001.67617120  
Sun Jan 1 16:13:41.192 1984 UTC  
Element set: MH 1-3-84  
Inclination: 25.8370 deg  
RA of node: 222.8130 deg  
Eccentricity: 0.6084848  
Arg of perigee: 233.3550 deg  
Mean anomaly: 54.0540 deg  
Mean motion: 2.05854161 rev/day  
Decay rate: 0 rev/day  
Epoch rev: 416  
Semi major axis: 26105.750 km  
Anom period: 699.524359 min  
Apogee: 35615.140 km  
Perigee: 3845.260 km  
Translate freq: 581.0047 mhz  
Invert: 1  
Beacon: 145.8100 mhz
Did You Work W5LFL?

This is the first draft of the W5LFL log, which we've put together after carefully transcribing about 4 hours' worth of tape. Background noise made it difficult for Dr. Garriott to write down or respond to each call received. The entire W5LFL log was recorded on tape, therefore, the tape becomes the official log. If your call isn't there, check the list of incomplete calls that follows the first list. If you attempted to contact W5LFL and are not on the first list, please do the following:

Look for a call sign resembling yours in the list of "incomplete" calls. If you find one, send us as much information about your transmission as you can, including date and time in UTC. We'll compare it to the time on the tape, and decide if your call qualifies as a contact. All determinations will be made by W5LFL and ARRL. Address your QSO information to ARRL HQ, Att: W9KDR, 225 Main St., Newtonville, CT 06111 — Bernie Glassy, W9KDR, ARRL Headquarters.

AA6S K1PAP KA7GHK N4HY T13DJT W2PAU WATFCW W8TXT
AB7C K1PKE KB4CRF N4JJK VE1AFU W3CWC WAIJXN WB0SVW
AE7Q K2IBP KB4WMN NSBLZ VE1BB W4AQL WAIJPSI WB9TTW
AL6G K2OYS KB4AMN N99DT VE1CAW W4BSE W32BNA
AL7W K2RWH KB9TNT N5EZM VE1CCY WAKYL W2ACHY WB4EMI
CE3CKE K2T2I KB4BV N6AVR VE1OC W4MOP W2ASFE WB4YIC
CE3AHD K3DI KC4P N6DD VE1UT W40DW W2AVMS WB4YUL
DC6SN K3NV KC7EM N6ECL VE3BNA W4ROA W2AVWL WB5AZI
DC6AH K3PGP KB6KE N4MJ VE3BNO W4WJ W4ABEV WB5DSH
DC8AM K3TC KD5JH N6NB VE3KLW W55F W4BZJ WB3P2D
DF6UQ K4FGE KD6QJ N6QP VE3KRP W5GEL W4EWA WB5RRR
DG6NAA K4JF KD7FY N6RJ VE400 W5HKT W4AGJI WB5VZL
D1HIJ K5ADQ KD7RF N7ARE* VE7BOQ W5HQU W4KXY WB6DEO
DK6RX K5CAY KE5C N7BHC* VE7CQY W5LEF W4ALZR WB6DTR
DL0UDA K5IH KE6VK N7DOF V1KBX W5LUL W4AMMD WB6GYE
DL1TYA K5OKG KE6XI N7WS V1KDF W5YN W4APLR WB6IDK
DL9GAK K5OGE KE7M N8DE V1KORR W5ARR W4ASBC* WB6NOA
DL9MH K5QHF KE4SFX N9GA V1KRR W5UN W4ATNV/7 WB6NYN
EA3AWD K6DYD KE6F N5GP V1KZAH W6KJ W4ASFO W2BAP
EQ4TS K6GSS KE7I* N5HI V1KZIF W6LEF W4DBY W2B5MV
EI6FI K6LY KNBL N6E V1KZQY W6YBL W4DXR W2ZKDF
EF1VX K6MYC KN2D N4AP V1K2PG W6X W4SNOM W24FAB
F5AD K6TDR KQ5D N7EE V1K2PMN W7AVD W4GCF W2HYD
F6AVG K7GII KQ5W N6EVIIC W10BK W7BGH W4ALUM W2DKSN
GA0YL K7ND KS1S N7FRRH W10DI W7ID W6DNK W4DRJ
G6WFC K7NMT KTTU NOFX W10FP W7KMF W6FEV W24CS
GM8XOC K8CS* KE5C N6E V1K1GF W10GG W7SW W65GK W25IF
GW6JXK K8KNT KY4Z N1DGC W10HD* W7KN W6YBT W25KZ
HH2CZ K9BI KY7B N1KRA W8PN W8AC W27BU W6DIA
IT1RF K9HM N8COX W82BDS W1ATW W8FQK W27DPX W2AQJ
IS6BF K0APGN N8CXC W3CGX W1PSG W8GUS W27JOE W1EVF
J1Y K0QY N0IS W1IDF W8FL W8WN W7RQ5 W1TUT
KO1LR K22TBD N0L* W1LTE W2GDD W9KDR W27UB W2ZRCP
K8RI K4AWJ N2EK SM2KTE W2JNO* W24V1F W28KEM W7K
K8DZ K45FV N4CAN SM4CLU W2NO W1BAR W28MTI W7MAU
K1KN K6DQZ

Incomplete Calls

Orbit 40

W5V W8U7_ W87 U_ WA6_ W85L_ _ZPR W825_ W89C_ W815_ W7_
KA0_ WA7_V W85_B_ W86_ W5D_ W82A_ _3L_ _4L_
AJW DG6_ HD9AA_ WA2VW_ W27_ W33I_ W24V_ W24_
Orbit 56

WS5C W4ADN_ W44_ W4U_ W8A_ W17_ W1A_ W23_ W23I_
Orbit 48

KC5A_ W4AN_ W25_ W27_ W33_ W24V_ W24_

*Heard on CW

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Member Drive Winners Told

AMSAT Headquarters has announced the winners in the first-ever member recruitment contest. The six-month campaign netted 370 new members according to General Manager Bill Lazzaro, N2CF. Prizes were shipped the week of January 16. The winners, their scores and prizes are shown in the box accompanying this article.

The contest period ran from July 1 through December 31. Prizes ranged from an option-laden grand prize all-mode vhf/uhf transceiver, the FT-726R from Yaesu worth nearly $1,400 to prizes for as few as one new member signed. In all, nearly $3,000 in prizes were donated by manufacturers and distributors of amateur satellite-related equipment.

Individuals who participated in the contest should call or write AMSAT soon to claim their prize. (Does not include those whose callsign appears in the box; their prizes have already been shipped.) As explained in ORBIT No. 14, page 28, the following prizes are yours if you participated but did not garner one of the main prizes.

For one point you earned either your name in space or an AMSAT callsign badge. For two points you can choose either an AMSAT T-shirt or belt buckle. Three points gets you either a credit at the AMSAT Software Exchange or a copy of K2UBC’s new book Satellite Experimenters’ Handbook. For four points or more you can choose either a year’s AMSAT membership or a year’s ASR subscription. Please claim your prize promptly.

According to N2CF, the recruitment drive will be repeated later this year with a kick-off announcement expected in the next few weeks. He wants to have the contest period bridge the peak of the hamfest and convention season to afford the broadest possible exposure and opportunity for this contest reprieve.

AMSAT congratulates the winners and all the participants who made this premier effort a huge success. The big winners may be the new members who’ve just joined the most exciting activity in Amateur Radio today.

A special note of thanks and sincere appreciation to the very special group of manufacturers and dealers who, without so much as an arm-twist, practically leaped on the bandwagon to make this effort the most successful campaign of its kind to date. Our hats are doffed to you truly fine (and visionary) folks! Thanks! You made it work.

<table>
<thead>
<tr>
<th>Place</th>
<th>Call</th>
<th>Score</th>
<th>Manufacturer</th>
<th>Model</th>
<th>Prize</th>
<th>Donor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N3CEG</td>
<td>71</td>
<td>Yaesu</td>
<td>FT-726R</td>
<td>All-mode vhf/uhf transceiver</td>
<td>Yaesu-Musen</td>
</tr>
<tr>
<td>2</td>
<td>KW2U</td>
<td>68*</td>
<td>Mirage</td>
<td>D-1010N</td>
<td>70cm 100-watt amplifier</td>
<td>Mirage</td>
</tr>
<tr>
<td>3</td>
<td>WD4FAB</td>
<td>20</td>
<td>Microwave Modules</td>
<td>MMX-1268-144</td>
<td>2m to 23cm xmit conv., 2w</td>
<td>Spectrum International</td>
</tr>
<tr>
<td>4</td>
<td>WA6VGS</td>
<td>18</td>
<td>Astron</td>
<td>VS-35M</td>
<td>35A metered dc pwr supply</td>
<td>KJI Electronics</td>
</tr>
<tr>
<td>5</td>
<td>KB0CL</td>
<td>16</td>
<td>KLM</td>
<td>2M-14C</td>
<td>2m crossed Yagi</td>
<td>KLM</td>
</tr>
<tr>
<td>6</td>
<td>W3LOY</td>
<td>13</td>
<td>Lunar</td>
<td>PAG-144-2</td>
<td>2m GaAsFET preamp.</td>
<td>Lunar</td>
</tr>
<tr>
<td>8</td>
<td>K8MU</td>
<td>9</td>
<td>KLM</td>
<td>435-18C + CS2</td>
<td>70cm crossed Yagi &amp; pol. sw.</td>
<td>KLM</td>
</tr>
<tr>
<td>9†</td>
<td>W6ISO</td>
<td>8</td>
<td>Lunar</td>
<td>PA1-144-2</td>
<td>2m preamp.</td>
<td>Lunar</td>
</tr>
<tr>
<td>9†</td>
<td>W3IWI</td>
<td>8</td>
<td>KenPro</td>
<td>KP-145G</td>
<td>Mast 2m GaAsFET preamp.</td>
<td>Spectrum West</td>
</tr>
<tr>
<td>11††</td>
<td>KO5I</td>
<td>7</td>
<td>Meatek</td>
<td>SLNA-144S</td>
<td>2m in-line preamp.</td>
<td>VHF Shop</td>
</tr>
</tbody>
</table>

Notes: * final score is 68½, points with ½ point for family members.
† Tie for ninth place.
†† Bonus prize donated by the VHF Shop!
Short Bursts

- Keplerian element data will be available from AMSAT HQ for an SASE. Henceforth HQ will be unable to respond to telephone request for this data. It is just too time-consuming for our budget-strapped office staff to accommodate easily.

- The RS satellites should now be on full-period according to G3IOR.

- A Clipperton DXpedition which includes AO-10 operation was discussed recently at the Northern California DX Club Meeting. Watch for further details on this exciting project!

- An exciting AMSAT awards program is taking shape. This one will be a delight to all and should encourage more activity and new members. Announcements are expected next month.

- Nearly 10 percent of all the calls worked by W5LFL from STS-9 were active AMSAT Members. Nice going, guys!

- W8DX and WH6AMX have sent their DX scorecards for tally by ASR. So far, W8DX leads the field with 60 claimed countries worked. Send yours in yet?

- UA3CR, nominal head of the Russian Amateur Satellite Project Committee recently conveyed congratulations for AMSAT OSCAR 10's performance to W3JWI and AMSAT via N4AR. Bill, N4AR, had chatted with Leo for a half hour recently on an early morning cw QSO via AO-10.

- ORBIT Magazine Editor KB2M is actively seeking advanced technical articles for ORBIT as well as construction and general interest articles. Send your manuscripts to Harold Winard, KB2M, P.O. Box 575, Wharton, NJ 07885.

- ORBIT Magazine #16 has been mailed.

- Net Manager W8GQW is vacationing in Arizona for the winter. His slot on the nets will be absorbed until his return by KO5I, N4HY, and N3AR.

- DJ4ZC reports having worked about 50 stations from his vacation QTH on Tenerife, EA8.

- Planning a convention talk or flea market booth for AMSAT this spring? Contact HQ early (now is okay) to arrange support for your event. Handouts, information and support kits available if you act soon.

- KA6M is the latest to join the packet crowd on AO-10 SSC 11 (145.830). A tentative sked is held Sundays at 1700 UTC.

Project OSCAR Annual Meeting is Held

President John Pronko, W6XN, of the Project OSCAR group reports on the Annual Meeting which was held on 14 January at Foothill College, Los Altos, California. The meeting was held between 2 and 5:30 P.M. with 37 members attending.

W6XN reported on Project OSCAR Prediction Calendars. He was followed by WB6JNN who presented a Syncom progress report. KA6M told of packet activity on AO-10. W6SP detailed current and future AMSAT projects. N6TX reported on the W5LFL Ham-in-Space mission.

Election of Board members was followed by election of Officers. Incumbents were all re-elected. The Officers are: President, John Pronko, W6XN; Secretary, Nick Marshall, W6OLO; Treasurer, Gil Morris, W8BKG; Chairman of the Board, John Browning, W6SP; Technical Director, Jim Eagleson, WB6JNN.

W6XN reports that lively discussion permeated the entire meeting.

GAS Can Help Sought

A cannister containing a set of experiments designed by high school students is scheduled to be sent up on the space shuttle on June 4. Unfortunately the group sponsoring this project has run into problems with the person in charge of the controller board. They are in desperate need of someone who can donate the material and the time to produce a simple controller board. The controller must turn devices on and off, based on the current time, or the temperature. I figure they need some kind of cpu, an a-to-d converter, some kind of temperature sensor, and a multiplexer.

What they can offer are some limited funds for hardware, a limited amount of travel money to the shuttle launch, hotel accommodations at the launch for two people, VIP tickets into the launch area for the takeoff and, if there is any TV coverage, they will mention you and your companies name.

There is about 60 days left to get this controller programmed and tested. If you cannot help, but know of an off-the-shelf controller that would do what is needed, I would like to hear from you also. Please write to WA2LQQ, P.O. Box 177, Warwick, NY 10990.

New Bulletins Favorably Received

A new service developed ad hoc on AMSAT OSCAR 10 is drawing favorable remarks from those who've heard the effort of W6KAG and W6CG. Bud Schultz, W6CG, has for several years been holding regular Saturday nets on 10 meters (lately on 15 meters) primarily in service to New Zealand, Australia and the Pacific basin area. The Southwest Pacific AMSAT Information Net has provided key information to hundreds in its tenure.

Now in an effort to better serve a wider community yet, W6CG has teamed with Butch Mason, W6KAG, to relay Bud's bulletin service abroad via AO-10. The result to date has been a very effective service according to those who have listened in on the interim downlink frequency of 145.957 MHz, Mode B. The location on the AMSAT Calling and Net Frequency (ACNF, 145.957) is a preliminary step until coordination for use of one of the so-called Special Service Channels (SSCs) is complete. The SSCs were
established precisely for the kind of service now being provided by W6KAG and W6CG, according to AMSAT sources.

In the present arrangement, W6KAG tape records W6CG and later transmits the audio to AO-10 from a 20-minute continuous loop tape. Both W6KAG and W6CG are retired and thus have the time to devote to this valuable public service. Both are located in the Los Angeles environs. Butch is in Rancho Palos Verdes and Bud in Anaheim.

The present schedule of transmissions is as follows according to W6CG: On Mode B days (Sun., Mon., Tue., Thur., Fri.), the bulletins will be transmitted from one hour prior to, through one hour subsequent to AO-10 apogee whenever that apogee occurs between 60 and 180 degrees West longitude. On Mode L days (Saturday and Wednesday UTC), the bulletins will be transmitted from two hours through one hour prior to apogee and from one hour through two hours subsequent to apogee whenever that apogee occurs between 60 and 180 degrees West longitude. In other words, on Mode B days, the bulletins straddle apogee. On Mode L days, the bulletins straddle Mode L times which themselves straddle apogee.

PACSAT Presentation Stimulates College Interest

Returning from a trip to England’s University of Surrey, home of UoSAT B and UoSAT OSCAR 9, AMSAT’s Assistant Vice President Harold Price, NK6K, found time to stop off at Morgantown, West Virginia. The occasion was a meeting of the Institute of Electrical and Electronic Engineers (IEEE) at West Virginia University and NK6K was the featured speaker.

On Thursday evening, 19 Jan., Harold was joined by N2CF at Washington University, a four hour drive west from Washington, D.C., for this important talk. As is often the case with NK6K’s presentations, this one was both informative and entertaining. AMSAT officials were hosted by the Chairman of the Electrical Engineering Department, Dr. Roy Nutter, NK6HI.

The one hour presentation was enthusiastically received by about 50 students and faculty on a blustery, cold evening. Viewgraphs supported the verbal description of the PACSAT project.

PACSAT, the forerunner of a family of digital, store-and-forward satellites, is a joint project of AMSAT and VITA, the Volunteers In Technical Assistance. A 1985 or 1986 launch opportunity from a Get Away Special (GAS Can) on a future Shuttle is being sought.

General Manager N2CF explained to ASR that AMSAT views the nation’s university and college system as a virtual boundless reservoir of engineering talent searching for worthwhile projects. The West Virginia opportunity is a “very promising situation” says N2CF. “We hope to promulgate the idea of participation in amateur satellite projects to numerous other universities,” he added.

Weber State College in Utah is building a satellite under the experienced hand of Gil Moore of Thiokol. Gil has played a key role in past AMSAT activities in connection with the Thiokol kick motors.

The West Virginia University group was particularly interested in participating in development of the digital equip-
Satellite: rs-5
Catalog number: 12999
Epoch time: 84012.04300232
Thu Jan 12 01:01:55.400 1984 UTC
Element set: 140
Inclination: 82.9565 deg
RA of node: 228.6352 deg
Eccentricity: 0.0011580
Arg of perigee: 65.8132 deg
Mean anomaly: 294.4149 deg
Mean motion: 12.05042100 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 9101
Semi major axis: 8033.890 km
Anom period: 117.497900 min
Apogee: 1682.576 km
Perigee: 1653.970 km

Satellite: rs-7
Catalog number: 13001
Epoch time: 84007.53970377
Sat Jan 7 12:57:10.406 1984 UTC
Element set: 139
Inclination: 82.9560 deg
RA of node: 228.1470 deg
Eccentricity: 0.0022488
Arg of perigee: 5.3765 deg
Mean anomaly: 354.7537 deg
Mean motion: 12.00675623 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 9074
Semi major axis: 8017.771 km
Anom period: 119.138665 min
Apogee: 1657.825 km
Perigee: 1621.796 km

Satellite: rs-8
Catalog number: 12998
Epoch time: 84008.06605693
Sun Jan 8 01:35:07.319 1984 UTC
Element set: 71
Inclination: 82.9596 deg
RA of node: 224.0269 deg
Eccentricity: 0.0050499
Arg of perigee: 343.1632 deg
Mean anomaly: 16.7752 deg
Mean motion: 12.13557899 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 9117
Semi major axis: 7996.238 km
Anom period: 117.659357 min
Apogee: 1660.240 km
Perigee: 1579.480 km
The AMSAT-Stoner Challenge Cup

An International Amateur Radio Satellite Competition

Bill Orr, W6SAI, is one of Amateur Radio’s best known and respected authors. In a now-classic QST article ("Sixty Years of Radio Amateur Communication", QST, Feb. 1962) Bill recounted a bit of history. It was one of those pivotal moments in the fascinating genesis of amateur satellites. Bill’s telling goes thus:

"The radio amateur gazed thoughtfully for a moment at the white paper in his typewriter. Suddenly his fingers sprang into action and the keys flashed the fateful words, 'Currently being tested is a solar powered six-to-two-meter transistor repeater which could be ballooned over the Southwest. Can anyone come up with a spare rocket for orbiting purposes?"

The fingers were those of Don Stoner, W6TNS, writing his "Semiconductors" column for CQ. The "fateful words", as W6SAI later put it, appeared in the April 1959 edition of CQ. From that point hence there existed a remarkable series of events resulting in OSCAR 1 (December 1961) through the recent launch of AMSAT-OSCAR 10, the most advanced of the proud lineage. But arguably it all began with those "fateful words" two and half decades ago.

Now AMSAT is set to commemorate the 25th anniversary of Don Stoner’s challenge to "come up with a spare rocket" with a challenge of its own. The AMSAT-Stoner Challenge Cup for amateur satellite enthusiasts will begin in April and aims to simultaneously recall the lineage while fixing sights firmly on the future of amateur radio in space with OSCAR. The AMSAT-Stoner Challenge Cup will take the form of an operating competition on AMSAT-OSCAR 10. The competition will run for three months and offers the winners in three categories substantial hardware (trophies, plaques) and software (certificates).

The competition is open to licensed amateurs and amateur radio satellite enthusiasts worldwide. The purpose of the competition will be to promote satellite activity through familiarity with its capabilities, to AMSAT membership and to stimulate refinement of ground station performance with special emphasis on receive capabilities.

The competition shall be held in three sections:

1. AMSAT members
2. Non-AMSAT members
3. SWLs (both members and non-members).

The general idea is to work as many stations in as many different grid squares as possible. Special emphasis (through scoring method) is placed on low-power transmitting and superior receive capability through bonus points. Grid squares are a universal system of dividing the earth’s surface into uniquely identifiable zones 2 degrees by 1 degree (longitude by latitude, respectively). The grid square system is described in QST, January, 1983, page 49. The article describes how to ascertain your own grid square identification. For example, ARRL Headquarters is at grid FN31. A more complete explanation, including the plan for locations outside the USA appears in "The Lunar Letter", April 1982, in an article entitled, "Worldwide QTH Locator System Proposed By Region 1," by Lance Collister, WAIJXN.

AMSAT will supply copies of the articles describing the system together with sample logs for this competition for $2 plus a SASE or (overseas) for $2 plus an SAE with 5 IRCs.

Complete rules are specified below. Because of the sensitivity of AMSAT OSCAR-10 to possible "desense" due to

Henry Norman, VITA Executive Director (left), presents a $5000 check to AMSAT's General Manager Bill Lazzaro, N2CF. The donation made last autumn will fund initial PACSAT work.
excessively high power on the uplink, the rules will be strictly enforced. Disqualification of stations using excessive power may result. This being the first-ever competition of its type, AMSAT has resolved to approach the activity with cautious optimism. A disciplined, mature approach to the competition is thus required of all participants. Unlike HF competitions where the sponsors can hardly turn off the ionosphere, THIS "ionosphere" can be turned off should things get out of hand.

The AMSAT-Stoner Challenge Cup is a benchmark for future, longer-termed AO-10 operating events and even AMSAT’s Technical Achievement Award for superior ground station capability (especially receiver performance).

So step up to the ultimate in space-age amateur radio events: The AMSAT-Stoner Challenge Cup and we’ll BCNU on AO-10! GL! — Doug Loughmiller, KO5I, AMSAT Vice President, Operations

AMSAT-Stoner Challenge Cup
Official Rules

1) Objective: Two-way communication via AO-10 Mode B or Mode L using the lowest uplink power possible. For SWLs, the objective is to report as many QSOs as possible with special emphasis on those QSOs involving QRP stations.

2) Competition Period: Commencing 0000 UTC 15 Apr. 84 and running continuously through 2400 UTC 14 July 84. No time limit on cumulative operating time.

3) Entry Categories:
   a) Challenger Class (AMSAT Members only; affiliated AMSAT organizations are included, e.g., AMSAT-UK, AMSAT-DL, JAMSAT, etc.)
   b) Competitor Class (Future AMSAT Members; not currently members)
   c) Observer Class (SWLs; includes hams not presently equipped for AO-10 both members and future members)

4) Exchange: QSO serial number, uplink power code, grid square and AMSAT member number (if any). See below for power code.

5) Scoring:
   Scoring is based on three major elements:
   a) QSO points which are earned for each QSO completed. Credit is given in inverse proportion to the uplink power employed. Basically the lower the power, the more points you get for each QSO. Points per QSO will vary both with your uplink and the other stations uplink and are computed on a QSO-by-QSO basis. See below.
   b) AMSAT Member multiplier. Each AMSAT member worked doubles the point value of each QSO. Thus an AMSAT member QSO gives you a member multiplier of two. Non-member QSO multiplier is one.
   c) Grid square multiplier. The multiplier is equal to one unit for each DISTINCT grid square worked.
   For observer class, simply report the power codes of each side of the QSO but do not apply the member multiplier or the grid square multiplier. Observer’s score is then the sum of individual QSO power codes as described below.

   Scoring details:
   QSO Points. Based on the matrix and explanation below. Uplink power code A is 200 watts EIRP or less. Uplink power code B is 201 to 800 watts EIRP. Uplink power greater than 800 watts on Mode B is not permitted.
   Uplink power is not limited on Mode L and each QSO is scored as if were Mode B, code A.

   Your Uplink
   A  B
   Other     5  3
   Station Uplink B 3 1

   From the matrix one can deduce the following. For QSO points, each QSO in which BOTH stations use less than 200 watts EIRP (code AA), the QSO points total 5. If either station uses less than 200 watts (code AB and BA) the QSO is worth 3 points. If both stations use between 200 and 800, (code BB) the QSO earns 1 point.

SAMPLE LOG AND SCORING INFORMATION FOR THE AMSAT-STONER CHALLENGE CUP

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>QSO Serial Number</th>
<th>Call Sign</th>
<th>Uplink Power Code Sent</th>
<th>Grid Square</th>
<th>Member Number</th>
<th>QSO Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Apr.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2200</td>
<td>523</td>
<td>W6SP</td>
<td>A</td>
<td>CM96</td>
<td>132</td>
<td>10</td>
</tr>
<tr>
<td>2201</td>
<td>524</td>
<td>VE2VQ</td>
<td>A</td>
<td>FA32</td>
<td>543</td>
<td>6</td>
</tr>
<tr>
<td>2202</td>
<td>525</td>
<td>XE1TH</td>
<td>B</td>
<td>CH86</td>
<td>—</td>
<td>1</td>
</tr>
<tr>
<td>2203</td>
<td>526</td>
<td>G31OR</td>
<td>A</td>
<td>EU90</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>2204</td>
<td>527</td>
<td>PY2LK</td>
<td>A</td>
<td>KY76</td>
<td>—</td>
<td>5</td>
</tr>
</tbody>
</table>

etc.

Total grid: 200
Total QSO Points: 1250

Grand total: 1250 x 200 = 250,000 points.

Note: Be sure to count only total different grid squares worked.
Sample Scoring calculation:
You work an AMSAT member. He’s running 500 watts EIRP; you’re running 125 watts. The QSO points are 3 (code BA). Since he’s a member, the member multiplier is 2. The total worth of the QSO is thus 3 x 2 = 6 points.
You work another station. He’s not a member. Both of you are running 100 watts EIRP. The QSO points are 5 (code AA). The member multiplier is 1. (He’s not a member). The QSO total is thus 5 x 1 = 5 points.
After all individual QSOs are tallied, the subtotal is multiplied by the grid square multiplier. Suppose your QSO sub-total is 1250 points. Suppose you worked 200 grid squares. Take the QSO points sub-total (1250) and multiply it by the number of different grid squares you worked. Thus: 1250 x 200 = 250,000 points; your grand total.
6) Logs: Log sheets may be obtained from AMSAT as described elsewhere. Home made logs are okay too as long as the format is followed.
7) Miscellaneous: No repeat contacts. One credit only for each station call sign worked. The QTH of your station is optional and can be moved at any time to any other QTH with unlimited freedom. Cw and ssb are the only modes permitted in this initial event. Note the affiliation of the member next to the member number using a convenient abbreviation with notes to indicate what it means, e.g., UK, DL, VE, ZL, etc.
8) Reporting: Logs must be sent to AMSAT, P.O. Box 27, Washington DC 20044 and must be postmarked not later than 1 Sept. 84. A summary sheet must be included to indicate grid square total and QSO point sub-total. A signed statement attesting to the accuracy of the log must be enclosed and the entrant must state the maximum power used did not exceed 800 watts EIRP on Mode B. (No limit on Mode L).
9) Awards:
a) Challenger Class. First place will be honored with a silver loving cup engraved with “AMSAT-Stoner Challenge Cup, 1984. FIRST PLACE (your call sign)”. The next 4 finishers will receive plaques. The next 5 finishers will receive special certificates. All entrants in the Challenger Class will receive a certificate.
b) Competitor Class. First place will receive an engraved plaque with the winners call sign and a one year AMSAT Membership. The next four finishers will receive special certificates.
c) Observer Class. The top 5 Observers will receive certificates.
10) Costs: A nominal entry fee is required to offset the costs of administration. AMSAT members fee is $2; non-members is $3.
11) Disqualification: An entrant may be disqualified for:
a) More than 2% log dupes (Callsigns or grid squares claimed)
b) Consistently exceeding the Mode B General Beacon (145.810 MHz) by 6 dB or more; about one S-unit.
c) Behavior incongruous with good amateur radio practice.

US Amateurs Win Radio Sport Medals
ARRL received from the Soviet Radio Sport Federation, medals and certificates for five US amateurs. The Radio Sport Federation sponsored a series of activity weekends throughout the month of October 1982. This operating event was to commemorate the October 3, 1957 launch of Sputnik and the October 28, 1978 launch of RADIO-1 and RADIO-2.
1st Catagory winners were:
W1NU 1st place Gold medal with certificate #261 and score 243.
N4AR 2nd place Silver medal with certificate #266 and score 202.
K9GQ 3rd place Bronze medal with certificate #269 and score 181.
2nd Catagory:
N2AA 1st place Gold medal with certificate #271 and score 114.
WB5EUC 3rd place Bronze with certificate #274 and score 34.

News From Surrey
A Special Report by the Staff at the University of Surrey.
UoSAT Bulletin-61 14:00 27th January 1984

Apologies are due for the late writing and loading of last week’s bulletin. The erratic schedule has been due to a combination of factors including lack of sleep, overwork and severe disruptions of service on our mainframe computer system. As can be imagined, the UoSAT-1 operational schedule will be liable to disruption as other tasks become more urgent.

Action will be taken to maintain a UoSAT-1 service during the UoSAT-B launch campaign, however since all members of the operational team will be in the U.S., this will be of a reduced nature. UoSAT-B details will be transmitted continuously once we return during the last week of February.

Detailed specifications of the UoSAT-B spacecraft will not be posted until they have been finalized in flight versions; data on the primary systems will appear first sometime in January, followed by the experimental systems as our workload permits. We hope to start the initial system specifications from next weekend.

The following received from G3YJO:
The flight UoSAT-B spacecraft underwent spin balance tests at British Aerospace last weekend (20th) and was successfully balanced to within 2 gm. meters both static and dynamic. This yields a center of gravity offset from the z-axis of around 0.002 inches compared to the maximum permissible for vehicle separation of 0.015 inches.

The spacecraft has been at Marconi Space & Defense Systems in vibration tests since Wednesday 25th and low-level resonance searches in all three axes have been completed - the first lateral resonance of the s/c is at 42 Hz. The full flight simulation vibration at 20 g's has been successfully completed in the z (thrust) axis after an initial problem with the tip-mass retention mechanism had been resolved. The major area of concern had been associated with the s/c wings - they see 60 g's at the tips, however both the Navigation Magnetometer and Space Dust experiments appear to have survived well. The lateral axes tests will continue over Friday & Saturday with Thermal Vacuum tests scheduled next week.
Harold Price, NK6K, arrived at Surrey on Thursday, 12/1/84 with the flight DCE (Digital Communications Experiment) which he collected in Ottawa, where it was integrated. Final minor hardware modifications were completed over the following weekend, and the module has been soak-tested since whenever not in use on the spacecraft. Much credit must be given to the US/Canadian team which has constructed this 3-PCB computer system to fit in a module box only 31 mm high! This involved such techniques as sinking the CPU crystal into a cut-out in its circuit board. A full list of constructors will be posted when it is complete.

10 flight cells selected in Ottawa from an initial set of 50 have been potted into cylindrical holes in an aluminum block, and mounted in the central core of the spacecraft. A circuit board containing voltage sensors for each of the 10 cells will be mounted on top of this battery unit. The flight spares will be cycled after launch to simulate the cells on the spacecraft and to allow experimental measurements to be made. When the battery selection is complete, a report of their findings on Nickel-Cadmium battery selection and testing will be produced; this is likely to be of interest to a wide range of Ni-Cd users.

The Canadian group would like us to stress that they are also closely affiliated to the VITA (Volunteers in Technical Assistance) organization, and that the work which they are doing for UoSAT-B and PACSAT is of great importance to that organization as well as the radio amateur service.

The UoSAT-B harness has been constructed on a 3-dimensional model as flight boards were produced and final wiring details confirmed, and inter-module connections are complete. Connections to the experimental modules on the wings, the top and the central core are complete except for a few which will be installed this weekend.

The 1802 computer is complete. Major problems compressing the inter-board wiring into the module boxes necessitate close inspection and possible re-wiring of some sections. The 4116 memory board flight model took some 36 hours to get working, due to the use of RCA and R.S. Components 4028 decoders in the prototypes (UoSAT-I as well as UoB) and a National Semiconductor version in the flight board. The N.s version decodes invalid BCD digits differently from the RCA version, and bootstrapping a computer without memory is very awkward!

The CCD camera analogue and digital PCB's have been tested separately and the two sections have now been connected together with a suitable display device, specially constructed by G4GPQ. This allows images to be offloaded at a 4 MHz rate from the CCD directly to a video display thereby allowing interactive assessment of the image quality. Preliminary experiments with the flight CCD and lens configuration, but not yet in a light-tight enclosure, have been most successful. Images of the onlooking experimenters have been displayed, as well as various test cards.

The command system prototype testing is complete, comprising the demodulators, command decoder and output latches. Some 112 commands are available to control the rest of the spacecraft. The flight spare telecommand system has been constructed for interface testing of the other modules, and the flight boards are also complete.

Construction of all 4 telemetry system boards is complete. They are now fully functional, and under soak test. The initial two boards contain a basic telemetry system, with the third adding frame headers and the fourth a programmable channel dwell facility. The dwell facility allows total reorganization of any part of the telemetry frame, for use either in specialized situations for rapidly scanning a number of channels or just to confuse the listening audience! A fault on the dwell command UART, persisting when the device was replaced and also demonstrated on the CCD/radiation memory system, nearly resulted in the scrapping of a whole batch of flight 6402s, since the prototype parts were sufficiently tolerant to hide the problem!

Spacecraft operations schedule

The following spacecraft operations schedule is now in use:

- Saturday: 1200 bulletin, telemetry, digtalker, (21 MHz)
- Sunday: 1200 bulletin, telemetry, digtalker, (21 MHz)
- Monday: Whole orbit fast-scan radiation data
- Tuesday: Check-summed telemetry data
- Wednesday: Digtalker and 1200bd telemetry.
- Thursday: Whole orbit telemetry data scan
- Friday: Load bulletin, digtalker & telemetry schedule

The current spacecraft power budget requires the radiation counters and scientific scientific instrument loads to be shed in order to run the 2.4 GHz beacon, currently scheduled every other weekend.

Data transmitted last week

The whole-order radiation data recorded on Monday, 23/01/84 started recording at 16:11:07.

Due to problems generating non-blank CCD images and the lack of time for diagnosis, an 1802 program which cycles between Digtalker and 1200bd telemetry will be run each Wednesday. This is also in response to a number of requests from educators for Digtalker transmissions during school times on weekdays.

The whole-orbit recorded telemetry normally transmitted on 26/1/84 was aborted due to the lack of a computer system. Sorry! The new telemetry channels which will be continued next week are: 02, 09, 22, 29, 30, 32, and 39.

This is in response to observers requesting continuation of the battery voltages and charge currents and the addition of three of the solar array facet temperatures.

Thanks for reports: JA2GSD, G1CHB, 12KBD, ON7VQ, KD1XA, K1KSY & KA1FAD, V2KAVH, G3HMO, ZL1AOX, Milham Ford School, W2RS, F6BVP.

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GAS Can Controller Project Undertaken

AMSAT has agreed to supply the primary controller for a Space Shuttle GAS (Get-Away Special) experiment package. The GAS package is a community sponsored project in the Texas cities of El Paso and Ysleta. It contains 12 experiments mostly in the Biological sciences.

The experiment is the primary GAS package on STS 41-F, currently scheduled for launch August 9, 1984. This mission will be the second flight of Discovery, the third Orbiter in America's shuttle fleet.

The GAS experiment slot was originally obtained by the local Coors Beer distributor in 1977. The experiments are being designed and built by El Paso/Ysleta High School students. Technical advisors have been supplied by the local Gas and Electric companies. Funds and other support have been obtained from community members.

When the original supplier of the controller withdrew, El Paso/Ysleta put out a general call for help. AMSAT accepted the challenge of designing and building the required hardware in the few months remaining. The basic requirements of the controller match the requirements of the PACSAT low power portable ground station controller. An AMSAT team had already been formed to do that design, and the group had begun work on the Digital Communications Experiment, the DCE, which will fly as part of the University of Surrey's UoSAT-B satellite on March 1, 1984.

The GAS controller will monitor and record the temperature in each of the 12 experiment compartments. The temperature will be controlled in some areas by switching a heater on and off. Several experiments require movements of an actuator, controlled by a stepper motor.

Although the GAS experiment does not relate directly to Amateur Radio, AMSAT will gain experience with the Shuttle and the GAS program. This experience will aid the PACSAT project which hopes to deploy from a GAS can in 1986. The controller design will be used for the low power portable PACSAT ground stations required by VITA, co-sponsor of the PACSAT project. Funding for the GAS controller will be supplied by the El Paso/Ysleta group.

The GAS controller will be built by AMSAT's PACSAT project. Lyle Johnson, WA7GXD, is the group leader for the controller project. Much of the work will be done by Bill Reed, WDIETZ, manager of PACSAT ground station design and his group in Dallas. Chuck Green, N6ADI, will be involved in system design. Harold Price, NK6K will coordinate software activities. KA9Q spotted the plea for help on a computer bulletin board service.
ARRL Sponsors Digital Conference

The American Radio Relay League will hold its Third Amateur Radio Computer Networking Conference on April 15, 1984 in Trenton, N.J. The conference will be held in cooperation with the 9th Trenton Computer Festival (TCFB4) being held April 14-15 at Trenton State college.

Technical papers on many aspects of amateur packet radio, AMTOR, computer-based message systems, digital speech, presentation-level graphics and related Amateur Radio digital communications will be presented. They will cover communications via terrestrial, ionospheric, meteor-scatter and satellite media including AMSAT OSCAR 10 and PACSAT.

Topics addressed may include network and system architecture, proposed standards, hardware, software, protocols, modulation and encoding schemes, applications and practical experience. For further information contact Paul Rinaldo, W4RI, Technical Department Manager at ARRL HQ, 203-666-1541 or 225 Main Street, Newington, CT, 06111.

Eastern VHF Conference Slated For New Hampshire

The 10th Annual Eastern VHF/UHF Conference will be held May 4-6, 1984, at the Sheraton Tara, Exit 1, U.S. Route 3, Nashua, New Hampshire. The program features a Friday night hospitality room, technical talks by well-known VHFers, "rap sessions" for the various VHF/UHF bands, noise figure and antenna measurements and other activities. To preregister, send $14.50 to Rick Commo, K1LOG, 3 Pryor Rd, Natick, MA, 01760 before April 29. Registration at the door is $20.00. The Saturday night banquet is $15.00 also payable before April 29.

Room reservations should be made directly with the Sheraton Tara Hotel, Nashua. A block of rooms has been reserved for the conference. Be certain to mention the "Eastern VHF/UHF Conference" to gain access to this reserved block of rooms.

Conference Chairman in Tom Kirby, W1EJ. Inquiries may be addressed to Lewis D. Collins, W1GXT, 10 Marshall Terrace, Wayland, MA, 01778. If you prefer you may telephone at 617-358-2854 before 10:00PM Eastern time, please.

Manual Tracking Systems Popular

The Satellipse Phase III tracker by K2ZRO is selling well according to the inventor, Kaz Deskur. The manual tracking device provides accurate antenna pointing information together with an informative view of coverage areas, LOS, AOS times, etc. Kaz advises that he will provide a specially designed graph for anyone who sends an SASE to him. The graph provides the argument of perigee parameter if you know the latitude of apogee for AO-10. The Project OSCAR calendar provides an enumeration of all AO-10 apogees for 1984. It gives date and time as well as latitude and longitude of the apogee. Given the Project OSCAR calendar and the K2ZRO Satellipse, one has a complete AO-10 tracking package for the entire year. Project OSCAR will be including the K2ZRO graph (latitude to argument of perigee converter) in all future mailings of the Project OSCAR Calendar. The calendar also contains the complete year's reference orbits for RS-5, 6, 7, and 8. The K2ZRO Satellipse is $100 paid North America to ZRO Technical Devices, P.O. Box 11, Endicott, N.Y., 13760. The Project OSCAR Calendar is available for $10 paid (North America) from Project OSCAR, P.O. Box 1136, Los Altos, CA, 94022. Both Project OSCAR and ZRO Technical Devices contribute directly to AMSAT. They deserve your support.

AO-10 Glitch Tests Command Team

An unexpected glitch associated with the sun angle sent a chill through the AO-10 command team last in January. On Monday, 30 January VE1SAT noticed a very strange series of readings in the PSK telemetry. He notified several other team members who then instituted an international contingency management team bridging three continents. Using electronic mail and the message forwarding capability of AO-10, the team was quickly able to ascertain that the problem had to do with the angle of the sun as seen by the sun sensors. There may have been some glint from one of the antennas or perhaps an uncharted internal reflection in the sun sensor. In any case the IHU (Integrated
Housekeeping Unit) was “confused” by the glint and gave a series of anomalous readings leading to the alert by the command team. Most serious of the indications was one which pointed to serious BCR Battery Charge Regulator malfunction. Fortunately this and another bogus indication (the spin rate) were all artifacts of the odd sun sensor output. DJ4ZC quickly determined a fix (lowering sensor trigger threshold) and AO-10 was back in shape. The contingency team stood down and the spacecraft was back in order the next day none the worse for wear. This, the second unexpected glitch, was handled quickly and again demonstrated the tremendous versatility of both the spacecraft and the command structure (executed through the DJ4ZC-developed IPS language.). The prior contingency developed when certain software “fuses” tripped out on 30 Sep 83. (See ASR #64).

Short Bursts

- Southern Ohio has a new area coordinator. Richard Burggraf, W8PGP, is new on the AMSAT team. Welcome! Somehow we missed mentioning that an ol’ veteran has put on an Area Coordinator’s hat, too. Bill “Shep” Shepherd, W4AUZ, of Lexington was appointed Area Coordinator for Kentucky last Autumn. How’d we miss that one, Shep? Sorry, Welcome aboard in any case! (And thanks!)
- Another veteran Area Coordinator and former OSCAR commander, Bud Schultz, W6CCG, spent a few days in the hospital last week. Bud had been suffering fainting spells and a serious lapse required the unplanned stay for observation. Doctors suspect a mild stroke caused by arterial blockage in the neck. Meanwhile Bud had returned home to rest. Problem is the ol’ Dutchman won’t sit still for too long and is fretting about getting the bulletins on AO-10 (see ASR #70, page 2). W6KAG is picking up the slack. Your QSL card to W6CCG will certainly cheer up Bud’s spirits. Mail to Bud Schultz, 3050 Ball Rd #154, Anaheim, CA, 92804.
- Nearly 22,000 QSOs had been logged by the RS-5 and 7 robots by late last year. USA had 9172, USSR 5764, Japan 2479, Federal Republic of Germany 2434, Great Britain 1746, Canada 1298, France 1149, Poland 786, Italy 757, Netherlands 595, Spain 472, Hawaii 152. Others: Africa 180, South America 205. Tks UA3CR, G3IOR, W6GQW.
- The new book, Satellite Experimenter’s Handbook is selling out as quickly as copies become available; looks to be among the years best sellers in the Amateur Radio world. This masterpiece has been getting rave reviews by virtually every aspect of amateur satellites and some aspects of commercial and scientific ones too. The work by former AMSAT Director Martin Davidoff, K2UBC, is available from AMSAT HQ for $10, postpaid in North America. Order yours today while copies last!
- The AMSAT sustaining Life Member program is a winner according to General Manager Bill Lazzaro, N2CF. A $15 donation garners the donor the rank of Sustaining Life Member and is recognized by a distinguished SLM pin.
- The graphics software from GM4HJ has arrived in the U.S. and is being prepared for distribution through the AMSAT Software Exchange. It runs on a Timex Spectrum 2000 and was demonstrated by G3IOR at the Space Symposium last November. Watch for price and availability on this

More DX Showing Up On AO-10

As announced in ASR #69, ASR will occasionally publish a list of country/prefixes which have been active on AO-10. The following is the first occasion. Thanks go to G3IOR, W8DX, WH6AMX, WØTT and WØCY for sharing their “scorecards” with us!

- A7, CE, CE0A, CT, CX (imminent ops by LU1ACH a/o 12 Feb 84 reported by LU4ENQ), DJ/DK/DL, DU, EA, EA8, E1, F, FC, FK8, FM, G, GI, GJ, GM, GW, HB, HB0, HC, HG, HL, HJ, H44, I, JA, JY, K,W,N, KG4, KG6, KL7, KP2, KP4, KV, LA, LU, LX, OE, OH, OK, ON, OY, OZ, PA, PJ2, PY, PM, SM, SP, SV, TI, TR, TU, UA1, 3, 4, U4, U5, UB, UL7, VE, VK, VP, VP8, VP9, V56, VU, V3, WH6, XE, YB, YO, YU, YV, Y2, ZD8, ZK2, ZL, ZS, ZS3, 3A, 3D2, 4U1, 4X, 5N8, 9H1, 9M2, 9Y4.

That makes 89. Additional inputs are welcome.
Satellite: rs-3
Catalog number: 12997
Epoch time: 0401.2881552735
Sat Jan 12 01:57:24.149 1984 UTC
Element set: 87
Inclination: 82.19509 deg
RA of node: 192.28156 deg
Eccentricity: 0.000696
Arg of perigee: 317.21325 deg
Mean anomaly: 42.14726 deg
Mean motion: 12.1503992 rev/day
Decay rate: 4e-08 rev/day^-2
Epoch rev: 7183
Semi major axis: 7987.548 km
Anom period: 118.465695 min
Apogee: 1665.778 km
Perigee: 1572.955 km

Satellite: rs-4
Catalog number: 13000
Epoch time: 0842.208176816
Fri Jan 20 11:39:44.768 1984 UTC
Element set: 170
Inclination: 82.92268 deg
RA of node: 222.8474 deg
Eccentricity: 0.0019384
Arg of perigee: 19.32247 deg
Mean anomaly: 348.84043 deg
Mean motion: 12.08562925 rev/day
Decay rate: 4e-08 rev/day^-2
Epoch rev: 7215
Semi major axis: 8026.662 km
Anom period: 119.336757 min
Apogee: 1655.582 km
Perigee: 1625.870 km

Satellite: rs-5
Catalog number: 12998
Epoch time: 04012.043082322
Thu Dec 27 21:55:54.084 1984 UTC
Element set: 140
Inclination: 82.9565 deg
RA of node: 228.6352 deg
Eccentricity: 0.0015880
Arg of perigee: 65.61332 deg
Mean anomaly: 294.4149 deg
Mean motion: 12.0542038 rev/day
Decay rate: 4e-08 rev/day^-2
Epoch rev: 9101
Semi major axis: 8055.890 km
Anom period: 119.477933 min
Apogee: 1682.576 km
Perigee: 1565.970 km

Satellite: s-or-8
Catalog number: 13002
Epoch time: 08408.06455943
Sun Jan 8 01:35:27.919 1984 UTC
Element set: 71
Inclination: 82.9566 deg
RA of node: 228.1470 deg
Eccentricity: 0.0008949
Arg of perigee: 343.1632 deg
Mean anomaly: 16.7752 deg
Mean motion: 12.04957989 rev/day
Decay rate: 4e-08 rev/day^-2
Epoch rev: 4917
Semi major axis: 7994.238 km
Anom period: 118.657575 min
Apogee: 1668.240 km
Perigee: 1579.480 km

Satellite: s-or-9
Catalog number: 13001
Epoch time: 08407.57979377
Sat Jan 7 12:57:10.468 1984 UTC
Element set: 159
Inclination: 82.9566 deg
RA of node: 228.1470 deg
Eccentricity: 0.00022468
Arg of perigee: 343.1632 deg
Mean anomaly: 16.7752 deg
Mean motion: 12.04957989 rev/day
Decay rate: 4e-08 rev/day^-2
Epoch rev: 9074
Semi major axis: 7917.771 km
Anom period: 119.138865 min
Apogee: 1657.923 km
Perigee: 1621.796 km

Satellite: s-or-10
Catalog number: 12999
Epoch time: 03361.08812312
Tue Dec 27 21:55:54.084 1984 UTC
Element set: 250
Inclination: 82.9566 deg
RA of node: 228.1470 deg
Eccentricity: 0.00015880
Arg of perigee: 144.2347 deg
Mean anomaly: 216.0676 deg
Mean motion: 12.0542038 rev/day
Decay rate: 4e-08 rev/day^-2
Epoch rev: 9073
Semi major axis: 8043.256 km
Anom period: 119.705793 min
Apogee: 1687.774 km
Perigee: 1565.970 km

Satellite: os-or-8
Catalog number: 17073
Epoch time: 08407.57979377
Sat Jan 7 12:57:10.468 1984 UTC
Element set: 826
Inclination: 98.7925 deg
RA of node: 356.94095 deg
Eccentricity: 0.0006957
Arg of perigee: 99.2279 deg
Mean anomaly: 268.9498 deg
Mean motion: 12.04957989 rev/day
Decay rate: 1.7e-07 rev/day^-2
Epoch rev: 10915
Semi major axis: 7228.791 km
Anom period: 103.108185 min
Apogee: 928.224 km
Perigee: 916.974 km

Satellite: os-or-9
Catalog number: 12880
Epoch time: 08402.260021683
Jan 21 20:48:56.481 1984 UTC
Element set: 572
Inclination: 97.5728 deg
RA of node: 356.94095 deg
Eccentricity: 0.00015880
Arg of perigee: 144.2347 deg
Mean anomaly: 216.0676 deg
Mean motion: 12.0542038 rev/day
Decay rate: 1.7e-07 rev/day^-2
Epoch rev: 12701
Semi major axis: 8686.357 km
Anom period: 94.477331 min
Apogee: 511.176 km
Perigee: 510.511 km

Satellite: os-or-10
Catalog number: 14129
Epoch time: 08401.27209481
Sun Jan 15 06:41:21.964 1984 UTC
Element set: 75
Inclination: 25.0148 deg
RA of node: 356.94095 deg
Eccentricity: 0.00022468
Arg of perigee: 144.2347 deg
Mean anomaly: 216.0676 deg
Mean motion: 12.0542038 rev/day
Decay rate: 9.2e-07 rev/day^-2
Epoch rev: 444
Semi major axis: 2618.029 km
Anom period: 697.53697 min
Apogee: 3562.212 km
Perigee: 3829.494 km

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Preliminary UoSAT-B Telemetry Format Compiled by NK6K

2/19/84 — Preliminary UoSAT-B telemetry data format. Currently incomplete. All equations subject to change. Some item names will change, although the actual function of all telemetry items has now been fixed.

Checksummed TLM format. Channel format is:

```
nnvvcc
nn — channel number
vv — value
c — To compute checksum, convert each ASCII character into the binary, e.g. ‘A’, which comes in as 41H becomes 0AH. Exclusive OR all 5 values. Convert the lower four bits of the XOR answer to an ASCII hex digit, e.g. O8H becomes 42H, this character is the checksum.
```

A 1EH cursor home character precedes UoSAT-2 in each frame. The number after UoSAT-2 on the header line is the date in YMMDDWHHMMSS, W is day of week, 0-6. The date below is bogus, it wasn’t initialized after the s/c was powered up. The s/c was in the Bldg 636 clean room when this frame was taken. Some of the data is valid.

```
00151010397982112010102048253458264825510731508335298240
151518111392820031021011134104115016813046141071117718575918756
201532171557726772001240317250007267477273767287368297569
3512271811572242432032207400073523567426008357776436525373953
457634100154268604300743040030456243627726145352992464
5914512101725661651326315141518605856460035738375897595
621015176178265393052654116161465637585546536900000
```

Non-checksummed frame. Everything is the same as above except that the checksum character becomes a space. This format is more pleasing to the human eye.

```
00151010397982112010102048253458264825510731508335298240
151518111392820031021011134104115016813046141071117718575918756
201532171557726772001240317250007267477273767287368297569
3512271811572242432032207400073523567426008357776436525373953
457634100154268604300743040030456243627726145352992464
5914512101725661651326315141518605856460035738375897595
621015176178265393052654116161465637585546536900000
```

A dwell format is also available, in which only selected channels are displayed. The channels can come out in any order, in checksummed or non-checksummed format. The UoSAT-2 and time stamp may or may not be included.
(the status points have been keyed in already at Surrey, I'm not going to key them in again, there are a whacking great lot of them (I'm picking up the lingo), I'll append them when Mac forwards the file from UK.)

Multiplexed Battery Scheme (channel 53)

Six consecutive TLM frames will carry the total volts, the following ten frames will be individual cells, starting with cell #10. Each cell has its own equation.

<table>
<thead>
<tr>
<th>Cell</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
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<tr>
<td>9</td>
<td></td>
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<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(to follow when available)</td>
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<td>6</td>
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<td></td>
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<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The DCE currents will have small counts even when the DCE is off. We think this is due to the + 10 coming in from the Nav Mag lines. If the Nav Mag is off (unluckily), the DCE currents will be zero when both it and the Nav Mag are off. Here are the status points as supplied by Mac back at Surrey, and updated at VAFB. This is preliminary and subject to change. Some items are undefined. These values are encoded in TLM channels 60-67, 12 points per channel, e.g. channel 60 has status bits 1,2,3,4,5,6,7,8,9,10,11,12 in that order. Thus 60400 means status point 2 is set, 1, and 3-12 are reset.

**Grid Square Program**

By W3IWI

The program GRIDX.BAS is intended to provide a simple way for AMSAT members to calculate the "Maidenhead" grid square designators on their home computers. This program allows input in either Longitude/Latitude of Grid Square formats and will calculate the other format.

If a grid square is given to less than 6 character precision on input, the center of the square defined by the characters is assumed. For example, W3IWI at 76.936 degrees west and 39.185 degrees north yields grid square FM19ME. If the grid location FM19 is specified, then the center of FM19, which is at FM19LL is assumed. From my location, this is about 30 km away.

Another feature of this program is that it gives you the range (along the surface of the earth) and azimuth from the first station entered (called 'home') to the target stations.

The GRIDX program was adapted from an earlier W3IWI program called GRID (which was rather machine specific). It was written and tested in North-Star (N*) disk basic (running under CP/M) and runs in N*, SoHo or BAZIC as is. I wrote the program with transportability in mind. The major N* "quirk" that you should have to adapt to other dialects is in the area of string notation. N* explicitly calls out string members. For example, if GS="ABCDEF/GHI", then GS(3,5)="CDE". Microsoft uses the MIDS function to accomplish this and would get the same sub-string with MIDS(GS,3,3). Similarly, GS(1,1) in N* is "A"; to get this in Microsoft, you would use either LEFTGS(GS,1) or MIDS(GS,1,1). Another minor change that is necessary (line 1830) is to change N*'s SQRT to SQR in most other dialects.
AO-10 Simulated Emergency Test Planned

The National Communications System (NCS) has requested the exclusive participation of AMSAT in an OSCAR-10 Simulated Emergency Test. The test is tentatively scheduled for the first week in May. Test traffic will be passed on one evening that week and on either Saturday or Sunday.

Those amateurs who are able to participate are asked to contact AMSAT Headquarters as soon as possible.

AMSAT views this test as an important opportunity to demonstrate to key government officials the viability and merits of amateur radio satellites in terms of providing emergency communications channels when normal means are degraded or destroyed. AMSAT believes a successful demonstration will advance our prospects for an early launch opportunity aboard a U.S. vehicle.

Contact HQ today!

Bulletin Stations Revise Schedule, Freqs

The growing popularity of the W6CG/W6KAG bulletins on AO-10, Mode B has prompted continuation of the trial services provided by the duo. However, several changes
will be manifest as the project enters its second phase.

Bud and Butch have advised ASR of several changes that will go into effect immediately. First, the bulletins will henceforth be transmitted only for orbits where the apogees fall between 120 and 180 degrees West. (Formerly 60 to 180.) The bulletins will be sent from one hour prior to through one hour subsequent to these apogees as before.

Secondly, on Wednesday and Saturday, the Mode B bulletins will follow Mode L so look for the bulletins from 1 hour through 2 hours after apogee on these days.

Third, no Mode B bulletins will be transmitted on Mondays, QRP day. If you value these bulletins, please let us know. Write W6CG, W6KAG or ASR.

**DX Notes**

Of the 89 countries having been on AO-10, ON7HP claims to have worked 82; K5ADQ claims 81. Latest claimant is W2RLV who sent in his list of 58. Not bad! How about you?

A rare Siberian station, R8K, operating at 71N, 189W is being heard on the RS birds. This station is very far east in Asia and could become an Asian for WAC-Satellite for stations in the Eastern U.S. and Canada. Watch for him on RS-5, 6 at 29420 and RS-7, 8 on 29470. “Vlad” says to QSL him thru UA0KCL. He’s also likely on AO-10. Tks K05I, G3IOR.

LUIAHC/CX has been heard and worked by several on AO-10.

### Satellite: ussat-b

**Epoch time:** 1984-03-19 09:30 UTC

**Element set:** prelaunch

**Inclination:** 98.2596 deg

**RA of node:** 124.2426 deg

**Eccentricity:** 0.0084180

**Arg of perilune:** 174.4207 deg

**Mean anomaly:** 226.7664 deg

**Mean motion:** 14.61025794 rev/day

**Decay rate:** 0 rev/day

**Epoch rev:** 0

**Semi major axis:** 7065.000 km

**Anom period:** 98.550869 min

**Apogee:** 690.030 km

**Perigee:** 684.236 km

### Satellite: oscar-10

**Epoch time:** 1984-02-12 10:28:39.971 UTC

**Element set:** 81

**Inclination:** 25.6986 deg

**RA of node:** 215.8353 deg

**Eccentricity:** 0.6009222

**Arg of perilune:** 245.0825 deg

**Mean anomaly:** 41.5600 deg

**Mean motion:** 2.05350406 rev/day

**Decay rate:** -9.3e-07 rev/day

**Epoch rev:** 502

**Semi major axis:** 26105.753 km

**Anom period:** 699.324750 min

**Apogee:** 35527.288 km

**Perigee:** 7834.543 km

**Receding:** 145.8100 mph
UO-11: Early Glitch Thought Not Serious

A problem with a cold 2 meter oscillator has put a temporary chill on the exuberance of a perfect launch of UoSAT-B into orbit March 1. University of Surrey scientist Martin Sweeting, G3YJO, said in a progress report, however, that several lines of approach are available to UoSAT program officials. A note of optimism was sounded when evidence supporting the theorized nature of the glitch surfaced.

The launch from Vandenberg Air Force Base on the California coast was letter perfect. At precisely 17:59 UTC, Thursday, March 1, the sleek Delta 3920 rocket lifted into the azure California sky trailing a plume of white, wispy exhaust trail. Aboard were the primary payload, Landsat D* (D-prime) and the secondary payload, UoSAT B.

UoSAT separated from the launcher while over Turkey at 19:11 UTC, 72 minutes into the mission. According to Program Manager G3YJO, the satellite was then in view of the command station at the University of Surrey, Guildford, England. “A lengthy series of instructions was transmitted to the spacecraft to establish the initial operating conditions,” reported G3YJO. The beacon was then switched on for 10 seconds to check the housekeeping telemetry. The first sequence was kept short so as to reduce the potential of corona discharge if outgassing were incomplete at that stage.

The beacon was commanded on during orbit #2 and later on #3 as well. A shock came to the Surrey team which was just starting to relax when WA3ZIA in Ottawa and KA9Q in New Jersey reported that nothing was being heard on the 2 meter beacon when it should have been on. “The UoS Command Team were ‘revived’ and awaited the first pass of the day, #8”, reported G3YJO. Later they found that the premature shut-down of the 2 meter beacon was due to software. Says Martin, “The timing clock selected had been running at 8 times that required.” After some analysis it was determined that the last observed telemetry was received by VK5AGR at about 23:00 UTC, 1 March. VK5AGR reported all was well with the telemetry at LOS. Piecing together the observations, the data seemed to support the clock selection theory as the culprit.

But now a new and potentially more serious malfunction manifested.

Despite numerous attempts, Surrey was unable to command the 2 meter beacon on again. Fears of catastrophic failure gave way to reasoning out a failure mechanism. According to G3YJO, a malfunction with the 2 meter beacon occurred during thermal vacuum testing. Then, the beacon was found to represent too large a load for the current limiter on the power distribution system. The fix implemented at that time was to increase the current “foldback” threshold so the oscillator would “cold-start”. The present theory holds that the cold-start problem has recurred.

This hypothesis is at least partially testable. Martin theorized that “If the 145 MHz beacon is on but not operating correctly, it should be possible to observe it with high gain antennas and spectrum analyzers.” Moreover, if the 2 meter beacon is producing “hash”, a noise-like spectrum of broadband, low spectral intensity, that could explain the inability to effect commands, the hash would be deafening both on the 2 meter and 70 cm command receivers.

Fortunately, there is an additional command receiver on UO-11 that distinguishes it from UO-9 which had one each on 2 meters and 70 cm. UO-11 has a 24 cm command receiver that, it is hoped, will be largely unaffected by the 2 meter beacon generated hash, if that be the case in fact.

Early substantiation of the “hash” theory came when a number of stations reported sightings of an extremely weak signal, with Doppler shift, on 145.825 MHz at the times and locations where UO-11 was expected. W4DAQ in Demopolis, Alabama called ASR on 3 March with an observation report. Later VK5AGR relayed the report of an observation made by VK1DF. The latter, using a 26-meter dish at the Orrolla Valley Tracking Station near Canberra, reported several observations made on 4 and 5 March. The levels were feeble indeed varying from -120 dBm to -135 dBm. Significantly, Darryl, VK1DF, reported that the signals were raspy; exactly what one would expect from a current-starved oscillator.

Other reports continued to filter in from around the world. These were checked against expected AOS-LOS times in hopes of verifying the observation report. N66K issued an appeal for reports of reception of the feeble UO-11 2 meter beacon “hash” as he put it, since it might be one of the all-time great “T-Hunts!” (UoSAT and hounds!)

Meanwhile, attempts to command using the 1.2 GHz
uplink have commenced. A command encoder was airlifted from London to Los Angeles where Chip Angle, N6CA, with the help of Harold Price, N6K6, will attempt to shut off the 2 meter oscillator. These attempts were continuing at press time.

Should the command on 24 cm prove unsuccessful, however, another feature of UO-11 is incorporated which distinguishes it from UO-9 and which, we are assured, precludes recurrence of the frustrating dilemma which temporarily debilitated UO-9. UO-9 wound up with 2 meter and 70 cm beacons simultaneously on and no practical way to overcome the strong local signal which served to QRM both the 2 meter and 70 cm command receivers. It took the thoroughly impractical multi-megawatt blast from a 150 foot (43 meter) radio telescope dish at SRI International in California to break the deadly loop on 20 Sept. 82 (See ASR #42, 22 Sept. 82). UO-11 has two safeguards to insure non-replication. First is the 24 cm command receiver which was mentioned above. Second, and significantly, it has a so-called “watchdog timer” which is programmed to turn off the beacons if no commands are heard for 20 days. This feature automatically breaks the loop in which UO-11 now exists. All are hoping this therapy will work if the command efforts by N6CA should fail to do the trick.

At press time most AMSAT officials were optimistic that UO-11 will be restored to its mission plan after this detour. On a distinct upbeat note, AMSAT officials were hailing the attainment of a successful launch with UO-11 as one of the great achievements in all of amateur radio history. They point out that beating the schedule seemed impossible to many when G3YJO and a team of AMSAT PACSAT individuals set out to build a spacecraft only last autumn. Many thought it impossible if a completed spacecraft were to enter Testing at that point. Nevertheless, the spacecraft was built, tested qualified and launched in record time. This, we are told by AMSAT, is the major story of UoSAT B: it made it to the pad on time, working and ready in all respects. And that will be what is remembered of UO-11 long after the recollections of the present glitch have faded.

Dayton Hamvention Preparations
In High Gear

The largest convention of its kind is rapidly approaching. Wray Dudley, W8GQW, reminds everyone that the weekend of 27, 28 and 29 April should be circled on your calendar. It is then that the mammoth event which is the Dayton Hamvention will be on-line.

The Hamvention is always an important event in AMSAT’s calendar too! AMSAT will be there with the largest contingent of any event throughout the year. The AMSAT booth is always busy and well-staffed with experts and friends to answer your questions; exchange views. And of course it’s time to renew old friendships and make new ones as well.

AMSAT forums have been arranged for each of the three days. AMSAT officials will give presentations on a variety of subjects of great interest to all members and to participate in discussion periods. A special guest will be Z56AKV, Hans, President of AMSAT SA. Hans is preparing talks on the balloon experiments performed by AMSAT SA and also on satellite operation for the beginner.

W8GQW lives in Troy, Ohio, not far from Dayton. Wray, along with K8OCL and WB8LE plays a key role in preparing for AMSAT’s participation in this fantastic event, the Dayton Hamvention. Plan now to be among the hundreds of AMSAT members on hand. It won’t be the same without YOU!

Short Bursts

- New Area Coordinator (Southern Ohio) Richard Burgraf, W8PBG is off and running. Dick gave a talk to the Instrument Society of America on 21 February. His talk was entitled “Design, Construction, Testing and Evaluation of Radio Amateur Communications Satellites.”
- A series of 5 video tapes made at the Space Symposium/Annual Meeting will soon be available through the AMSAT Videotape Library. The tapes include all the major speakers and topics covered including AO-10, locator systems, packet Radio, antennas and more. The tapes were recorded by W3TMZ, W3XO and the staff of the Applied Physics Laboratory where the meetings were held last November. AK3E volunteered to edit the tapes and he has done a fine job indeed according to W3TMZ. ASR will announce tape availability and procedures for borrowing the tapes from the library which is managed by W8OQAI, Roger, in Greeley, Colorado.
- W8DX reports a two-way SSTD QSO on AO-10 with F1BL. Other SSTD activity has been observed as well.
- KA6M reports a significant advance in packet communications. On 11 March, on orb 560 the first teleport-type operations took place on AO-10. Here several stations communicated over AO-10 using packet radio techniques.
- WA6OJS/6 in Monterey, CA hooked up with W3IW1 near Washington D.C. using KA6M as a teleport (terrestrial-space relay) station. WA6OJS was not aware that he was being trunked through AO-10. The transmissions were error free over the satellite link according to KA6M. KA6M maintains a system of packet repeaters in Northern California. KA6M says “This is probably the first all digital interlink experiment performed on the AMICON channel.” AMICON is the AMSAT International Computer Network and it resides on AO-10 SSB L1, 145.830 MHz. Participating in the experiment on 11 March were W3IW1, NK6K, AI8A/6, WA6OJS/6 and KA6M.

New Area Coordinators Announced

Chief Area Coordinator W3BCY announces the appointment of the following new area coordinators:
New York City (and environs)
Roger Soderman, KW2U

New Mexico
J.D. Miller, WA5WHN

Oregon
David Barnard, W7LSV

AMSAT congratulates these newest team members. Welcome aboard! Additional Area Coordinators are sought. Contact W8BCY, 1404 S. 10th St., Salina, KS 67401 or call (913) 827-2927.
Patches to Programs Offered

NSSAHD and N3AR have provided ASR with some minor fixes for two popular versions of the W31WI orbital prediction program. We print them below.

From NSSAHD for the IBM-PC version, Bob says to make the following change:
Modify line 900 to read: 900 IF MONTH > 2 THEN D8 = D8 + F9

From N3AR for the VIC-20 and Commodore 64 (AMS-2064), Ron says to make the following changes to allow the program to properly process negative drag factors:
Add lines:
2625 SP$=""":IFA(J)<0:THENSP$="""
2915 SP$=""":IFA(J-8)<0:THENSP$="""
Change lines 2630 and 2920 to read as follows:
2630 RW = J + 5: CL = 0: GOSUB 5800: PRINTES(I); ""
2920 RW = J - 4: CL = 0: GOSUB 5800: PRINTES(I); ""

The fix in the last two lines added SP$

Also, Ron advises that a value in line 6560 should be corrected as follows: change .27960663 to .27460663.

New UoSAT Systems Overview

Mechanical Framework

The spacecraft is constructed in a similar way to OSCAR 9. It has a square-section central core supporting rigid top and bottom plates. Solar cells are mounted on all four sides of these plates, enclosing a basic cuboid of dimension 35.5 X 35.5 X 58.5 cm. Two stacks, each of two module boxes of dimension 23.5 X 17.6 X 3.1 cm, are mounted on the outside of each face of the central core. A 'wing' extends the base of the spacecraft symmetrically by 16 cm on each side in one axis to permit the mounting of two SHF helical antennas, one on each side of the launcher attach fitting which is itself mounted in the center of the bottom plate. The Navigation Magnetometer and Space Dust experiments are mounted above this wing, one on each side.

Solar Cells

Four solar arrays of dimension 49.5 X 29.5 cm are attached to the four sides of the spacecraft. These are capable of supplying up to about 0.9A at 28V when fully illuminated. The cells were manufactured by Solarex.

Battery

A solid octagonal block of aluminum, 14.9 X 14.9 X 10.2 cm, is fitted into the center core of the spacecraft and is drilled to accept ten 'F'-sized Nickel-Cadmium cells, each 3.2 cm in diameter and 9 cm long. These cells, in series, form a 12V battery of 6.4Ah nominal capacity and are charged when the spacecraft is in sunlight in order to provide sufficient power to run the craft during peak load demands and its eclipse periods.

Battery Charge Regulator

Two redundant BCRs are responsible for accepting the 28V supplies from the solar cells (and a similar supply from the umbilical connector) and charging the battery as required depending on the current drain, the battery voltage and the battery temperature.

Power Conditioning Module

The PCM regulates the 12-14V battery bus supply to provide 10V, 5V and -10V supplies for powering the spacecraft systems and experiments.

Power Distribution Module (PDM)

The PDM switches the various regulated and unregulated rails to all the s/c systems and experiments, dependent on the commands which it receives from the Telecommand system. Each switch has an individual current foldback facility so that a faulty module is allowed to draw up to a predetermined current before it is latched off, necessitating a power-down under positive command before resetting.

Telecommand System

The telecommand system comprises three uplink receivers, three data demodulators, a command detector and sets of command latches which hold the status of the command specified. The receivers are located in the 144 MHz, 438 MHz and 1268 MHz amateur bands and the demodulators are robust devices which do not depend on phase-locked loops or other potentially unstable techniques. A command detector scans the three receivers according to a priority system and detects a valid set of command instructions, passing the data contained therein to the relevant latch. Some latches drive a set of multiplexer address inputs directly so that uplink and downlink path selection may be performed immediately on the command latch board.

The 112 command latches drive the Power Distribution System, the remaining spacecraft systems and experiment functions. There is a parallel I/O port to the spacecraft 1802 computer for autonomous control of spacecraft operations in addition to serial data links with the 1802 computer and the DCE for backup operations.

145.825 MHz Beacon

The 145 MHz beacon on UoSAT-8 is nearly identical to the one flown most successfully on UoSAT-1. The modulation index has been increased in order to ensure better reception on most radio amateur receivers. Modulation is by frequency shift keying, as on UoSAT-1.

435.025 MHz Beacon

This beacon is a completely new design which generates its frequency standard from a phase-locked synthesizer system. As a result, the dc to rf efficiency is much improved. In addition to frequency shift modulation, phase shift modulation is a switchable option.

2401.5 MHz Beacon

When the original supplier of the 2.4 GHz beacon was unable to meet his commitment, Colin Smithers, G4CWH,
at the University of Surrey stepped in and designed and built the transmitter and power supply in less than four weeks. The dc to rf efficiency has been improved by some 5 times over UoSAT-1 implementation. Both AFSK and PSK modulation methods are possible.

Telemetry System

The basic output of the UoSAT-B telemetry system is very similar to that of UoSAT-1. However, 60 analogue channels, digitized to 3 decimal digits and 96 status points encoded into hexadecimal digits are available together with a real-time clock for frame identification and the satellite identifier, ‘UoSAT-2’. A checksum digit can also be added to each channel. A dwell facility has been added so that up to 128 channels can be output in rotation, combined with clock times and line feeds or frame ends in any combination.

1802 Computer & DigitaLink

The 1802 computer has been designed to support all the modules on the spacecraft, as well as to control the overall scheduling and be usable for specific communications experiments. To satisfy these requirements, the computer has access to many modules via parallel interfaces. It accesses some of the other modules as well as the receivers and transmitters via serial connections. In addition, there is a real-time clock and a total of 48kb of RAM for data storage.

The DigitaLink speech synthesizer is housed with the 1802 and has ROMs containing over 550 words. These will be used initially for ‘speaking’ telemetry.

Navigation Magnetometer

The Navigation Magnetometer is a three-axis flux gate device, much upgraded from the one flown on UoSAT-1. Indeed, the 14-bit resolution is very similar to that obtained from the much more complicated scientific magnetometer on the previous craft. The Nav. Mag. will be used for determining the attitude of the spacecraft during initial maneuvers, as well as for experimental measurement of magnetic field disturbances once the attitude is stable.

DSR Experiment

The DSR stores data from the CCD imager, particle counter experiment or computer UART and outputs it in a checksummed format. The unit has 2 banks of 96k X 8 CMOS memory which can be used as two separate banks or as one 192kb bank. The output frame consists of a three byte sync code, a two byte frame address, 128 bytes of data and 5 bytes of error detection/correction code. The data is sent in serial form with start bit, 8 data bits and selectable 1 or 3 stop bits. The data can be output at 1200, 2400, 4800 and 9600 bps.

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AMSAT At Dayton Hamvention:

Vintage '84

Taking full advantage of the showcase offered by the largest amateur radio assemblage in the world, AMSAT plans a full agenda of seminars at this year's Dayton Hamvention, April 27, 28 and 29. Visitors to the show will be treated to a diverse program of satellite-related topics by an equally diverse group of AMSAT experts.

As we went to press these were the exciting events on tap for the weekend.

Early attendees will catch the Friday forum featuring AMSAT General Manager Bill Lazzaro, N2CF. Bill will explain AMSAT, Its Purpose and Operation. He will be followed by Executive Vice President Vern "Rip" Ripportella, WA2LQQ who will present a review of today's satellites and a preview of tomorrow's. Bill Tyan, W3XO, who represented AMSAT in the W5LFL Ham-In-Space Project, will review that activity and forecast future similar events which may be just around the corner. Net Manager Wray Dudley, W8GQW, will moderate the Friday forum and also explain the nature and purpose of AMSAT's on-the-air network and information program.

Those who can resist the legendary Dayton fleamarket Saturday will be treated to yet a second panel of experts on a panel moderated by Senior Vice President John Champana, K8OCL. Panelists will include President Tom Clark, W3IWI; Vice President (Engineering) Jan King, W3GEY; Assistant Vice President (Engineering) Harold Price, NK6K and special guest speaker Hans Groenendaal, ZS6AKV who was recently elected President of AMSAT South Africa.

Topics will include OSCAR 10 design, operation and beginner station equipment; packet radio and satellites and the AMSAT-Stoner Challenge Cup AO-10 competition.

On Sunday, the Hamvention wrapup day, Orbit Magazine Editor Harold Winard, KB2M, will moderate a panel which will discuss AMSAT in the future. Panelists will include W3IWI, K8OCL, W3GEY and WA2LQQ. Also discussed will be advanced projects including Solar Sail of the World Space Foundation, Amateur Space Telescope of the Independent Space Research Group and others.

In addition to the exciting forums and panels, AMSAT will have a busy booth stocked with the goodies long-associated with this event. The "Future Now" T-Shirts will reprise, belt buckles, AMSAT Software Exchange products will be available. Featured too will be the new ARRL/Davidoff Satellite Experimenter's Handbook. AMSAT's T-shirt cover girl, Amy is expected to make a cameo appearance over the weekend. Don't miss the chance to have your own AMSAT T-Shirt initialed by this famous young fawn.

AMSAT-Stoner Challenge Begins

The first-ever OSCAR 10 satellite competition got under way April 15 under the auspices of the OSCAR 10 satellite. The competition was sponsored by the Northern California DX Foundation. The announcement was made by President Bridget Stoakley, K0SI.

At press time hundreds of contacts had been racked up by competitors in the 90-day event. Stations worldwide are participating and enthusiasm is reported high.

Meanwhile, Don Stoner, W6TNS, has contacted AMSAT and suggested an interest in participating in the awards ceremony next autumn. It was Stoner who in April 1959 set in motion a chain of events which led first to OSCAR 1 and ultimately to OSCAR 10. (See Orbit #17 and QST for April 1984, page 57, for stories by K0SI on how it all began.)

In a related development, N4DJD has suggested to AMSAT that a small committee of observers be established to oversee the competition. Bill's suggestion involves citing those who best exemplify the gentlemen's approach to satellite competition. Awarded here, Bill says, would not be those with the highest grid square total but rather the most courteous observed by committee members. AMSAT was known to be studying the concept at press time and an announcement may be made at the Dayton Hamvention regarding a "courtesy" type award.

Complete rules for the AMSAT-Stoner 25th Anniversary Challenge Cup are found in ASR #71 with clarification of minor points in #73.

UO-11 Silence Persists;
Salvation Prospects Sag

The so-called watchdog timer which formed the central hope for a prompt extrication from a post-launch glitch has turned out to be a toothless mutt. After the 2-meter beacon
went silent within hours of launch it was thought an instability in the power regulator to the 2-meter beacon had caused the beacon to generate noise. The noise, ASR was told, was blocking further commanding of the bird. However, hope focused on the watchdog timer which would eventually turn off the beacon. “Eventually” was thought to be “21 days more or less.”

The 21 days expired a month ago and the silence from UO-11 persists. Unofficial sources have speculated aloud that the watchdog timer may not have been implemented in the flurry of commands sent from Surrey after the beacon fell silent. Further confusion derives from not knowing which commands were actually loaded in UO-11 after the emergency developed and which were ignored because of transmission errors on the command uplink.

Adding to the difficulty surrounding the recovery efforts is a growing uncertainty regarding the actual orbit of UO-11. Surrey sources openly doubt the object called by NASA 14781 (84-21B) is REALLY UO-11. It would not be the first time errors of this type have occurred. Indeed OSCAR 8 was mistaken for sometime before Doppler measurements showed NASA had actually characterized AO-8 as launch debris and vice versa.

Arrangements have been made with SRI International in Menlo Park, California to attempt to localize UO-11 and later to command it. The SRI team under Dr. Robert Leonard, KD6DG, rescued UO-9 when a command glitch rendered it deaf for months in 1982 (see ASR 42, 43). Bob has agreed to arrange for a large L-band station to look for UO-11 on an “As-available” basis.

KD6DG is Director of the Radio Physics Laboratory at SRI International. He tells ASR that in accord with suggestions by UoSAT Program Manager Martin Sweeting, G3YJO, initial efforts will center on locating UO-11 from other hardware in the vicinity, the team will first track UO-9. Since UO-9 and UO-11 are physically quite similar, obtaining the radar cross-section of -9 will improve the discrimination ability when looking for -11. This radar location effort will be interspersed with attempts to hear the local oscillator (LO) of the 1.3 GHz command uplink aboard UO-11. Positive identification of the LO will confirm the bird is not “brain dead” as well as help localize it.

The third effort will be to command the bird to turn the 2-meter beacon on. Once this is done, Surrey can begin anew.

Amidst this recovery activity, however, is the growing reality that UO-11 is in a grave situation if it lives at all. Fears that the batteries may have frozen are sobering reminders of the cost of “minor” flaws occurring in space. In fact, there are few, if any, inconsequential failures in space.

After nearly two months in space, UoSAT OSCAR 11 hovers in the balance. Controllers on the ground know neither where it is with certainty nor the precise nature of the malady which may have cut short its mission at the outset. All the while an immutable clock beats out its indefatigable rhythm. Presently powerless, would-be UO-11 users and controllers alike wonder at its fate and contemplate the starkly unforgiving nature of the space business.

New DX Swells Active Countries On AO-10

Recent reports indicate that more than 90 countries have been on AO-10 since launch. Reporting on claimed countries worked, G3IOR cites the claim of ON7HP (91), K5ADQ (90) and G3IOR (89). Moreover, more than a dozen new countries have appeared this year alone. G3IOR forwards the following:

VS6XLA (Jon) and VS6HH (Robin) both are on ssb. UMBMAW (Url) on 145.910 ssb. Ron, YJ8RC, was on 145.930 ssb. HB0POMMP, Fred, was on from Vaduz. FK8CR (Ed) was on, QSL via F6EKW. Graham, VK9ZW, has worked a number of stations.

Gordy, VE5XU, reports working JA1YPMJ/D1 in late March from Ogasawara Island.

Ed, N2EK, reports T29ZSS (Rick) is on AO-10.

Nick, W8CA, adds GU6E6FB to our growing countries list. The Guernsey Island station was on last autumn according to Nick.

Ted, W4FI, adds LZ, VP5, FK1 and Y24QO to the tally. Of course the really BIG CATCH was BY1PK who appeared briefly on AO-10 in between stints on 15 meters. According to Chip Margelli, K7LA, who along with XYL Janet, operated the event, the visitors were given a choice of working 15 meters or OSCAR by the Chinese authorities. They opted for 15 meters except for a short interval which yielded a QSO or two on AO-10. KG6DX was one of the lucky ones to share BY1PK via AO-10, ASR is told. Nice catch, Joel!

Additional DX inputs are welcome!

RS Contest Winners Announced

The Radio Sport Federation has announced the winners in several categories of the contest held last October. The winners are:

Europe: 1. OK3AU; 2. SP9DH; 3. DJ8T
North America: 1. VE5XU; 2. WASZIB; 3. W3TSA
Soviet Union: 1. UA3CR; 2. UU6MA; 3. UA4NM
Club: 1. UK3OBW; 2. UK9SAD; 3. UK2CAU
(Sri, no info on Asia, Pacific or Africa.)

A short contest will be held on the RS birds from 1300 to 1530 UTC on 23 June. The usual rules apply. Thanks G3IOR.

New Area Coordinators

AMSAT’s Chief Area Coordinator Jim McMik, W0CY, announces the selection of three new area coordinators in North America. They are:

R. Dean Morrison, W0TT, 8407 W. Highridge Road, Parkville, MO 64152; Richard Ruhl, W5GGLD, P.O. Box 539, Kingfisher, OK 73750; Gerald W. Moore, W8BLAJ, 114 St. Francis Avenue, Tiffin, OH 44883 (419-447-6719).

ASR and AMSAT congratulate these new Area Coordinators. Thanks for joining up and hope that this Spring and Summer hamfest season keeps you busy!
Short Bursts

• The Dayton Amateur Radio Association (DARA) has selected Lyle Johnson, W47GXD, for its first technical Achievement Award. Lyle is President of TAPR, the Tucson Area Packet Radio group. He was cited for his leadership in bringing to fruition the now-famous TAPR Terminal Node Controller (TNC) board which is fast becoming de facto standard of amateur packet radio. Lyle attended the Trenton Computer Faire April 14 and 15 in New Jersey along with other TAPR packeteers. (See related story below.) DARA also selected Dave Bell, W6AQ, as Amateur of the Year. For special achievement, Ethel Smith, K4LMB, was selected in connection with her work with the YLRL. Dave Bell is among Hollywood’s best known documentary producers and has been involved in the amateur radio documentaries for years.

• The Trenton Computer Faire brought thousands of computer enthusiasts together in the New Jersey capital recently. Within these thousands were hundreds of radio amateurs. ARRL was a co-sponsor of the affair. Paul Rinaldo, W4RI, ARRL Technical Department Manager, hosted a packet radio conference on the evening of April 14. Recommendations from the meeting will be forwarded to the FCC. On Sunday several prominent packeteers presented papers to the amateurs attending. Representatives of packet groups from across North America were present.

• “SSTV Today” is the name of a monthly published in Michigan. Managing Editor Ron Flynn, KB8LU, is a strong AMSAT supporter as is Gale Sells, W7AMQ, who describes SSTV experiments over AO-10 in the April, 1984 edition. Subscriptions and back issues as well as information may be obtained from: SSTV Today, P.O. Box 39, Bangor, MI 49013. Thanks KB8CL!

• W9KDR at ARRL HQ advises that the W5LFL QSL (2-way) and all other QSL cards for one-way have been mailed. Yours should be along soon if not already in your hands.

UoSAT Story Acknowledged

ASR Editors gratefully acknowledge the help of Roger Peel, G8NEF, in preparing the story on “New UoSAT Systems Overview” which appeared in ASR 74, pages 3 and 4. Roger’s byline should have appeared on the last line of the article as indeed it did on the manuscript. It was inadvertently omitted in the production process. We regret the omission and thank both Roger and University of Surrey for their continued documentary support. Likewise we extend our thanks to AMSAT UK for its superb communications vehicle, OSCAR News, Edited by Ron Broadbent, G3AAJ, Secretary AMSAT UK.

UoSAT Overview (Continued from the previous issue)

Magnetorquers & Boom Assembly

Magnetorquers — coils of wire energized to act as electromagnets — are built into all 6 faces of the spacecraft, wound around the edges of the honeycomb panels supporting the solar cells and the top and bottom plates. The fields created interact with the earth’s magnetic field to produce a torque which tends to rotate the spacecraft.

When the spacecraft has been positioned so that the CCD camera end is pointing towards the earth (a long and complex process) a boom can be extended from the top of the craft. The boom appears similar to a steel tape measure, although it becomes nearly tubular once it has been unrolled. It is about 12 meters long. The boom carries a 2.5kg mass on the far end and this, in conjunction with the spacecraft body at the other end, creates a ‘dumb-bell’ configuration which naturally lines up with the earth’s gravitational field so that one end points downwards, rather like a pendulum. It is, however, bi-stable! Any residual swinging motion can be damped with further controlled applications of the magnetorquers.

Sun Sensors

The sun sensors are made with specially fabricated solar cell substrates which are masked by grey-code stripes and illuminated by light passing through a slit in a metal foil in front. The mask coding on the cells can be used to derive the angle at which the incident light is falling on the slit. Six such sensors are mounted around the top plate to provide complete 360 degree coverage.

Horizon Sensors

Built by a first year student at the University of Surrey, the Horizon Sensor is able to detect when only one of two photodetectors is illuminated. The detectors are housed in two narrow tubes of 4mm diameter and mounted at a small angle to each other so that the whole sensor thus detects the ‘edge’ of an illuminated object. This will be the earth, the moon or the sun. A fix can then be made on the object’s position.

Digital Communication Experiment

The Digital Communications Experiment (DCE) was

Future Events Of Note

The West Coast VHF-UHF Conference will be held at the Paso Robles Inn, Paso Robles California May 4, 5 and 6. Contact Mike Goshay, K6HXW at P.O. Box 493, Arroyo Grande, CA 93420 for information. Register directly with the Paso Robles Inn. Call 805-238-2660. According to W6HDO, AMSAT Chairman W6SP, Project OSCAR President W6XN and Area Coordinator W6CG will be on hand in addition to the usual VHF/UHF notables including WB6NMT and K6MYC.

The Second Annual Conference on Private Sector Space Research and Exploration will be held on Sunday, May 27, at the Hayden Planetarium in New York City. The first session starts at 9:00 AM. AMSAT’s Roger Soderman, KW2U, New York vicinity Area Coordinator will be on hand. Info is available from Ron Molz, I.S.P.C. Conference, 394 King Street, Chappaqua, NY 10514. You may call him at 914-238-5253 (home) or 516-531-2170 (work). The conference is sponsored by the Independent Space Research Group, ISRG. The ISRG proposes to build, launch and operate the Amateur Space Telescope (AST).
designed and built by AMSAT and VITA groups in the USA and Canada. It has two serial ports which can receive and transmit to the RF system and the 1802, as well as an NSC-800 CPU and nearly 128kb of CMOS RAM. The DCE will be used to investigate various packet radio protocols for use with a future digital 'store-and-forward' satellite being planned by AMSAT. In addition, the DCE has interfaces with the navigation magnetometer and the telemetry system for long-term data storage.

**Space Dust Experiment**

The Space Dust experiment was built by a group of students at the University of Kent, England. It has a dielectric diaphragm which, when punctured by a large particle, discharges the capacitance associated with it, thereby indicating the impact. In conjunction with a piezo crystal microphone which detects particles of smaller size, correlation techniques can yield a measurement of the momentum of the incident particle.

**CCD Camera**

The CCD camera is a re-designed version of the device flown on UoSAT-1. Indeed, the CCD array at the center of the camera is the same type as used before, although the later batches of this part are substantially improved over the early one used 2 years ago. This time the analogue electronics surrounding the array are also greatly improved. The active area of 384 pixels by 256 pixels is stored with seven bits of grey-level, in 96kB of RAM in the DSR experiment. The DSR is then responsible for the picture downlink, adding addressing and error correction and detection information as required. The DSR downlink is organized in packets of 128 bytes each, three across each imager line, so that two may be selected for display (using an extra digital filter) on existing UoSAT-1 CCD displays. The variable video amp gain and integration period of the CCD imager have been set up to provide the latitude required to photograph both land images and also auroral features, the latter being of interest in conjunction with the particle detector experiments.

**Particle Detectors and Wave Correlator Experiment**

Three Geiger counters, each with different electron energy thresholds, similar to those flown on UoSAT-1, and a multi-channel electron spectrometer are mounted on the spacecraft to serve as a near-earth reference for magnetospheric studies to be carried out concurrently with the AMPTE & VIKING spacecraft missions due for launch later in 1984, and for ground-based studies of the ionospheric D, E and F regions being pursued with riometers and EISCAT. Data will be available in either real-time or, for more detailed analysis, from stored measurements over both polar auroral regions to professional scientists and radio amateurs. A data-base of the measurements acquired over the life of the spacecraft will be established at Surrey in conjunction with the SERC and will be available to approved experimenters.

The modulations imparted on particles, as a result of wave-particle interactions in the magnetosphere on auroral field lines, will be observed by a Particle Correlator Experiment designed around an NSC-800 microprocessor at the University of Sussex, England. The measurements will identify wave-modes responsible for accelerating electrons into the auroral beam and will also identify wave-modes which limit the further growth of the auroral beam.

**Satellite: oscar-9**
- Catalog number: 12988
- Epoch time: 84099.40458635
- Sun Apr 8 09:42:35.260 1984 UTC
- Element set: 613
- Inclination: 97.5844 deg
- RA of node: 72.9486 deg
- Eccentricity: 0.0003141
- Arg of perigee: 30.1444 deg
- Mean anomaly: 329.9951 deg
- Mean motion: 15.25203584 rev/day
- Decay rate: 9.5734e-05 rev/day²
- Epoch rev: 13890
- Semi major axis: 6885.197 km
- Ano period: 94.411967 min
- Apogee: 494.507 km
- Perigee: 490.195 km
- Beacon: 145.8259 MHz

**Satellite: oscar-10**
- Catalog number: 14129
- Epoch time: 84097.34280771
- Fri Apr 6 08:13:38.586 1984 UTC
- Element set: 97
- Inclination: 25.7059 deg
- RA of node: 266.1228 deg
- Eccentricity: 0.692647
- Arg of perigee: 266.5026 deg
- Mean anomaly: 36.1701 deg
- Mean motion: 2.05857411 rev/day
- Decay rate: -1.424e-06 rev/day²
- Epoch rev: 613
- Semi major axis: 21605.470 km
- Ano period: 699.513315 min
- Apogee: 35516.380 km
- Perigee: 3826.098 km
- Beacon: 145.8100 MHz

**Satellite: oscar-11**
- Catalog number: 14781
- Epoch time: 84096.35772883
- Thu Apr 5 08:35:07.770 1984 UTC
- Element set: 19
- Inclination: 98.2505 deg
- RA of node: 138.7507 deg
- Eccentricity: 0.0013579
- Arg of perigee: 149.7713 deg
- Mean anomaly: 210.4279 deg
- Mean motion: 14.61838533 rev/day
- Decay rate: 4.10e-06 rev/day²
- Epoch rev: 506
- Semi major axis: 7062.462 km
- Ano period: 98.506103 min
- Apogee: 699.343 km
- Perigee: 679.969 km
- Beacon: 145.8250 MHz

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Mode L Progress Report
by William D. McCaa, Jr. K0RZ

There have now been 88 stations reported active on Mode L. Most of the activity occurs between 436.48 and 436.58 MHz.

The beacon continues to intermodulate the downlink signal. Comparing the transponder signals to when the beacon is keydown in the cw mode, the signals in the passband are 12 dB weaker with key up and 6 dB weaker in the PSK telemetry mode.

Many stations are using low power. Their sub-1 kW ERP signals are heard up to 30 dB below the beacon. The transponder throughput is non-linear as well inasmuch as a 10 dB change in the input signal results in a 15 dB change in the output. The PSK signalling produces sidebands on the downlink. It is believed the Mode L HELAPS power amplifier is running in Class C operation as a consequence of a failed bias transistor.

Notably, the transponder and beacon signals are stronger when the Mode L transponder is first activated one hour prior to apogee on Wednesdays and Saturdays. The strength subsides by as much as 15 dB on the transponder and 10 dB for the beacon during the course of the two hour Mode L operation. This phenomenon has been routinely observed over the past 8 weeks. Upon Mode L commencement the signal levels are generally about 8 dB stronger than they had been in the past but by the end of the two hour period they have reverted to their former levels.

The secret of consistent Mode L operation is still to be found in a superior 436 MHz receive antenna system. A minimum of 20 dBi gain should be sought if favorable results are to be obtained. A low noise preamp (< 1.0 dB NF) mounted at the antenna is strongly recommended. On the uplink, 10 kW ERP is sufficient.

The station at K0RZ presently comprises 2 x 38 element loop Yagis at 24 cm (horizontal polarization) and 8 x 15 element NBS Yagis (horizontal) at 70 cm. A low noise GaAsFET on 70 cm insures satisfactory reception.

Answers Sought For Curious Anomaly

The very popular Yaesu FT-726R VHF/UHF transceiver is the current focus of attention in an effort to learn the cause of a curious i-f anomaly. According to W3IWI, the problem manifests when using the FT-726R for sending FSK packet radio. He suspects the difficulty may be attributed to a 455 kHz ceramic filter (LF-C2A). There are two types of filters supplied. The other is a CFM-455. W3IWI indicates he will be testing the filters on a network analyzer in order to establish a basis for the apparent asymmetry which affects FSK transmission. His findings will be reported here.

On a related note, N0AN has found an apparent cause for the low ssb output observed by many on the same radio, the FT-726R. According to N0AN, the combination of the microphone supplied and the AGC circuit time constant results in inappropriate AGC action to roll back the output. The result is less than full output from the rig. He goes on to suggest a simple solution involving the addition of a small capacitor to change the AGC attack time. N0AN reports he has recommended the solution to about a dozen -726R owners who have been most pleased with the result.

Yaesu's Vice President in Los Angeles, Chip Margelli, K7JAA, has been advised of both situations. Yaesu will be investigating he advises.

The FT-726R has quickly established a sizeable market share especially in the satellite market. The rig can be configured to operate full duplex for Mode A and Mode B satellites. User reports to ASR have been very favorable to date. Yaesu-Musen donated a full-equipped FT-726R to AMSAT for the member recruitment drive this past spring.

New Launch Opportunity Sought

AMSAT is negotiating for a major new launch opportunity targeting the early 1986 time frame. The payload capacity will be quite large allowing launch of a payload at least as large as AMSAT-OSCAR 10 (formerly Phase III-B).

If obtained from the launch authorities, the launch opportunity could be used to orbit Phase III-C, similar in design to the successful AO-10 satellite now approaching its first birthday. Although the low inclination of AO-10's orbit has affected its overall performance, it seems on its way to becoming the most popular OSCAR ever. Phase III-C will build on its predecessor's technology. However, there may be some additions too. According to a preliminary report by AMSAT DL Vice President Werner Haas, DJ5KQ, the
Phase IIIC bird may contain a Mode L digital transponder in addition to the Mode B and Mode L linear transponders. There is also the suggestion by Werner of a 2.4 GHz S-band beacon by DC9RK.

The year 1986 could very well be a very productive one as regards OSCAR launches. Besides Phase IIIC, if a launch is obtained, the year could see the French Arsenes, the Japanese JAS-1 and the digital store-and-forward PACSAT satellite all launched. PACSAT is explained in an excellent, current article in the best-selling computer magazine, BYTE. Besides these birds, a new Radio Sputnik or two during 1986 would not surprise.

Meanwhile, very preliminary discussions concerning the possibility of a constellation of geo-stationary amateur radio satellites surfaced at the recent Dayton Hamvention in the U.S. As envisioned, at least three Mode B/L satellites would be positioned at strategic locations to provide coverage of major regions. With appropriate interlinking (either satellite-to-satellite or via powerful terrestrial relays) global coverage could result. Mode "S" (at 2.4 GHz) experimental mode might also be included in the projected 1986-87 time frame.

AMSAT emphasized the conjectural nature of discussion at this very early stage of discussion but felt a reckoning of sentiment for this type of project within the potential user community is appropriate. They emphasize that much conceptual work need be done before even preliminary planning can commence. Thus for the present the discussions seem to be of the "what if" character.

One critical element is user support. The geo-stationary option is a very costly and potentially risky one. On the one hand an ambitious project could conceivably absorb most of the world's satellite designing/building talent and a similar quantity of its fiscal resources. On the other hand it could be the spark which ignites the general amateur radio community's interest in space community. The latter effect could generate hitherto undreamt of income to be plowed into new space hardware and projects. The geo-stationary option, Phase IV, cannot be seriously contemplated without early, broad support from the world amateur radio community. It will take unprecedented support in dollars and manpower.

Should such an option be considered seriously? What

---

Kaz Deskur, K2ZRO, Silent Key

It is with deepest sorrow that ASR notes the passing of a dear friend and colleague. Kaz Deskur, K2ZRO, of Endicott, New York succumbed on 23 April.

His was one of the most easily recognized calls in AMSAT. But notoriety was not his goal. Developing new graphic satellite tracking aids did make him famous nevertheless. His Satellabe, introduced in the mid-seventies, quickly became the standard by which other similar devices were measured.

Likewise, his character and motivation formed a standard for others to emulate. Anecdotes of his selfless, generous nature abound. Our favorite is one which tells of how he received a letter from a Polish ham who sought to emigrate to the U.S. but knew no one to sponsor him and his family. He learned of Kaz through ham radio, wrote a letter to Kaz and was delighted with the result. Not only did Kaz agree to sponsor the immigrant, but Kaz actually put him and his family up in the Deskur home for a year.

In fact his character transcended our hobby and he had become a genuine hero to many who knew him. There are tales of his World War II exploits as an underground radio operator in war-torn Poland. Under Nazi death sentence for his commando work he twice escaped the executioner's bullet.

One of the earliest satellite aficianados, K2ZRO became one of the first to receive a coveted Sputnik QSL. Later he became highly active on AMSAT OSCAR 6. He earned DXCC 300+, WDX Honor Roll and the CHC Arne Trossman trophy for having earned over two hundred awards in ham radio.

Kaz's interest in ham radio involved public service too. He was active in emergency communications in southern New York. He was AMSAT's Area Coordinator for Southern New York. He appeared at numerous conventions and hamfests in AMSAT's behalf.

As ASR noted in its June 1, 1981 edition which spotlighted K2ZRO, perhaps it was the war-engendered crisis which spawned his wry wit. Always quick with a laugh and cheerful at heart, he was a source of constant inspiration to those around him. He was highly energetic and respected for his ingenuity in his professional career with IBM. His long-time employer, IBM recognized Kaz on several occasions for his inventiveness and resourcefulness.

K2ZRO became known to AMSAT members through his popular Satellabe and recently his unique Satellape. His regular column appeared in Orbit magazine. Kaz regularly scanned dozens of foreign magazines seeking material for his well-liked column. A frequent contributor to the progenitor AMSAT Quarterly Newsletter, he also authored articles for 73 magazine.

Kaz is survived by wife Sofie, three sons and a daughter. Two sons, Andy (KA1M) and Ed (WA2DFY) followed their Dad's footsteps and became hams. Andy and Sofie say they will continue the ZRO Technical Devices business (Satellape) that Kaz founded.

The funeral was held in Endicott, New York on 26 April. AMSAT sent flowers on behalf of all Kaz's AMSAT friends. The family has requested that donations in Kaz's memory be made either to AMSAT or the American Cancer Society.

We know with certainty that few of his kind will pass this way. Thus the more poignant is his passing. We benefitted in knowing him. He touched us deeply; he is missed dearly and will n'er be forgotten. Courage. Here cracks a noble heart.
serves of financing should be explored? Tapped?

Interested individuals are encouraged to air their views (preferably in writing to AMSAT). Based on an assessment of supportability and an initial feasibility study, AMSAT will try to establish a baseline viability for this conjecture. Phase IV may be out of reach for several years to come or the Amateur Radio community may get behind the concept and help leap-frog itself into a vastly more advanced posture. Is this the first leap?

**Short Bursts**

- A new packet radio DX record has apparently been set. The old record set on 10 meters involved ZL1AOX and WA2LQQ who communicated via the digital mode last summer for a 300 km. The new record belongs to VK2AQG (near Sydney) and W3IWI near Washington. The new packet DX record of 15,700 km was set 6 May using AO-10 near apogee. In related news, PY2BJO and JA1ANG are close to operational on packet. Several Z5 stations are thought to be close as well thanks to the efforts of Z56AKV and KE3DJ/ZE1FE.

- KO5I will again be heading for the hills when he puts Arkansas on the air via AO-10 over the Memorial Day weekend, 26-27 May. Watch for this rare grid square!

- The AMSAT-Stoner Challenge Cup competition is picking up steam. The event is being worked worldwide. Some stations are approaching 500 contacts as not quite one third of the competition period has elapsed.

- KO5I of AMSAT and W9KDR of ARRL confirm that AO-10 WILL be available for Field Day use this June. Normal schedule will be observed including the regular Mode L schedule on Saturday.

- G8NEF reports UO-11 recovery efforts continue in earnest. Roger points out (with regard to ASR #75) that several avenues are being pursued and that their is no positive indication of watchdog timer efficacy at present. Motivation to recover from the present dilemma is high, he reports, and progress reports are regularly posted on the UO-9 bulletin board.

**New Equipment Tempts Dayton Attendees**

Several new items targeting the amateur satellite enthusiast debuted at the Dayton Hamvention last week. The casual observer was teased by new arrays of aluminum, splendid little black boxes and an assortment of goodies bound to deplete the cash reserves.

KLM/Mirage had new active and passive hardware on display. The KLM 1200DF 1.26 GHz transverter features 5 watts output on both 1296 and 1269 MHz with bandswitching between the two. The i-f is at 2 meters. The new KLM 144-22C 2 meter crossed Yagi provides notable improvement over the -16C and -14C according to the spec sheet supplied. Gain claimed is a mighty respectable 13.1 dBiC. It's big too. A gigantus elevation system called the EL 3000 Moontracker could likely torque a Voyager across the ecliptic, not to mention a typical EME array. The sturdy device is designed for the very largest of OSCAR arrays and most EME-type aluminum assemblages.

New from Europe is a handsome 70 cm helix from DJ2UT of Sommer GmbH of Denzlingen. (Distributed by Eurotechnik, W1L, P.O. Box 843, Plainville, CT 06062). Claimed is 16 dBi on a boom length of 6.6 feet (2 meters). The sturdy appearing structure is made to endure, it's evident.

Advanced Receiver Research had its new in-line GaAsFET preamp line on display. The two-meter version can handle 25 watts and is designed to be left in circuit. It senses rf from the transmitter and switches the GaAsFET out in transmit mode to protect the sensitive device from damage.

Spectrum International showed their complete line of premium imported Microwave Modules. New was the 24 cm transmit converter, the MMX-1268-144. S.I. donated this unit to AMSAT for the member recruitment drive. The unit was won by WD4FAB.

Spectrum West showed new imported rotors for OSCAR use. Unconfirmed reports suggest S.W. has merged with AEA, also from the Washington (state) area.

The VHF Shop of Mountain Top, PA, had some gorgeous UHF “trinkets” on display including 2C39 amplifiers for 24 cm, Mode L use. New water cooling jackets for the 2C39's were offered. The VHF Shop is stocking a wide assortment of advanced VHF/UHF supplies of interest to OSCAR users.

Similarly, KJI electronics, another Orbit advertiser, displayed the latest in Lunar, ICOM, KLM and Mirage equipment. KJI was one of the first to have the new KLM-22C antenna available from stock.

Cushcraft had its new 70-cm crossed Yagi on display. A representative suggested the veteran 2-meter crossed Yagi might be a candidate for update as well.

Hy-Gain/Telex indicated strongly a desire to produce a viable OSCAR antenna system. Representatives at their booth were most anxious to learn of long-term AMSAT planning.

No major new transceivers were obvious to the casual viewer.

And we probably missed a few new entrants along the route as well.

**Susan Champa, Daughter of K8OCL, Cited For Rocket Fuel Project**

Miss Susan Champa, daughter of Dr. and Mrs. John Champa of Piketon, Ohio, has been cited by the Ohio Academy of Science for her high school science project involving rocket propellants. A junior at Zane Trace High School in Kingsington, Ohio, Miss Champa analyzed and classified various rocket fuels in terms of their chemical system and effectiveness.

The award was made in connection with the science fair held in late March. Miss Champa is in a college preparatory curriculum. She intends to study the physical sciences in college.

John Champa, Susan's father, is K8OCL, AMSAT's Senior Vice President.
Satellite: rs-7  
Catalog number: 13001  
Epoch time: 081411.157818277  
Sat Apr 21 10:02:02.472 1984 UTC  
Element set: 1  
Inclination: 82.9576 deg  
RA of node: 174.1225 deg  
Eccentricity: 0.0010006  
Arg of perigee: 205.3532 deg  
Mean anomaly: 150.8937 deg  
Mean motion: 12.056137 rev/day  
Decay rate: 4e-08 rev/day^-2  
Epoch rev: 19310  
Semi major axis: 8033.547 km  
Anom period: 119.469945 min  
Apogee: 1668.259 km  
Perigee: 1628.227 km  
Satellite: rs-6  
Catalog number: 12999  
Epoch time: 081411.41608446  
Sat Apr 21 10:02:02.472 1984 UTC  
Element set: 1  
Inclination: 82.9576 deg  
RA of node: 174.1225 deg  
Eccentricity: 0.0010006  
Arg of perigee: 205.3532 deg  
Mean anomaly: 150.8937 deg  
Mean motion: 12.056137 rev/day  
Decay rate: 4e-08 rev/day^-2  
Epoch rev: 19310  
Semi major axis: 8033.547 km  
Anom period: 119.469945 min  
Apogee: 1668.259 km  
Perigee: 1628.227 km  
Satellite: rs-5  
Catalog number: 12999  
Epoch time: 081411.157818277  
Sat Apr 21 10:02:02.472 1984 UTC  
Element set: 1  
Inclination: 82.9576 deg  
RA of node: 174.1225 deg  
Eccentricity: 0.0010006  
Arg of perigee: 205.3532 deg  
Mean anomaly: 150.8937 deg  
Mean motion: 12.056137 rev/day  
Decay rate: 4e-08 rev/day^-2  
Epoch rev: 19310  
Semi major axis: 8033.547 km  
Anom period: 119.469945 min  
Apogee: 1668.259 km  
Perigee: 1628.227 km  
Satellite: rs-8  
Catalog number: 12999  
Epoch time: 081411.41608446  
Sat Apr 21 10:02:02.472 1984 UTC  
Element set: 1  
Inclination: 82.9576 deg  
RA of node: 174.1225 deg  
Eccentricity: 0.0010006  
Arg of perigee: 205.3532 deg  
Mean anomaly: 150.8937 deg  
Mean motion: 12.056137 rev/day  
Decay rate: 4e-08 rev/day^-2  
Epoch rev: 19310  
Semi major axis: 8033.547 km  
Anom period: 119.469945 min  
Apogee: 1668.259 km  
Perigee: 1628.227 km  
Satellite: os-10  
Catalog number: 14129  
Epoch time: 084697.34280771  
Fri Apr 6 09:13:58.568 1984 UTC  
Element set: 97  
Inclination: 25.7059 deg  
RA of node: 206.1228 deg  
Eccentricity: 0.0027647  
Arg of perigee: 260.5025 deg  
Mean anomaly: 30.1741 deg  
Mean motion: 2.0558711 rev/day  
Decay rate: -1.42e-06 rev/day^-2  
Epoch rev: 617  
Semi major axis: 26105.476 km  
Anom period: 697.513315 min  
Apogee: 3563.360 km  
Perigee: 3026.998 km  
Beacon: 145.81900 mhz  
Satellite: os-11  
Catalog number: 14761  
Epoch time: 084697.34280771  
Fri Apr 6 09:13:58.568 1984 UTC  
Element set: 23  
Inclination: 48.2497 deg  
RA of node: 177.7317 deg  
Eccentricity: 0.004838  
Arg of perigee: 93.1724 deg  
Mean anomaly: 267.1177 deg  
Mean motion: 4.6680345 rev/day  
Decay rate: 2.52e-06 rev/day^-2  
Epoch rev: 794  
Semi major axis: 7062.423 km  
Anom period: 98.505295 min  
Apogee: 715.630 km  
Perigee: 694.680 km  
Beacon: 145.8250 mhz  

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UO-11 Heard At 1.2 GHz;
Hope Springs Fresh

Using a large radar dish in Greenland, a team of SRI International scientists and engineers have developed impressive evidence that UO-11 is "alive". No positive sighting of UO-11 had been made since orbit 3 when at about 2300 UTC, 1 March 84, VK5AGR reported hearing the beacon.

The SRI team at Sondre Stromfjord used a 33 meter (100 foot) dish to listen to the 1.2 GHz command receiver local oscillator. They heard the weak (+7 dBm at the source) signal twice on 11 May. The first time was at 1403 UTC and the second occasion was the subsequent orbit when they heard it at 1542 UTC.

The facility at Sondre Stromfjord is an experimental L-band radar facility run by SRI International. The station chief is Finn Steenstrup, OX3FS. The installation was used as a sensitive receiver in response to requests for assistance to Dr. Robert Leonard, KD6DG, Director of the Radio Physics Laboratory of SRI International, Menlo Park, California. AMSAT's Executive Vice President WA2LQQ and later UO-11 Program Manager Dr. Martin Sweeting, G3YJO, requested the assistance of Dr. Leonard last month when it appeared circumstances warranted a major commitment. Dr. Leonard was quick to volunteer to do what he could. Previously KD6DG and a team at SRI International had successfully commanded UO-9 from a serious malfunction (See ASR #42). The station at Sondre Stromfjord, 67 degrees North by 51 degrees West, is located on the west coast of Greenland. According to KD6DG, the receiver used at 1.2 GHz has a noise temperature of approximately 50 degrees K.

The problem with UO-11 began with what probably was a cold 2 meter beacon oscillator. (See ASR #74.) The theory held that it was operating erratically or partially due to regulator current limiting. It was thought that the resultant rf noise had been blocking each of the three command receivers. Commanding from Surrey proved futile. There were isolated reports of sightings of the 2 meter beacon being heard around 145.825 MHz but these could not be positively confirmed. G3YJO and his team tried listening for the "hash" from Jodrell Bank in England but without apparent success. An additional effort was mounted at SRI where it was thought the feeble emanations of the command receiver local oscillator could be heard.

Based on estimates of the oscillator's power (+6 dBm), the mixer isolation (30 dB), the path loss, the Sondre Stromfjord's system noise temperature and the sky noise at 1.2 GHz, it was felt the team had a good chance to hear the local oscillator (LO).

The signals heard at 1403 UTC, 11 May exhibited the anticipated Doppler shift, were within the range of anticipated amplitudes and the source tracked perfectly according to the NASA predictions for object 14781 (UO-11). The large dish could not slew rapidly enough to keep pace with the swift movement of UO-11 so the dish was slewed as rapidly as possible in the desired direction. UO-11 thus passed through the "gaze" of the large parabolic dish and was visible for just a few moments. Long enough, however, to satisfy these professionals that they had seen what they were looking for. They even noted some amplitude variations which were interpreted as tumbling motions of the satellite.

Word of the successful sighting in Greenland was relayed to Menlo Park by telex and thence from KD6DG to G3AAJ in London by telephone. It being a weekend, many of the Surrey team were away. It thus fell to Ron, G3AAJ, to spread the good news among his colleagues. G3IOR alerted the AMSAT nets to the favorable developments on Sunday, 13 May.
The sightings at SRI are significant in at least two ways but do not absolutely assure the newest bird’s salvation, unfortunately. The fact that the 1.2 GHz command receiver is apparently in good condition indicates that it and the power conditioning equipment are functioning and that at least part (and hopefully all) of the spacecraft is alive. Second, confirmation of the Keplerian elements by virtue of having heard UO-11 exactly where and when expected is most helpful. It eliminates any doubt whatsoever about the accuracy of the element sets employed. The remarkable events of the past week do not guarantee that UO-11 will be commandable. There is still a critical series of events that must transpire before UO-11 can be considered back in order. The first of these will take place very soon as UoSAT team specialists prepare the command software for SRI that will hopefully soon return UO-11 to its promising course which, off to an auspicious beginning last March 1, has been diverted these 11 weeks now.

UoSAT-OSCAR 11 may be on the way back to a productive life. Stay tuned!

Short Bursts

- WH6AMX reports having worked two new DX stations on AO-10. They are UC2AAB and FR7DA. Nice catches, both. Any more good catches to report?
- ASR will soon resume its feature “Spotlight” on productive AMSAT volunteers. Know someone you believe is worthy of being spotlighted here? Let us know and we’ll take it from there. Help us find out who the real “doers” are and we’ll help you recognize superior performance!
- Carlos Huertas, LU4ENQ, AMSAT’s Chief Area Coordinator for South America has announced an extensive reorganization of AMSAT Argentina. He has appointed Art, LU1AHC, General Coordinator. Operational Coordinator named is Ignacio, LU1ESY. Pedro, LU1BUV is a brilliant programmer and has been appointed Software Manager. A team under the direction of Hugo, LU4DXT, at the University of La Plata has been charged with Special Projects including developments in packet radio. Two regional coordinators have been appointed as well. They are Daniel, LU6EEG, (Southern Region) and Luis, LU9JH (Northern Region). Congratulations to the appointees!

West Coast VHF/UHF Conference

The twenty-ninth annual West Coast VHF/UHF Conference was held 4-6 May 1984 at the beautiful Paso Robles Inn in California’s Salinas Valley. A spirited group of 220 progressive amateurs gathered under the oak trees to socialize and to attend presentations on the latest developments in utilization of the higher frequencies. Planned and co-chaired by Cliff Buttschardt, W6HDO and Mike Goshay, K6HXW, the excellent program included numerous sessions of great interest to amateur satellite enthusiasts.

Bob Janeway, W6HVT, led off with “Amplifier Intercept Points Using Spectrum Analysis.” Next came Folke Rasuall, SM5AGM, who talked about “VHF Operation and Grid
The attendees learned about the long struggle which preceded standardization on the system which is now being introduced to many parts of the world by the Stoner Challenge competition.

Jerry Haigwood, KY4Z, and Bob Stein, W6NBI, described "DL6WU Yagi Antenna Design Using the Home Computer." They followed up with words of action by making their portable micro-computer capability available to the attendees for performance evaluations of individual designs.

Mike Staal, K6MYC, gave a DXpedition slide entitled "Moon Bouncing Outside the Continental 48," in which he shared his recent adventures in providing rare-country EME and 6-meter contacts. Referring to the preceeding presentation, Mike mentioned that KLM is proposing use of a standardized computer analysis technique to evaluate the gain of commercial antenna designs in order to have gain figures accepted for publication in QST. A wit in the audience observed that KLM uses dB/mgh as a reference. This parameter translates to "Decibels with respect to More Gain Hill." Ken Holladay, K6HCP, who like Mike is associated with the same antenna manufacturer, quickly responded, "In this area, KLM is on shaky ground." Those who do not follow California news closely should be told that Morgan Hill, the site of KLM, recently gained notoriety by being at the epicenter of a moderately severe earthquake.

Paul Shuch, N6TX, briefed on "23 cm FM — the Newest Commercially Available Equipment." He described the impact of commercial designs on the development of a practical band plan and the difficulties encountered by the ARRL VHF-UHF Advisory Committee in dealing with the problem.

Jim Eagleson, WB6JNN, of Project OSCAR, covered recent progress in "Translators and Narrow Band Amplitude Compressed Sideband (ACS) Techniques." As is the case with Packet communications, these developments provide opportunities for AMSAT leadership in the establishment of amateur functional standards for both satellite and terrestrial applications. Jim was followed by John Brown.

ing, W6SP who talked about "The Future of AMSAT" and by John Pronko, W6XN, who gave an update on "AMSAT-OSCAR 10 Status."

Traditionalists will be heartened to learn that in spite of all the emphasis on computer analysis, the fun-filled weekend was concluded at the country fairgrounds with an old-fashioned, analog, antenna gain measuring session.

— W6SP

Space Perspectives

An Editorial Comment by WA2LQQ

Owen Garriott's 2 meter operation from Space Shuttle Columbia (STS-9) last Autumn garnered the attention of radio amateurs worldwide. W5FLF opened a stimulating new chapter in Amateur Radio while becoming the first genuine "Ham-In-Space."

However, the STS-9 mission has not been without its critics. The intervening months have seen several negative assessments of the whole W5FLF effort. The critics have been dismayed STS-9 and soundly disparaged prospects of imminent reprise.

We are surprised and puzzled by the myopia manifested in our colleagues. With planning well-advanced for the next "Ham-In-Space" mission, we think it important to peel back the facade and get on to basics. What really lay beneath the hoopla and ballyhoo carnival atmosphere? Was anything meaningful accomplished on STS-9?

The critics focus primarily on two major themes: 1. Havoc reigned supreme as thousands jammed limited 2 meter frequencies, and 2. The announced schedule was inadequate or not observed.

Both themes warrant scrutiny.

The first criticism is accurate; factual. Unprecedented QRM erupted on 145 MHz in some areas. Discourtesy and downright reprehensible behavior was occasionally observed (and adequately reported). But the existence of QRM is not at all the point. There are more important issues involved than QRM!

Similarly the second criticism is accurate; factual. Operational constraints, simply the need to put space science ahead of Amateur Radio, meant limits on available air time. In some cases schedules had to be changed. Just as Amateur Radio is an adjunct to our daily lives, W5FLF's operation on STS-9 was an adjunct to the main business of flying a complex mission in space. Criticism here seems based more on factors of disappointment and chagrin in having missed out, we conclude. But again this criticism, although accurate, misses the larger point of the mission.

In fact the REAL point lies several layers above the muck of 2 meter QRM; above the disappointment of unfulfilled wishes to QSO Owen.

What was intended by NASA, W5FLF, ARRL, AMSAT, K6DUE and others who helped put the package together was to expose a broader segment of society (primarily the world's youth) to the wonder, fascination and challenge of Amateur Radio in the space context. Unequivocally, this was accomplished. With Pete O'Dell of ARRL, Doug Ward of NASA and Roy Neal of NBC feeding the press, truly un-
precedent coverage was afforded W5LFL. As a result, thousands have been prompted to study to become licensed radio amateurs. How many other tens of thousands may enter technical careers as a result of this episode is probably unknowable. An unqualified success in this category we'd suggest.

What was also intended was to crack the door a bit for a future, more ambitious synthesis of Space Shuttle and Amateur Radio. The aim was to show the rigorous safety and performance requirements of a manned spacecraft would not be anathema to amateur radio equipment be it a simple transceiver or more complex arrangements. This was clearly demonstrated with a modest beginning on STS-9. Everything worked well. We note with satisfaction the more ambitious, equipment-intensive plans for the Spring, 1985 flight of Dr. Tony England, WØORE. An unqualified success in this category as well, we'd suggest.

Seen in the context of primary objectives, who can deny STS-9 was enormously successful? In finding fault, the critics of W5LFL's efforts fail to peer through the QRM fog to the fundamental issues. Moreover, some self-described leaders in amateur space fail in a more serious sense.

Surely some of the QRM on 145 MHz was deliberate. There are a few nihilists out there who will “shoot” at anything resembling organized productive activity. But most of the QRM we observed resulted from simple ignorance of operating guidelines set forth to contact W5LFL. People were transmitting on the downlink frequencies for instance. Others were calling W5LFL while Owen himself was transmitting. Others had not the slightest notion of what they could do to increase their chances of success in contacting Owen. We ask whose responsibility it is to educate the ill-informed in the correct approach? We suggest it may be some of the self-same few who are now most vocal in their criticism. They should be leading the way to new and more effective ways to show folks the RIGHT way to do it next time.

We challenge the critics, the myopic moaners and groaners to channel their energies into making it work better next time. The inverterate complainers, we submit, would do well to light a few candles rather than curse the QRM.

So while the criticism may accurately cite fact (QRM and schedules), the critics are shortsighted. Certainly we can do better next time. But it will take better education of the users, more productive use of leadership energies and a firm view on objectives and the future if we are to un-mire ourselves from the terminal stillness we saw played out on 2 meters last Autumn. Given the uproar, it's a credit to the mission that so much was accomplished.

The mark of success is simply the degree to which an endeavor meets its established objectives. W5LFL's initial "Ham-In-Space" met every important objective and more. NASA was impressed. The public was inspired. Amateur Radio operators were challenged. Some succeeded; most had some fun trying. In the long view it was one of the most significant episodes in Amateur Radio history. We look to the myopic critics to get their collective wits together and prepare the public for the ambitious WØORE mission next Spring. They owe nothing less to those who seek leadership qualities in them.

As KO5I put it recently, “Either lead or follow but please don't block the road for those who would move forward.”

John, G3BVU, (right) presents Rip, WA2EQO, with a donation for the membership drive (29 April, 1984).
AMSAT and ARRL Propose Second "Ham-In-Space" Mission

A joint AMSAT/ARRL proposal to have a second astronaut "Ham-In-Space" early next year has been prepared and will be forwarded to NASA soon according to AMSAT and ARRL officials. The document proposes that Astronaut Tony England, W5OR, be permitted to operate specific amateur radio equipment from aboard mission 51F/Spacelab-2 scheduled for launch during March, 1985.

The proposal cites the achievements of Owen Garriott, W5LFL, who became the first "Ham-In-Space" last November with his STS-9 mission. The proposal builds on the W5LFL efforts and suggests new and interesting aspects for the 51F mission of W5OR.

Proposed are additional operating bands (including an HF band) as well as new emission types beyond the 2 meter FM voice emissions used exclusively by W5LFL. The 51F effort would differ markedly from the STS-9 activity in other significant ways as well. The W5OR mission, if the proposal is accepted, would be significantly more equipment-intensive than W5LFL's mission which depended on his constant presence and participation in the radio activity.

Neither ARRL nor AMSAT officials would be quoted for the record but ASR has learned from reliable sources that some automatic RF equipment was proposed to NASA which would obviate 100% human intervention as was the situation (and constraint) with the W5LFL activity. Officials say they are reluctant to speak for the record because of the preliminary, tentative nature of the negotiations and the desire to avoid raising false hopes should specific aspects of this more ambitious enterprise be unattainable.

Four Years After: Up From the Ashes and Prospering

The 23rd of May marked the fourth anniversary of the ill-fated LO2 Ariane launcher which failed on liftoff and ingloriously deposited AMSAT's Phase IIIA satellite in a shallow, water grave off Devil's Island, French Guiana. The anniversary was marked by a special activity within the regular 75 meter East Coast AMSAT Net beginning at 0100 UTC, 23 May 84.

With Net Control Station WA2LQQ providing a replay of the countdown audio originally transmitted on the ALINS (AMSAT Launch Information Net/Service) four years ago, the scene was set for President Tom Clark's recollection of those infamous, dark moments when it seemed AMSAT, even amateur satellites' future, hung in the balance. W3WJ recalled how it felt sitting in the control room at the Goddard Space Flight Center on what has come to be called Black Friday with W3GEY and W4PUJ close at hand. Tom described those as some of his worst-ever memories.

W3WJ then described how, with laudable encouragement from the members, the organization reconstituted its resolve and determined to forge ahead. Phase IIIB was successfully launched a little over three years later, Tom concluded.

In an especially poignant aspect, Tom noted the replay of the Black Friday launch audio was simulcast on AO-10 in addition to the 75 meter net frequency providing vivid, demonstrative evidence of how far we had come. AO-10 was high over the Atlantic Ocean at the time illuminating much of the Western Hemisphere with its strong, reliable 2 meter downlink.

One wonders if Phase IIIA, now 4 years drowned, heard its progeny calling from above and grieved yet again over skies unfurled.

Net Control, Bulletin Stations Sought

AMSAT's Net Manager Wray Dudley, W8GQW, has announced openings for additional Net Control Stations (NCS) and AO-10 Satellite Bulletin Stations.

AMSAT organizes nearly two dozen regularly scheduled on-the-air nets. Their function is to provide timely, useful information for AMSAT members and members-to-be alike. Orbital predictions, news of important operating conditions as well as special events and DX alerts are all grist for the NCS mill. Nets serve local, regional, national or international users and originate with NCS worldwide.

Several HF net billets (positions) have become vacant or will become vacant in the next few months. Net Manager W8GQW is seeking to begin the short training/indocoration period required in order to phase in the new NCS concurrent with the departure of retiring NCS. In addition, new standby (reserve) stations are needed to fill contingencies
such as travel, illness or storm conditions.

Basic requirements include a viable HF station which can present a competitive signal in the venue in which it is to be employed. For example, doing "battle" on the 20 meter International Net Sundays calls for a linear amplifier, excellent beam and a good tower at least. On the other hand, qualifications for running a local net in a metropolitan area might require only an HT capable of accessing the local repeater.

A reasonable speaking voice and basic familiarity with the subject matter are obvious assets a good candidate would possess. However, the candidate NCS needn't be a technical expert by any means. Nor must he (she) have the voice of Orson Welles (or Helen Hayes). Orbital information will be provided to the NCS regularly.

Related openings exist for Official AMSAT Satellite Bulletin Stations (SBS) too, according to W8GQW. SBS provide essential oneway transmission of important information similar to the function of W1AW. Presently AMSAT has a prototypical service generated by W6KAG and W6CG. These transmissions are heard on AO-10 Mode B. The transmissions appear in the Special Service Channel (SSC) H2, nominally 145.962 MHz. Schedule for the AO-10 SBS service is presently on Mode B days (Monday, Tuesday, Thursday, Friday and Sunday) from 1 hour prior to thru 1 hour subsequent to apogee whenever apogee occurs with sub-satellite point (SSP) between 60 and 180 degrees west longitude.

East Coast (USA) stations are especially sought says W6KAG who has been supplying the bulk of the uplinking on H2. Butch has been rising at odd hours for months now to provide this valued service. He suggests because of the irregular hours at which apogee occurs, a retired or semi-retired individual is most likely to succeed with this assignment.

To be an AO-10 AMSAT SBS you need a viable AO-10, Mode B station, a cassette recorder and be willing to undertake a commitment of service to the amateur satellite community of a couple of hours per week. Obviously, the more stations that are involved, the more the work can be spread around. Point of contact for these openings is likewise W8GQW.

One of AMSAT's key reasons for being is to provide information on the progress of the Amateur Space program. AMSAT's NCS and SBS system is an essential link in the information chain. If you think you want to be a part of it all on a direct basis, contact W8GQW today. (Wray Dudley, W8GQW, 1617 West McAlig Rd., Troy, OH 45373, 513-339-2254.)

UO-11 Prospects Brighten As Surrey Seeks Answers

Prospects for a successful mission brightened notably when on 14 May UO-11 responded to a telecommand originated at the University of Surrey command station in England. UO-11 had been mute for 10 weeks prior due to unknown causes. However, with the successful command action 14 May, the 2 meter telemetry beacon (145.825 MHz) was activated providing valuable insight to the overall spacecraft condition as well as perhaps clues to the lingering mystery underlying the failure which terminated beacon telemetry on UO-11's third orbit just a few hours after its 1 Mar. 84 launch from Vandenberg AFB, California. UO-11 had failed to respond to numerous command attempts since then.

In status reports since 14 May, Roger Peel, G8NBF, spokesman for the Surrey team, has indicated that while they are pleased with the return of the beacon telemetry and that it provides (at last) a viable tool for delving into the malfunction's root cause, there are additional factors to be dealt with. The reports suggest that the team no longer believes the cause to be attributable to the "cold oscillator" current limiting hypothesis advanced previously. Indicating that the commanding remains far from satisfactory, the group suggests a possible temperature-related effect connected with the command decoder. While still very tentative, there has been some indication from telemetry that the command decoder works less reliably as temperature approaches ~11C from about ~5C. Surrey is testing this hypothesis against observed "commandability." They have added an additional diagnostic tool to their arsenal with the implementation of a so-called "digital loopback" or echoback scheme. Using this tool they listen to the 2 meter downlink telemetry as it "regenerates" the command uplink as heard by UO-11. Thus they are able to learn very quickly how/if each command sequence is received and processed by the command decoder module.

It is possible a combination of causes is making commanding UO-11 more difficult and intermittent than it should be. The tumbling motion and QRM from radars may also enter the picture.

Surrey indicates it will take at least a month to sort things out, get to the bottom of the current situation and determine a suitable workaround plan. Meanwhile, they intend to proceed extremely cautiously in order to avoid extinguishing the best candle they have to probing the mystery: the 2 meter beacon telemetry. Given that, several of their resident bright minds, a little time and continued encouragement and support and UO-11 may well yet fulfill its ambitious destiny: potentially one of the most significant amateur space and space education tools ever conceived.

G3IOR, G4CUO Claim First Crosslink QSO With AO-10

Using a combination of AO-10 and RS-6, G3IOR and G4CUO have laid claim to a significant first. The duo claims that on 7 May they became the first ever to establish contact using a two satellite relay of which AO-10 was an element. (A two satellite relay was first accomplished using AO-6 and AO-7 nearly a decade ago.)

Both stations used the now classic Mode B-to-Mode A relay, the QSO occurred between 0705 and 0711 UTC on 7 May with signal reports of 559 exchanged for a full two-way, two-satellite QSO.

With an uplink to AO-10 of about 435.085 MHz, RS-6 picked up the 145.920 MHz AO-10 downlink. RS-6 then retransmitted the cw signal on its 10 meter downlink at
29.413 MHz. Both satellites were over North Africa at the time. Crosslinks may become important to future OSCAR users as geo-stationary systems of global coverage satellites are envisioned for later in this decade. An alternative to intersatellite linking is to use a terrestrial relay for traffic destined for another coverage zone.

**UoSAT-2 Engineering Data**

The following engineering data was reduced by KA9Q from data captured by WA2LQQ beginning at 0202 UTC, 21 May 1984.

A detailed analysis will appear in the next issue of ASR.
| Satellite: oscar-9 | Perigee: 882,339 km |
| Catalog number: 12889 | Eccentricity: 145.0550 mhz |
| Epoch time: 24133.08973490 | Sun May 14 01:34:11.132 1984 UTC |
| Element set: 576 | RA of nodes: 185.9728 deg |
| Inclination: 97.5902 deg | Argument of perigee: 155.7397 deg |
| Mean anomaly: 174.2946 deg | Mean motion: 15.25615622 rev/day |
| Asc node: 402.305600 min | Earth rate: 4.210e-05 rev/day * 2 |
| Apogee: 467.170 km | Epoch rev: 14434 |
| Perigee: 460.787 km | Semi-major axis: 6845.046 km |
| Anom period: 94.35858500 min | Apogee period: 94 |
| Semi-major axis: 6845.046 km |
| Anom period: 94.35858500 min |
| Apogee period: 94 |
| Satellite: oscar-3 | Perigee: 798.335 km |
| Catalog number: 12977 | Anon period: 118.461369 min |
| Epoch time: 24133.04292361 | Apogee: 1674.592 km |
| Fri May 11 11:45:49.977 1984 UTC | Perigee: 1578.408 km |
| Element set: 94 | Anon period: 118.461369 min |
| Inclination: 92.9604 deg | Apogee: 1674.592 km |
| RA of nodes: 155.4371 deg | Perigee: 1578.408 km |
| Eccentricity: 0.886213 | Semi-major axis: 798.335 km |
| Mean anomaly: 255.7002 deg | Mean motion: 12.13586130 rev/day |
| Mean motion: 12.13586130 rev/day |
| Earth rate: 4e-08 rev/day * 2 |
| Epoch rev: 10546 |
| Semi-major axis: 798.335 km |
| Anon period: 118.461369 min |
| Apogee: 1674.592 km |
| Perigee: 1578.408 km |

**Satellite: oscar-10**

| Catalog number: 14127 |
| Epoch time: 24133.08554387 |
| Wed May 9 20:31:51.214 1984 UTC |
| Element set: 100 |
| Inclination: 25.5752 deg |
| RA of nodes: 100.3768 deg |
| Eccentricity: 0.6072798 |
| Mean anomaly: 24.7235 deg |
| Mean motion: 2.0584786 rev/day |
| Earth rate: 682 |
| Semi-major axis: 2610.208 km |
| Anon period: 695.542624 min |
| Apogee: 35637.72 km |
| Perigee: 5326.124 km |
| Reclines: 145.830 mhz |

**Satellite: oscar-11**

| Catalog number: 14731 |
| Epoch time: 24133.148569737 |
| Sun May 15 09:32:19.815 1984 UTC |
| Element set: 25 |
| Inclination: 96.3407 deg |
| RA of nodes: 165.6397 deg |
| Eccentricity: 0.8014556 |
| Argument of perigee: 39.2928 deg |
| Mean anomaly: 720.7353 deg |
| Mean motion: 14.61506957 rev/day |
| Earth rate: 1.55e-05 rev/day * 7 |
| Epoch rev: 1058 |
| Semi-major axis: 2610.208 km |
| Anon period: 695.542624 min |
| Apogee: 35637.72 km |

**Satellite: rs-5**

| Catalog number: 12999 |
| Epoch time: 24133.173980680 |
| Sat May 12 04:18:32.563 1984 UTC |
| Element set: 166 |
| Inclination: 82.9516 deg |
| RA of nodes: 162.6536 deg |
| Eccentricity: 0.8889536 |
| Argument of perigee: 171.6266 deg |
| Mean anomaly: 168.5191 deg |
| Mean motion: 12.05846892 rev/day |
| Earth rate: 4e-08 rev/day * 2 |
| Epoch rev: 10556 |
| Semi-major axis: 8053.669 km |
| Anon period: 119.497425 min |
| Apogee: 1665.715 km |
| Perigee: 1648.452 km |

**Satellite: rs-6**

| Catalog number: 13007 |
| Epoch time: 24133.149509319 |
| Mon May 11 11:52:56.511 1984 UTC |
| Element set: 89 |
| Inclination: 87.9634 deg |
| RA of nodes: 148.0269 deg |
| Eccentricity: 0.3051501 |
| Argument of perigee: 105.4771 deg |
| Mean anomaly: 257.2032 deg |
| Mean motion: 12.13561344 rev/day |
| Earth rate: 4e-08 rev/day * 2 |
| Epoch rev: 10556 |
| Semi-major axis: 7954.222 km |
| Anon period: 115.645782 min |
| Apogee: 1679.179 km |
| Perigee: 1556.816 km |

**Satellite: rs-7**

| Catalog number: 13008 |
| Epoch time: 24133.149510621 |
| Mon May 11 11:54:26.716 1984 UTC |
| Element set: 194 |
| Inclination: 82.7658 deg |
| RA of nodes: 161.5617 deg |
| Eccentricity: 0.2808808 |
| Argument of perigee: 143.8761 deg |
| Mean anomaly: 216.2367 deg |
| Mean motion: 12.06669585 rev/day |
| Earth rate: 4e-08 rev/day * 2 |
| Epoch rev: 10556 |
| Semi-major axis: 8026.658 km |
| Anon period: 119.335721 min |
| Apogee: 1678.925 km |
| Perigee: 1540.742 km |

**Satellite: rs-8**

| Catalog number: 13007 |
| Epoch time: 24133.149509319 |
| Mon May 11 11:52:56.511 1984 UTC |
| Element set: 89 |
| Inclination: 87.9634 deg |
| RA of nodes: 148.0269 deg |
| Eccentricity: 0.3051501 |
| Argument of perigee: 105.4771 deg |
| Mean anomaly: 257.2032 deg |
| Mean motion: 12.13561344 rev/day |
| Earth rate: 4e-08 rev/day * 2 |
| Epoch rev: 10556 |
| Semi-major axis: 7954.222 km |
| Anon period: 115.645782 min |
| Apogee: 1679.179 km |
| Perigee: 1556.816 km |

Satellite: rs-7

| Catalog number: 13008 |
| Epoch time: 24133.149510621 |
| Mon May 11 11:56:21.156 1984 UTC |
| Element set: 194 |
| Inclination: 82.7658 deg |
| RA of nodes: 161.5617 deg |
| Eccentricity: 0.2808808 |
| Argument of perigee: 143.8761 deg |
| Mean anomaly: 216.2367 deg |
| Mean motion: 12.06669585 rev/day |
| Earth rate: 4e-08 rev/day * 2 |
| Epoch rev: 10556 |
| Semi-major axis: 8026.658 km |
| Anon period: 119.335721 min |
| Apogee: 1678.925 km |
| Perigee: 1540.742 km |
First HT-to-HT QSO Scored
Thru OSCAR 10

An important milestone was reached May 28th when amateurs in West Virginia and California apparently became the first ever to QSO using handheld transceivers (HT) through an amateur radio satellite. KB6DDQ in Los Angeles and KB8GL in Wheeling, WV, each using only a 2-m FM HT first established contact at 1458 UTC. The historic event was facilitated by so-called "gateway" stations which served to connect local terrestrial repeater systems to the high-flying AMSAT-OSCAR 10 (AO-10) satellite. Although in the past cw QSOs have been reported where one of the stations keyed the transmit switch of his HT for a crude key, it is believed the May 28th QSO comprised the first occasion on which both QSO participants used HTs.

In West Virginia, KB8GL used his 2-m HT to talk through the Triple States Radio Amateur Club repeater, KB8GL/R. Signals from the repeater were picked up by the local gateway station W8BZTV which converted them from FM to SSB while converting them to the 436 MHz OSCAR 10 uplink frequency. Signals were then beamed by W8BZTV to OSCAR 10 positioned high over the Western Hemisphere.

Meanwhile in L.A., gateway station N6JFD tuned to the AO-10 downlink and converted the SSB back to FM and forwarded the signals to the WA6OBT repeater to which KD6DDQ was tuned. The reverse path to Wheeling was the mirror image of this path. Both repeaters and gateway stations operated full duplex and the QSOs were two-way. Signals in both directions were excellent according to monitors.

Later, the W7LWE repeater/gateway in Lake Havasu City, AZ joined in the fun. This made it the first three-way gateway operation and effectively linked amateurs in three states using OSCAR 10's trunking capabilities.

According to an AMSAT official, "This historic event marks the vanguard of easy-access satellite communications for utility use by minimally equipped amateurs."

Participating in the May 28th linkups also were KR3V, KB8AN, K2QWD, N6IAW, W7MCF and numerous others.

Further dramatizing the significance of gateway operations, an event on the preceding day, May 27, vividly showed another aspect of the new, long duration coverage OSCAR; endurance. On May 27th the Wheeling gateway was linked to expert satellite station ZL1AOX in Christchurch, New Zealand for three hours continuously.

AMSAT is suggesting that demonstration of satellite communications by using gateway interconnects may be just the vehicle to exhibit the new OSCAR 10 capabilities while reducing new-user costs to zero. According to AMSAT's WA2LQQ, "Nothing can beat the flexibility of your own OSCAR station, but for those just starting out, this seems a good way to taste the wine before one buys the bottle!"

A free information kit is available from AMSAT (for an SASE) at P.O. Box 27, Dept GW, Washington, DC 20044.

The AO-10 array of KL7NO. Shown are two-meter and 70-cm linear Yagis and a pair of 24-cm loop Yagis. (KL7NO photo.)
Advanced Telecom Equipment Proposed for WØORE

Additional aspects of the ambitious WØORE Ham-In-Space proposal by ARRL/AMSAT have been revealed. Speaking on Westlink, ARRL's Public Affairs Manager Pete O'Dell, KB1N, says the Mission 51-F proposal is based on the success of W5FL but adds significantly to that base as well.

In addition to the two meter FM voice transmissions, the proposal calls for a 10 meter downlink. The modulation of the ten meter transmitter could be from any one of several sources. Perhaps most exciting is the prospect of amateur slow scan television (SSTV). If accepted, the standard format SSTV would use a "frame grabber" store and forward concept fed by NASA fast scan video sourced on the shuttle.

Another possibility for signal source is a 2 meter to 10 meter scanning channelized repeater. A 2 meter scanning receiver with calibrated dwell time would retransmit the uplink audio in a selected 10 meter downlink. The repeater would use FM inputs and outputs.

The 10 meter signal originated at the shuttle's altitudes may introduce some interesting propagation research opportunities for amateurs the proposal points out. Thus beacon operation at 10 meters is also proposed.

AMSAT's inputs to the 51-F proposal were coordinated by Bill Tynan, W3XO. The mission is presently slated for a March 1985 liftoff.

The proposal's ambitious new aspects are complemented by WØORE's operating plan which, ASR has learned, include plans for more scheduled QSO's with schools and amateur radio affiliated organizations. Word at ARRL and AMSAT HQ was that hopes were high that the proposal would be accepted by NASA. Cautious optimism was voiced by W3XO, KB1N as well as Roy Neal, K6DUE and the pioneer Ham-In-Space, Owen Garriott, W5FL in recent interviews with ASR.

AO-10 Hints At Potential Research Topic

Not much has been said since launch of AO-10 regarding the potential for using it as a research probe into various propagation phenomenon. However, several interesting possibilities are suggested by recent dialog between ASR and various active AO-10 users.

An interesting phenomenon has been observed by a number of observers including NØAN, WØRKP and WA2LQQ. EME (moon bouncers) have noted and often seek to advantage themselves of the signal enhancement occurring when the moon is a degree or two above the horizon. The resultant ground effect can add several dB to the echo amplitude. A similar effect has been observed with AO-10 when the spacecraft is close to apogee and just at the observer's horizon. Enhancement of several dB has been reported. Downlink signals can appear surprisingly potent in this circumstance.

Also at these special times a different and very pronounced effect can be noticed. Apparently due to the mutual interference of direct and earth-reflected rays, interference rings are established. The observer hears these as deep fades with highly regular periodicity between 7 and 8 seconds. The fades can be 15 dB or more deep. Polarization changes are noted between AOS and the spacecraft's rise to about 5 degrees above horizon also.

The effects observed, it is reported, seem most noticeable around apogee since the off-boresight angle between the observer and the spacecraft are lowest for the required on-horizon condition when the spacecraft is at apogee. Minimizing boresight error concurrently minimizes spin modulation especially on Mode B. There is every reason to believe the observed diffraction rings will be heard (with anticipated different periodicity) on Mode L but there have been no reports to ASR of this to date.

A second experimental propagation mode involves ducting or so-called Tropo. With the warm summer months at hand in the Northern Hemisphere the scene is set for some interesting times listening sub-horizon for AO-10 via ducts.

The several meteor showers offer yet another interesting avenue for research using AO-10 as a probe.

AMSAT and ASR encourage amateurs and serious students alike to advantage themselves of the enormous opportunity at hand to employ AO-10 as a priceless, accessible tool for probing propagation from the troposphere up to the magnetosphere. Reports and articles are welcome and solicited by AMSAT.

Technical Achievement Award Kicks Off Soon

AMSAT has named Dave Olean, K1WHS, to head up its Technical Achievement Award program. The object of the program is to promote and recognize superior skill in engineering, assembling and testing an amateur radio station especially in the amateur satellite service.

Dave is an experienced VHF operator of note and has himself engineered one of the most sensitive amateur radio stations in the world. His massive 2 meter EME array was featured on the cover of QST and has been measured at 26 dBI gain.

An award will be made to each participating amateur who can demonstrate his station meets certain minimum receive sensitivity requirements, Dave explained. On-the-air transmissions will present precisely calibrated amplitude signals. Numerical code groups will be sent by cw. If one successfully copies the cw, one qualifies for the award. The amplitude of the transmissions will then be reduced incrementally with code groups sent at each level. Endorsements to the basic award will be made for each successive lower level copied. Tests will be run on both Mode B and Mode L. Tests will normally be scheduled around apogee to equalize path losses for participants. Initial plans call for 4 tests per year according to Project Manager K1WHS.

Provision of a standard reference amplitude signal, a frame of reference for all to measure up to, coupled with a tangible reward for upgrading station performance is viewed as a positive step towards improving the performance of the general user community. It will go a long way to reducing demands on the transponder since, presumably, with better "ears" users will find less need to use higher
transmit power levels. There may also be a future tie-in of this program with operating awards so that bonus points in an operating event may be garnered by a station which had previously earned a specific endorsement to his Technical Achievement Award.

First test run of this program is anticipated mid-to-late summer according to KIWHS. Stay tuned.

**Short Bursts**

- Several changes are afoot in the Net Control Station area. After many years of selfless service, W6CG is retiring from NCS duty. Bud has founded and has been the mainstay of the Southwest Pacific AMSAT Information Net which is held each Saturday at 2200 UTC on either 28878 kHz or 21280 kHz. Bud cites his health as the cause of his retirement. Bud's long history of service to AMSAT is capsulized in ASR #20, November 16, 1981.
- Also retiring from NCS duty is N3AR. Ron cites business and personal reasons for retiring. Ron also spearheaded the C64 program development effort which brought the W3IWI orbit program to Commodore users.
- W8GQW is actively seeking replacements for these two fine NCS. See ASR #78.
- In related news, Operations Vice President KOSJ has announced the appointment of Butch Mason, W6KAG, as Voice Bulletin Special Service Channel coordinator. Butch and W6CG have been formulating and transmitting the voice bulletins on AO-10 SSC H2, 145.962 MHz.
- JR1SWB reports JAS-1 is progressing very well but that there may be some delay in the launch. Sound familiar?
- Jan King's, Phase IV "Starburts" concept continues to provoke enthusiastic discussion. A key test will come later this month when technical experts from several AMSAT affiliated organizations meet in England to discuss future projects.
- Gateway operations may require redefinition of the Phase III bandplan. (See related story herein.) Inputs regarding which segment of the band (top, middle, lower downlink) should be used are invited. Please advise HQ on this.
- A proposal to realign Mode B and Mode L operating times has surfaced. The proposal, if adopted, would change Mode L operating times from the present 8 hours per week (2 hours per apogee every Wednesday and Saturday) to 8 hours per week (1 hour per apogee on each Monday, Wednesday, Friday and Saturday). In each case the operating window would be centered on apogee. Intent is to spread Mode L operating time across the week better. Comments to HQ are invited.
- UO-11 telemetry analysis next time as space allows.

**Suspect Low Temps Affect UO-11 Command-Ability**

With nearly a month of data accumulating since the return of the UO-11 beacons on 14 May, suspicions have focused on the temperature of the command decoder module as being the cause of the problem which silenced the beacons shortly after launch.

Progress is being made nevertheless with late reports from the University of Surrey, Guildford, England suggesting the spin is being analyzed and attempts to deploy the gravity boom may occur later this month.

An earlier report appeared on the UO-9 bulletin board. The following is an extract of that bulletin concerning UO-11.

The most likely cause of the last 10 weeks silence is indicated by the very poor command uplinks. Indeed, only 8 commands were loaded into the spacecraft in the first 2 days after recovery. This accompanies a decrease in command decoder and battery temperatures, which is cyclic between 5c and 12c with a period of about 10 days. Commands are received — albeit infrequently — over only about 3-4 days of this cycle, explaining why the current investigations are proceeding cautiously. Since temperature fluctuations are connected intimately with sun-angle, and hence attitude, the command problems could be purely due to the spacecraft antennas pointing away from the earth during some parts of the precession cycle.

Further investigations are continuing with efforts to characterise the signals received by the spacecraft receivers, which are not performing as well as expected. In addition, experiments to improve the performance of the data decoders (which convert the audio signals received into digital data for use by the telecommand logic) are under way, concentrating on pre-distortion of the uplink waveforms.

Stephen Hodgart, our attitude control expert at Guildford, has been working on an elementary magnetorquing manoeuvre which can be controlled to improve the average sun angle (and hence the temperature), the antenna pointing (always towards the ground over the Northern Hemisphere), and hence the command success rate, given a minimum of ground interaction in the process. This will

**Sister Cities Gateway Program Starts**

ASR solicits entries for a list of operational or soon to-be-operational gateway stations worldwide. The list will be published periodically to inform gateway operators what other stations are favorably disposed. List inputs should contain call sign and QTH of the gateway station, the primary terrestrial (local) coverage area; name, address, callsign and telephone number of the gateway station; other relevant information (such as repeater operating frequencies, etc.)

Extremely helpful also would be a tentative operating schedule. For example, "1500 to 2200 UTC Sundays whenever AO-10 is in view of Tulsa, OK." The published list will comprise a forum for gateways who wish to schedule a special event linkup for their coverage areas by matching in the so-called "Sister Cities Gateway Program." Using the "Sister Cities Gateways Program" sponsors in London, England might match up their coverage area with that of London, Ontario or even Lake Havasu City to check on the welfare of the (former) London Bridge!

Send gateway info to: ASR, P.O. Box 177, Warwick, NY 10990.
be attempted on one of the next few ‘warm’ cycles, once all the possible side-effects have been evaluated.

**Oscar-11 Attitude — from Stephen Hodgart (UoS)**

The angular motion of UoSAT-2 has been estimated from the magnetometer data extracted from the pass over Guildford on orbit 1076.

This reveals a dominant transverse motion, a spin state approximating a ‘flat spin’ or ‘tumbling’, defined by a rotation of the z-axis about a spin axis in the plane of the x and y axes of the spacecraft. This arbitrary spin axis is the direction of the overall angular momentum vector and is parallel, within 1 or 2 degrees, to the plane of the orbit. The period is 42 seconds.

The motion is complicated by a slow z-spin oscillation with a period of 165 secs and an amplitude of ±45 degrees. This oscillation couples to the dominant transverse motion causing the flat spin to modulate into a nutational cone of a wide half-angle varying between 84 and 96 degrees, in synchronism with the z-spin oscillation. Every half-cycle this cone flattens for an instant to the pure flat spin and then inverts.

Further analysis using other orbital data is required to test for possible precessional change in the angular momentum, also to test for any continuous advance in the z-axis rotation in addition to its angular oscillation.

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**Orbit Predictions  By KA9Q**

**oscar-9:**

Wed Jun 6 01:03:01.281 1984 UTC: Ascending node at 137.9 west
Nodal period: 94.43341 min
Longitude increment: 23.606536 deg w/orbit
Element set 644, epoch: Sun May 27 09:48:51.21 1984 UTC

**oscar-11:**

Wed Jun 6 00:49:39.674 1984 UTC: Ascending node at 44.5 west
Nodal period: 98.56213 min
Longitude increment: 24.457604 deg w/orbit
Element set 29, epoch: Sun May 27 02:29:08.726 1984 UTC

**rs-5:**

Wed Jun 6 01:56:46.380 1984 UTC: Ascending node at 134.6 west
Nodal period: 119.55145 min
Longitude increment: 29.805553 deg w/orbit

**rs-6:**

Wed Jun 6 00:39:17.68 1984 UTC: Ascending node at 123.2 west
Nodal period: 118.71513 min
Longitude increment: 29.085569 deg w/orbit

**rs-7:**

Wed Jun 6 00:33:40.767 1984 UTC: Ascending node at 117.2 west
Nodal period: 119.19447 min
Longitude increment: 29.925512 deg w/orbit

**rs-8:**

Wed Jun 6 01:56:24.178 1984 UTC: Ascending node at 132.5 west
Nodal period: 119.75292 min
Longitude increment: 30.867781 deg w/orbit
Element set 274, epoch: Thu May 24 06:35:55.695 1984 UTC

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**Satellite: oscar-10**

Catalog number: 14129
Epoch time: 04146.88369868
Fri May 25 21:12:30.867 1984 UTC
Element set: 103
Inclination: 25.6202 deg
RA of nodes: 120.5898 deg
Eccentricity: 0.069713
Arg of perigee: 129.5321 deg
Mean anomaly: 22.7147 deg
Mean motion: 2.05046494 rev/day
Decay rate: 1.215e-06 rev/day
Epoch rev: 77
Semi major axis: 26196.549 km
Anom period: 699.555831 min
Apogee: 35639.517 km
Perigee: 32143.739 km
Beacon: 145.5100 mhz

**Satellite: oscar-11**

Catalog number: 14781
Epoch time: 04146.88354265
Sun May 27 02:29:07.761 1984 UTC
Element set: 29
Inclination: 98.2421 deg
RA of nodes: 210.3619 deg
Eccentricity: 0.0004872
Arg of perigee: 358.1460 deg
Mean anomaly: 1.9576 deg
Mean motion: 11.41067821 rev/day
Decay rate: 2.559e-06 rev/day
Epoch rev: 1252
Semi major axis: 7863.365 km
Anom periods: 98.5041188 min
Apogee: 694.181 km
Perigee: 674.395 km
Beacon: 145.8258 mhz
AO-10 Approaches First Birthday

Last Saturday, 16 June, marked the first anniversary of the launch of Phase IIIB, now known as AMSAT-OSCAR 10. The condition of the spacecraft is generally described as excellent. No serious problems have manifested since 30 Sept. 1983 when a watchdog thermal monitor unexpectedly shut down the Mode B transponder. (See ASR #64.) This problem turned out to be minor; merely a refinement of a temperature trip point in software was all that was required.

Mode L performance is down due to a bias regulator failure. Despite this, activity levels are showing a slow, steady growth. Mode L users now approximate 100 according to a tally by K6RZ. Mode B users are not easily determinable but ASK has heard estimates of 2,000 to 5,000 occasional and regular users worldwide discussed. Early fears of congestion on Mode B appear to have been unwarranted.

On 9 May the argument of perigee passed 270 degrees. On that date, therefore, the latitude of apogee equalled the orbital inclination, 25.62 degrees. Prior to 9 May the latitude of apogee had been progressing north since launch. After 9 May the latitude of apogee will move slowly south again. According to the Satellite Experimenters’ Handbook (available from AMSAT) the rate of change of argument of perigee is 0.277 degrees per day. That means that 325 days after 9 May (when argument of perigee was 270 degrees) the apogee will occur over the equator (when argument of perigee equals 360 degrees). That will occur on about 29 Mar. 1985. The latitude of apogee will continue moving south for another 325 days until on approximately 17 Feb. 1986 when it will reach its maximum southern latitude of 25.62 degrees. At that time the Southern Hemisphere will enjoy the visibility advantage of having apogee occur deep in one’s own hemisphere.

Potentially one of the most popular uses of AO-10 will be gateway access by minimally equipped amateurs. Gateway stations are also a possible conduit for essential emergency communications for long-haul traffic as well as regional coverage. Interest in gateway access is beginning to blossom.

The first operating event on AO-10, the AMSAT-Stoner 25th Anniversary Challenge Cup competition was begun on 15 April. Hundreds of competitors have racked up thousands of QSOs apparently without disrupting other satellite users and perhaps demonstrating how low-keyed competitive events can co-exist with other diversions in the satellite context.

With perhaps another 5 years of productive life ahead, one can only imagine the return on investment that lies ahead for amateurs. And you know, it’s kind of hard to imagine a ham radio world without AO-10 up there percolating. It’s downright comforting. On this first anniversary then, let us ponder at how far we have come; how things used to be when a quick 15 minute pass was gone before one realized it and Phase III was just a dream of the future. Not only has the future arrived...but it’s now aged one!

More remarkable yet, with barely its first birthday passed, the outlines of AO-10’s successors are now visible...some plain...some fuzzy...PACSAT...JAS-1...ARSENE ...and the ultimate system, Phase IV is lurking, tantalizingly perceived through filaments of future’s fog to test the ar-
chitects’ grasp of real and might-be paths to the future of amateur satellites.

HAPPY BIRTHDAY AMSAT-OSCAR 10 from all the world’s amateurs!!!!!

UoSAT Team Says Bird Now Under Full Control

Following a harrowing 10 weeks when the silence of space permeated the receivers of earthbound observers listening for the beacons of UoSAT-OSCAR 11 to return, the powerful 2 meter beacon was successfully commanded on 14 May. Now, in a further dramatic breakthrough, University of Surrey UoSAT program officials report the bird is under full control. The announcement from Surrey ascribes the malfunction to a few components in the VHF command receiver. According to G3YJO at Surrey, the breakthrough came on 6 June. This follows by one day the first successful exercise of the Digital Communications Experiment, DCE. We quote the following UoSAT Bulletin for summary and details.

***UoSAT-OSCAR 11 Spacecraft Operational Status***

Dr. M.N. Sweeting, University of Surrey, UK. 1200 gmt 7th June 1984

The UoSAT team at the University of Surrey successfully re-established command over the UoSAT-2 spacecraft at 2135 gmt 6th June on orbit 1418 using the hitherto inoperative VHF command uplink.

Following a successful launch by NASA on 1st March, UoSAT-2 performed perfectly for the first orbits, switched off the 145 MHz downlink under computer control as instructed and then refused to respond to ground commands. A lengthy series of tests to attempt to home in on the nature of the spacecraft’s problem were undertaken over a period of 10 weeks — culminating in the successful reception and tracking of the known very low level microwave signal which is continuously radiated from the microwave receivers on the spacecraft. This breakthrough, by an outstation of SRI International in Greenland, [on 11 May] confirmed, for the first time after UoSAT-2 fell silent, that the spacecraft primary power systems were functioning and that the Surrey ground-station was indeed tracking the spacecraft accurately.

[On 14 May] on orbit 1076 the Surrey command station succeeded, with difficulty, in switching the 145 MHz transmitter back on using the UHF command uplink. The data subsequently transmitted from the spacecraft allowed the command team to proceed with cautious diagnostic routines to attempt to pinpoint the cause of the problem. After four weeks of exhaustive and painfully slow tests and analyses, the problem has been identified and isolated to a small area of circuitry — about 5 components — that directs command data received by the spacecraft from the VHF uplink to the command decoder. This crucial circuit has triple redundancy, one for each of the three command receivers, and the same fault has not yet occurred on the other circuits. In keeping with the design philosophy of redundancy through different technologies, there are also two routes whereby this area of circuit can be bypassed using either the primary spacecraft (1802) computer or the Digital Communications Experiment (DCE).

Once the problem had been fully understood, the DCE was programmed — using the UHF uplink — to provide a ‘bypass’ around the fault and, when activated on orbit 1418, restored the VHF uplink back to full capacity. The DCE was chosen to do this task firstly as it would leave the primary spacecraft computer free to concentrate on the complex navigation and attitude control & stabilisation tasks now imminent, and secondly as the DCE requires a shorter ‘start-up’ sequence transmitted to get it going! The final configuration will depend on operational requirements and the bypass may be provided by either or both computers.

Initial results indicate that the VHFI/UHF antennas, antenna feeds, hybrid and diplexers are all performing [well] supporting low error-rate full duplex operations at 145 MHz. The current unfavourable attitude of the spacecraft gives rise to a marginal UHF uplink due to antenna directivity — aggravated by low temperature. This should improve if the spacecraft becomes earth-pointing following attitude control manoeuvres and stabilisation.

In the immediate future, UoSAT-2 operations will entail a checkout of the spacecraft functions; detailed navigation analyses and attitude manoeuvres to prepare for gravity gradient stabilisation before the various experiments can be activated on a regular basis.

In a demonstration of the flexible design of the spacecraft, the UoSAT-2 mission has been revitalised. The result is that we are now back to where we were on orbit 3 after launch and we have to proceed with the commissioning of the spacecraft and its experiments. We do not yet know whether there are any other ‘gremlins’ in the spacecraft nor what the operational implications of the use of the on-board computers for the ‘bypass’ will be on the planned experiments.

The UoSAT Team would like to thank all those who have given support through the dark passages of the last months and particularly to Bob Leonard and his team at SRI International and to Harold Price (AMSAT/NTA) for providing the necessary software for the DCE at short notice — transferred from California by electronic mail! — Martin Sweeting [G3YJO], UoSAT Programme Manager

Call For Nominations

AMSAT Headquarters announces that nominations for the office of Director are now in order. The seats of three of the Directors (W3WV, JA1ANG and G3IOR) are up for election in this cycle. Last Autumn VE2VQ, W3GEY, W6SP and W6XN were elected. The term of office is two years.

An AMSAT member who agrees to serve can be nominated by any five current AMSAT members or by an AMSAT Member Society. Nominating petitions may be sent to: AMSAT, 850 Sligo Ave., #601, Silver Spring, MD 20910. Petitions must arrive not later than 31 July.

Nominees will be requested to provide minimal background/biographical data which will be published with the ballots. ASR will publish the platform statements of the nominees again this year. Equal space will be made available to all nominees and the statements will be published in random sequence subject to arrival date at AMSAT HQ.
The election will take place at a date to be determined in the next few weeks when the time/place of the Annual General Meeting is established. Dates in October and November are presently being considered.

This year marks the first time serious consideration is being given to beginning the practice of rotating the place of the Annual General Meeting from year to year. A prime candidate for this year is Los Angeles and initial feasibility studies performed to date indicate many of the necessary elements are at hand.

Consideration is also being given to the proposition of holding the Annual General Meeting in conjunction with a Space Symposium (as was done at the Applied Physics Laboratory in 1983) and then to follow that on a Monday and Tuesday with the annual Board of Directors’ Meeting.

**K2ZRO Commemorated With OSCAR Station**

The memory of Kaz Deskur, K2ZRO, was enshrined last weekend with the dedication of the K. Deskur Satellite Radio station at the Roberson Kopernik Observatory near Binghamton, N.Y. The 16 June ceremonies were held to celebrate the 10th anniversary of the observatory and to dedicate the OSCAR station as well as a new telescope and seismograph.

K2ZRO died 23 Apr. 1984 in Binghamton. (See ASR #76.) Kaz’s service to the greater Binghamton/Endicott community was legend. At the Saturday dedication a grateful community articulated a small “thank you.”

Among the dignitaries attending the dedication and commemoration ceremonies was Astronaut Commodore Richard Truly who recently flew in the Space Shuttle. AMSAT was represented by Executive Vice President Vern “Rip” Riportella, WA2LQQ.

Over the years K2ZRO had contributed significantly but often anonymously or in subtle ways to the progress of the amateur satellite hobby. The K. Deskur memorial OSCAR station at the Roberson Kopernik Observatory is a fitting tribute, we submit, to a remarkable colleague who we miss deeply.

**Late News On BVØ DXpedition**

Too late to make the last ASR edition, the following details about a satellite DXpedition to Taiwan, BVØ, has been received from JR1SWB.

JH1KRC was to operate AO-10 from Taiwan from 8 June to 18 June using the call BVØJA and BVØYL. QSL address is: DXFF, P.O. Box 12, Shinjukukita-Ochiai, 161, Japan.

**WD4FAB To Coordinate Volunteer Activities**

Dick Jansson, WD4FAB, has been named to coordinate all AMSAT volunteer activities. He will establish a data base of available talents and another of open tasks. The main effort will be to effect successful matchups of people with tasks so that jobs get done and people feel satisfied they are contributing to the program.

WD4FAB points out in a letter to key AMSAT managers that in the past too often a prospective volunteer was overlooked or even ignored because the demands of project schedules precluded the requisite training/orientation exercise. Dick will help to smooth the indoctrination and provide “counseling” to those shopping for a good “match.”

Interested prospects may reach WD4FAB at 1130 Willowbrook Trail, Maitland, FL 32751 or may call 305-644-9008 at reasonable times.

**Short Bursts**

- A trio of recent Hamfests has presented AMSAT’s best to a host of thousands in the South, the North and the West. N2CF, KO5I and WB5PMR led a strong contingent of dedicated AMSAT volunteers at the Dallas HamCom convention. Promoting the satellite activity was N5AHD, W5IU and NK6K too. The fine team brought in $1200 for their efforts. Meanwhile VE2VQ led a team at the Rochester HamFest which grossed $800. KB9Z reports $900 was raised for AMSAT at the Rocky Mountain Division ARRL Convention over the Memorial Day weekend. Assisting KB9Z were WB0GAI, WB0RLY, W0TT, WB0PSV and WA6ERB. Congratulations to all!
- Stations in Portland OR, Rapid City, SD and Tulsa, OK are urgently needed for a AO-10 emergency communications experiment on either 28, 29, 30 June, 1 July. If you are in one of these QTHs and have AO-10 capability, please contact AMSAT HQ at 301-589-6062 as soon as possible.
- WD4FAB has two excellent articles in the current (June) edition of QST. The first is on thermal design for amateurs and the second is on a 23 cm bandplan. Check them out. Congratulations WD4FAB!
- Ian Ashley, ZL1AOX, has been named Amateur of the Year for 1983 in New Zealand. Ian was cited for his work as an AO-10 telecommand station and for his pioneering work in packet radio. The award was made recently at the annual meeting of NZART, The New Zealand amateur radio society. Congratulations to Ian!
- Hmm. That makes two major awards in year for AMSAT folks: Lyle Johnson, WA7GXD (who we’ve agreed to share with TAPR-hi) and Ian, ZL1AOX. In prior years W3CEY has been honored by the Central States VHF Society and other awards have been bestowed on numerous AMSAT members. And is anyone wondering why we’re so proud to be part of an organization which can attract and motivate talent like this?
- On the satellite DX front, G3IOR reports new stations on include T26FE, 9X5HR, VP2EME, VP2ES. Meanwhile ON7HP is up to 97 countries worked. Pat says OX will be on AO-10 soon as well.
- Don’t forget to get your envelopes on file at the AMSAT QSL Bureau, 1850 Lisle Ave., Obetz, OH 43072. Our continued thanks to WB8OTH for his superb efforts in this essentially thankless job. Thanks Perry!
Orbit Predictions

By KA9Q

Satellite: rs-5
Catalog number: 12999
Epoch time: 04147.12198177
Sat May 26 02:55:39.214 1984 UTC
Element set: 165
Inclination: 82.9292 deg
RA of nodes: 155.2656 deg
Eccentricity: 0.081108
Arg of perigee: 137.6494 deg
Mean anomaly: 222.4971 deg
Mean motion: 12.0565307 rev/day
Decay rate: 4e-03 rev/day*2
Epoch rev: 10720
Semi major axis: 8033.876 km
Anom period: 119,479862 min
Apogee: 1674.190 km
Perigee: 1656.350 km

Satellite: rs-6
Catalog number: 13002
Epoch time: 04144.42449493
Element set: 61
Inclination: 82.9626 deg
RA of nodes: 149.7578 deg
Eccentricity: 0.0805179
Arg of perigee: 58.5839 deg
Mean anomaly: 382.1858 deg
Mean motion: 12.13561945 rev/day
Decay rate: 4e-06 rev/day*2
Epoch rev: 10771
Semi major axis: 7996.228 km
Anom period: 119,459787 min
Apogee: 1574.634 km
Perigee: 1592.146 km

Satellite: rs-7
Catalog number: 13001
Epoch time: 04140.47530240
Sat May 19 11:24:26.127 1984 UTC
Element set: 95
Inclination: 82.9577 deg
RA of nodes: 153.7289 deg
Eccentricity: 0.0819552
Arg of perigee: 118.9203 deg
Mean anomaly: 249.4629 deg
Mean motion: 12.0666375 rev/day
Decay rate: 4e-06 rev/day*2
Epoch rev: 10858
Semi major axis: 8026.673 km
Anom period: 119,337808 min
Apogee: 1682.622 km
Perigee: 1651.355 km

Satellite: rs-8
Catalog number: 12998
Epoch time: 04145.27289685
Thu May 24 08:32:55.695 1984 UTC
Element set: 274
Inclination: 82.9621 deg
RA of nodes: 158.1641 deg
Eccentricity: 0.0810655
Arg of perigee: 197.1757 deg
Mean anomaly: 162.8721 deg
Mean motion: 12.09284019 rev/day
Decay rate: 4e-06 rev/day*2
Epoch rev: 10857
Semi major axis: 8045.226 km
Anom period: 119,706128 min
Apogee: 1681.922 km
Perigee: 1651.913 km

Satellite: oscar-9
Catalog number: 12888
Epoch time: 04155.35892310
Sun Jun 3 08:31:13.995 1984 UTC
Element set: 647
Inclination: 97.5912 deg
RA of nodes: 129.7804 deg
Eccentricity: 0.0600593
Arg of perigee: 131.7528 deg
Mean anomaly: 226.4027 deg
Mean motion: 15.2582416 rev/day
Decay rate: 4e-07 rev/day*2
Epoch rev: 14743
Semi major axis: 6863.34 km
Anom period: 94,372526 min
Apogee: 499.592 km
Perigee: 494.335 km
Beacon: 145.8250 mhz

Satellite: oscar-10
Catalog number: 1419
Epoch time: 04154.14664979
Sun Jun 3 03:22:52.141 1984 UTC
Element set: 105
Inclination: 25.6378 deg
RA of nodes: 176.2473 deg
Eccentricity: 0.6669574
Arg of perigee: 276.7795 deg
Mean anomaly: 21.6361 deg
Mean motion: 1.065861398 rev/day
Decay rate: -1.36e-06 rev/day*2
Epoch rev: 732
Semi major axis: 26186.844 km
Anom period: 699,536285 min
Apogee: 35629.315 km
Perigee: 3534.378 km
Beacon: 145.8180 mhz
NASA Chooses AMSAT’s WA4SIR For Shuttle Science Mission

Apparently the Hams-In-Space theme will have periodic reprise throughout the second third of the decade as NASA has selected Dr. Ron Parise, WA4SIR, to fly as Payload Specialist on at least 2 future shuttle missions!

Ron was notified on 11 June 84 of his selection. In an exclusive interview with ASR last week, Ron indicated he had applied for the position in Sept. 83 and was delighted at his success. He is anxious to include Amateur Radio activities in the mission although he cautions, “This will be a crew-intensive mission” referring to the projected March 1986 planned launch of Mission 61F. The 61F mission will be a further flight of the Spacelab series.

Dr. Parise is an astronomer with a PhD from the University of Florida (1979) and is 33 years old. He has been a licensed amateur since he was 11 having held prior calls WN8JBR and WA8MHD. Ron is a native of Warren, Ohio, is married and has a young son. He and his wife, Cecelia, are expecting another child.

The newest astronaut-selection is employed by Computer Sciences Corporation in their Systems Sciences Division and currently lives in Silver Spring, Maryland not far from AMSAT Headquarters. Ron is an active AMSAT member and frequently gives talks and presentations on science aspects of OSCAR. He has been AMSAT’s Science Coordinator for the UO-9 mission. Computer Sciences is under contract to NASA and in fact Ron works at the Goddard Space Flight Center at Greenbelt, Maryland.

Ron indicates his contract with NASA calls for him to fly at least two missions and to be backup for a third.

The first flight opportunity for Ron will be the 61F mission currently slated for Mar. 86. This mission will include the ASTRO 1 experiment sponsored by the NASA Office of Space Sciences and involves observation with three separate, specially designed ultraviolet (uv) telescopes.

Ron helped design the Ritchie-Crétien uv telescope which may provide a glimpse of Halley’s comet which will be in the vicinity at the time. A second instrument has been built by Johns Hopkins University and is aptly called the Hopkins Ultraviolet Telescope or simply HUT. It is a prime focus spectrometer. The third instrument is the Wisconsin Ultraviolet Photo Polarimeter or WUPPE for short. The WUPPE is a classic Cassegrain design optimized for uv work.

Ron will operate the telescopes, help point them and oversee experimental data collection. Follow-on missions for Ron and the telescopes could include ASTRO 2 (Nov. 86) and ASTRO 3 (July 87).

Regarding his operating Amateur Radio from the shuttle Ron says he is “enthusiastic” and looks forward “to bringing some radios aboard”. Ron says he will support proposals to NASA for Amateur Radio activity on the missions he will be flying but because of intense preparations for the science aspects of the mission, will be unable to spearhead the proposal effort. He indicated full support for the premise without hesitation, however.

The Amateur Space program has its roots firmly planted in space science. AMSAT is a remarkable alloy of scientists, engineers, educators and layman reflecting the very best in Amateur Radio. We are justly proud that “one of our own” has been selected to carry space science further along new paths and will be carrying Amateur Radio along just to keep in touch! Congratulations to Ron, WA4SIR! (And to us, too.)

Dr. Troy England, W7ORE, is due to fly the shuttle in March 85 and an ambitious proposal was jointly submitted by ARRL/AMSAT recently to permit Tony to follow the lead of Owen Carriott, W5FL, and Owen’s historic 1983 premiere Ham-In-Space effort.

Greenland DXpedition Planned For AO-10

Members of a scientific expedition to a mountainous area of Greenland will be active on AMSAT OSCAR 10 from July 25 to August 20, 1984. Mauro, I9BCK, will be part of a team travelling to Stauning Alps, Scoresby Land at 72 degrees N, 25 degrees W. Operating under the call I9BCK/OX, Mauro will be using a 10-turn helix for the 435-MHz uplink and a pair of 10-element crossed Yagis to receive the 2-meter downlink. The station, which will generate 30 W at 435-MHz, will be powered by an array of solar cells.

The most useful orbits for North American stations will be 843, 847, 851, 855, 884, and 886. Those in Europe should listen during orbits 859, 861, 863, 867, and 871. In the Far East, Mauro should be available during orbits 834,
836, 838, 873, 877. Receive frequencies will be around
145.87 MHz for cw and 145.91 MHz for phone contacts.
Operation will be approximately 4 hours around apogee.
For confirmation, QSL cards should be sent to I0JAI.

The expedition, called "Stauning 84," is part of a scient-
ific research program to study the ionosphere at high
latitudes. Indeed, some impairment of satellite operation
is expected due to auroral scattering and listener reports
on the effects of auroral reflections on the uplink signal are
requested.

In addition to satellite operation, the expedition will
operate an hf station from 2200 to 0600 UTC. Frequencies
to watch for cw operation are 1840, 3510, 7005, 14025,
21025, and 28,025 kHz. Phone operation will be on 3785,
7070, 14195, 21220, and 28,530 kHz. The hf station will
run 100 W and use wire antennas.

**Tapes Available At Library Says WB0GAI**

Roger Johnson, WB0GAI, tells ASR that numerous tapes
are available through the AMSAT Video Tape Library which
he administers for AMSAT. The available tapes are as
follows:

#1 OSCAR, the Satellite You Can Use — A narrated slide
program outlining the history of amateur satellites. Also
includes a silent film of the attempt to launch Phase III-A.
Available in VHS and Beta II.

#2 KA9Q Orbital Simulation Tape — A Computer simul-
ation of the earth as it would appear from OSCAR 10. Simula-
tion runs 60 seconds only. VHS only.

#3 Amateur Radio's Newest Frontier — The original ARRL
tape of the W5LHL SSTV-9 flight in December 1983. VHS only.
[Following tapes were originated at the 1983 AMSAT An-
nual Meeting/Space Symposium]

#4 OSCAR 10, its design technology and construction,
W3GEY and the Mode L transponder, W3GEY. Runs 1:49.
VHS only.

#5 OSCAR 10 operations and ground tracking require-
ments by KO5I. Map-based tracking systems by K2UBC. Personal

computer-based orbital predictions and tracking programs
by NSAHDI. Runs 1:42. VHS only.

#6 Independent Space Project Committee by Ron Molz.
Solar Sail Project by K8OCL. Amateur Space Telescope by
Jesse Eichenlaub. Amateur satellite programs worldwide by
W3IWI. Runs 2:03. VHS only.

#7 Packet Communications: PACSAT, UoSAT B. Circularly
polarized antennas by K2UBC. Runs 1:49. VHS only.

#8 Analysis of engineering problems facing AO-10 by KA9Q.
Spacecraft technology status; panel discussion by W3GEY,
W4PUJ and KA9Q. Runs 2:00. VHS only.

All tapes are available for a non-refundable fee of $6.00.
Please also send a SEPARATE check for $25.00 per tape in
U.S. funds. The second check will be returned when the
tape borrowed is received at the library. Tapes may be re-
tained by the borrower for up to 3 weeks from the time of
receipt. Correspondence may be addressed to: AMSAT
Video Tape Library, 1627 36th Avenue Court, Greeley, CO
80634.

**Call For Papers**

AMSAT officials have announced that the AMSAT Annual
General Meeting will be held in Los Angeles this year.
The exact date remains to be decided but it appears late Oc-
tober or early November are prime candidate times. The
Second Annual AMSAT Space Symposium will be held in
conjunction with the meeting. AMSAT has issued a call for
papers to be presented at the Space Symposium. Cleyon
Yowell, AD6P, has been named Symposium Technical
Chairman and inquiries should be directly to him. Dennis
Dinga, N6DD, has volunteered to handle logistics for the
meeting and Symposium.

**Space Hardware On Display In Finland**

Visitors to the Space 2000 exhibition in Finland this sum-
mer will get a first-hand look at Soviet space hardware. The
exhibition at the Dipoli Conference and Congress Center
near Helsinki will feature the 32-m long Salyut-Soyus-
Progress space station. In addition, there will be more than 30 exhibits related to the conquest of space showing sputniks, space capsules, and a variety of scientific and communications satellites.

The exhibition will be open from July 6 until August 5 from 10 A.M. until 8 P.M. The patron of the show is Mauno Koivisto, the president of Finland.

**UO-11 Progress Report**

*UoSAT Bulletin-80 22nd June 1984*

**UoSAT-OSCAR 11 Status**

Work continues apace to continue the investigations into the initial problems with OSCAR-11, to commission other parts of the spacecraft and to start commutated attitude control manoeuvres.

Major milestones achieved last week included the successful re-powering of the 1802 main computer, the use of the programmable dwell features of the telemetry system and the transmission of a number of new data formats which will be used to help the commissioning procedure.

The past week has been spent actively magnetorquing. The transverse spin (period initially around 40 seconds when the beacon was switched back on in May) has now been reduced to zero and work is currently being done to remove the oscillations which remain. The magnetorquer has been left on continuously since the spin nearly stopped, locking the z-axis of the spacecraft onto the Earth's magnetic field in a similar way to the permanent magnet used on OSCARs 7 and 8. The manual magnetorquing referred to below is performed using computers on the ground to compute the spacecraft's attitude from the dwell telemetry received and to pulse the magnetorquers by remote command. This process is being automated for the final damping, with a program due to run on the 1802 computer on-board the spacecraft.

A daily account follows:

**Saturday 16/6/84**

Transverse spin 82 seconds.

**Sunday 17/6/84**


**Monday 18/6/84**


**Tuesday 19/6/84**

Manual magnetorquing morning and evening. Spin about 600 seconds.

**Wednesday 20/6/84**

Manual magnetorquing during the morning, culminating in the z-magnetorquer coil being left permanently on at the end of orbit 1617. On orbit 1622, a whole-orbit telemetry program was loaded at 19:43:29, recording channels 1, 2, 3, 10, 50, 52. This showed on the next pass that the spacecraft was locked to the magnetic field, but oscillating widely around it.

**Thursday 21/6/84**

Magnetorquing to damp the oscillations mentioned above was performed during the morning, followed by the loading of the whole-orbit telemetry program again. Load time was 10:55:27 and channels recorded were 0, 2, 10, 20, 30, 52. The battery charging and power budget at this attitude was monitored, but not deemed to be too low. The ODATA program was loaded again at 18:43:56 and again on orbit 1637 (no time available), both using the same recorded channels.

**Friday 22/6/84**

More manual magnetorquing further damped the oscillating motion. This was followed by another ODATA to evaluate the effect. The load time was 11:27:17 and channels recorded were 1, 2, 3, 10, 50, 52.

**OSCAR-11 Attitude**

Preliminary attitude control manoeuvres commenced on orbit 1535, 14th June, to reduce the transverse spacecraft spin and to nudge the z-axis up into the orbit plane ready for magnetic capture and subsequent gravity gradient boom deployment. The manoeuvres thus far have comprised commutated firings of the z-axis magnetorquer under on-board computer control initiated by ground command from real-time analysis of the spacecraft motion.

These manoeuvres will continue until the control algorithms have been verified, the magnetorquer effects calibrated and, hopefully, the spacecraft spin reduced. OSCAR-11 is transmitting a selected number of telemetry channels to provide rapid sampling of navigation data and magnetorquer status. Using the dwell telemetry, channels 01, 02, 03 and 61 are transmitted in a one-line frame with the standard checksum, thus providing very fast data for ground analysis.

**UoSAT-OSCAR 11 Operations Schedule**

Further transmissions of whole-orbit-telemetry data are likely next week to assess the performance of spacecraft systems and the results of attitude manoeuvres. Magnetorquing data and diagnostics from automated procedures can also be expected. Various tones and transmissions of random characters indicate uplink tests and other esoteric activities!
OSCARs 9 and 11 Whole Orbit Recorded Telemetry

The following is an extract from UoSAT bulletin no. 27, describing an 1802 computer program which can be run on OSCAR 9 to collect telemetry data over the period of one or more orbits and repeatedly dump the stored information back to the ground.

DETAILS OF THE WHOLE-ORBIT TELEMETRY RECORDING PROGRAM ARE GIVEN BELOW. THIS PROGRAM CAN STORE UP TO 7 CHANNELS OF TELEMETRY FROM EACH FRAME OVER A PERIOD OF UP TO 100 MINUTES (OR 1 CHANNEL FOR APPROX. 700 MINUTES) FOR LATER TRANSMISSION. PLOTS OF THE TELEMETRY CHANNELS RECORDED BY THE SPACECRAFT THROUGHOUT A WHOLE ORBIT INCLUDING ECLIPSE, ETC. ARE USEFUL INDICATORS TO THE CONDITION OF THE VARIOUS INTERNAL SYSTEMS. THE PROGRAM PRODUCES CHECKSUMMED LINES OF DATA, WITH SERIAL NUMBERS AND A VARIABLE NUMBER OF TELEMETRY DATA VALUES. EACH LINE HAS BEEN RECORDED FROM THE STANDARD TELEMETRY FRAME (5.28 SECONDS DURATION, EACH CHANNEL DIGITISED AT THE TIME IT WOULD BE TRANSMITTED IN THE STANDARD TELEMETRY FORMAT).

THE DOWNTOWN FORMAT IS:

NNNNXYZZYXXYYZY2CC

WHERE NNNN IS F-HEX DIGIT SERIAL NUMBER (UP TO 0469D LINES ARE SENT AS DATA IS ACCUMULATED)
XYZ ARE BCD TELEMETRY CHANNEL VALUES AS IN ORDINARY TELEMETRY (VARIABLE NUMBER FROM 1 TO 7). CC IS 1 BYTE CHECKSUM (ADD NN, NN, 0X, YZ, CC BYTES USING 8-BIT BINARY ADDITION - RESULT SHOULD BE 0A8H).

NNNN-0000 GIVES CHANNEL NUMBER RECORDED IN OYZ POSITIONS.

THE LINE WITH SERIAL NUMBER 0001 WAS RECORDED AT THE PROGRAM LOAD TIME. NO COMPUTER-READABLE TIMESTAMP IS AVAILABLE, BUT WE WILL ATTEMPT TO GIVE THE PROGRAM LOAD TIME AND TELEMETRY CHANNEL NUMBERS IN FUTURE BULLETINS. DISPLAYING WHOLE-ORBIT DATA IN REAL TIME (OR FROM A TAPE RECORDING) IS AN IDEAL DEMONSTRATION FOR EXHIBITIONS, ETC.

Modifications for OSCAR 11 include a different telemetry period (4.84 secs instead of 5.28 secs, caused by using 2 stop bits per character rather than 3 and the opportunity to insert a timestamp from the real-time clock to indicate when the data was recorded (not yet implemented)!

UoSAT-OSCAR 9 Schedule

The 21 MHz beacon will be in use this weekend.

Friday Load bulletin
Saturday Bulletin/1200 bd telemetry/Digitalalker
Sunday Bulletin/1200 bd telemetry/Digitalalker
Monday Radiation Data
Tuesday Checksummed telemetry
Wednesday CCD image
Thursday Whole-orbit telemetry data

Friday Load bulletin

General News — QSL Cards

UoSAT-OSCAR 11 QSL cards are being prepared — we hope they will appear sooner than the UO-9 cards and will be coloured! Cards will be backdated for earlier reports!

General News — HF Beacons Enquiry

We have received an enquiry from NASA-HQ concerning the number and distribution of stations receiving the HF Beacons Expt on UoSAT-OSCAR 9. If you haven’t returned a questionnaire but actively track the HF beacon(s) or would be interested in a future, higher power experiment, please let us know!

General News — UoSAT Newsletters

The following information has finally been printed at UoS.

The full pack will be sent to all enquirers who have written to us since this year’s newsletter, just ask for individual sheets if you want them!

Newsletter — General status of UoSAT activities at June 1984

Datasheet 1 — UoSAT Project Summary
Datasheet 2 — UoSAT-1 Technical Data Summary
Datasheet 3 — UoSAT-1 Orbit Geometry, Tracking and Groundstation details
Datasheet 4 — UoSAT-1 Telemetry
Datasheet 5 — UoSAT-2 Project Summary
Datasheet 6 — UoSAT-2 Technical Description
Datasheet 7 — UoSAT-2 Reception, Data formats and Telemetry equations
Datasheet 8 — UoSAT-2 FSK demodulation using BBC Micro.

Questionnaire — As transmitted on this bulletin

Further sheets will be issued in the near future. Anticipated subjects include data decoding, experimental suggestions and educational ideas.

Thanks for Reports & Questionnaire Returns

ZL1MO, ON6UG, ZL4KW, W4AUA, VK4XY, G3UMF, VK4ZF, WSA2IB, W2RS, K9Q, HA5WH, G8ISI, OZ1GBY, G8TIZ, VK2ZAZ, VK2WB, VK2ZHM, HB9RKR, VK5AGR, G3HMO, ZL4TQ, N4HY, I2KBD, K1KSY, KATFAD, GB8ND, G3YMC, IV3TK, IW3ER, G3VYV, G6YFF, VK2WB, G6TPQ, GM6JVC, ON7VQ, ZL3QL, VK2AVH, ZL1AOX, JA4GVA, G6ESK, G2UK, G4XXR, OZ1WN, G6GWR, I2KBD

N. Clayton (ZL), M. Osleider (ON), B. Lindholm, Milham Ford School
G6ESK, ON4FI, OZ1IWS, G4GPO, G4PSO, JA2GSD, G3HMO, OZ2LLW, I2KBD, D Hudson (Sir William Turner’s 6th Form College).

This week: K1KSY, F6EPU, G3FIJ, G3RLW, HB9CBU.

Amateur Satellite Report is published and mailed First Class bi-weekly for the Radio Amateur Satellite Corporation. The purpose is to enhance communications about the Amateur Radio Satellite Program. Subscription rates for the United States, Canada, and Mexico are $22.00. Foreign is $30.00. The rate covers 26 issues (typically one year). Send check or money order in U.S. funds (drawn on U.S. banks only) to “Satellite Report,” 221 Long Swamp Road, Wolcott, CT 06716. Information contained herein may be quoted without permission provided credit is given to Amateur Satellite Report, Wolcott, CT 06716. Amateur Satellite Report is Copyright Protected and duplication of this publication in any way including by the photocopy process or by electronic means (computer data banks, etc.) is not permitted under any circumstances. Amateur Satellite Report is endorsed by the ARRL as the special interest newsletter serving the Amateur Radio Satellite Community. The editorial opinions expressed are not necessarily those of the ARRL.
Short Bursts

- According to WA2RDE, ON7HP claims to have contacted his 100th country on AO-10. Although not currently confirmed by ASP, Peter, ON7HP, was known to have been closing on the milestone recently. His crossing the magic 100 mark was rumored imminent. If substantiated it would mark an important first in the annals of OSCAR. AO-10 had been in operation less than a year when word of Peter's presumed achievement was received. More on this later.
- John Champa, KB0OCL, spoke at yesterday's (15 July) Hall of Fame Hamfest in Canton, Ohio. John led the AMSAT Forum at the 10th annual event.
- Roger Soderman, KW2U, represented AMSAT at the 2nd Annual Conference of Private Sector Space Research and Exploration at New York City's Hayden Planetarium 27 May. Roger's talk was entitled "Satellites On A Shoestring". The event was scheduled to coincide with another conference, "Moving Industry Into Space" during which top government and industry leaders presented ideas on the commercialization of space. Other speakers on the 27th from the "Private Sector" conference included Jesse Eichenlaub of the Independent Space Research Group, Ronald Molz, Independent Space Projects Committee.
- A brand new brochure called "The Radio Amateur Space Program (What is all the excitement about)" is included in the new ARRL Satellite Locator package. Written by KB0OCL, this superb document replaces the obsolete "What Is AMSAT" which had been a mainstay for years. It is available for an SASE from AMSAT Headquarters and is a fine handout for hamfests, club meetings and the like. A real fine job by KB0OCL. Read this one and be proud to be part of the AMSAT team!
- The enhanced C64 AMS 20-64 version of the W3IWI program has been mailed out but, due to a clerical error, the second sheet of instructions was omitted. The additional sheets are being mailed now.
- The AMSAT-Stoner 25th Anniversary Challenge Cup ended on 14 July. We'll have a recap of the event and some preliminary claimed scores as soon as possible.
- The first dry-run of the new AMSAT Technical Achievement Award on-the-air test should be held in the next few weeks with the first official record run anticipated in late September. Object of the test will be to demonstrate the receive sensitivity of your satellite station. A basic award will be made and then endorsements will be made to the basic award for subsequent improvements in receive sensitivity. Project Manager K1WH5 is working out the technical details now to insure a fair, challenging project. A series of handsome awards will distinguish this program so tidy up your antennas now and tweak those preamps for the excitement just a few weeks away!
- A new booklet, "Establishing and Operating An Amateur Radio Satellite Gateway Station for Your Local Repeater" is available in limited numbers from AMSAT Headquarters while the supply lasts. The 14 page brochure by WA2LQQ covers the basics in straightforward terms. Send an SASE.

John Champa, KB0OCL (left) accepts donation of 70 cm power amplifier on behalf of AMSAT from Everett Gracey WA6CBA, Vice President of Mirage. The presentation took place at the 1984 Hamvention in Dayton. The donation will go into the prize cache for the new Member Recruitment Drive coming soon.
($0.37) to AMSAT requesting the brochure. Insure the envelope is a business size or larger. A small donation to cover reproduction costs is appropriate.

- UO-11 continues on the comeback trail with gravity boom deployment, the next major milestone, in sight for the next few weeks. All’s going well now.
- Attending the ARRL National Convention in New York? Contact N2CF at HQ if you can help out in the AMSAT booth 20-22 July.

**Tampa Ham Becomes First Walkie-Talkie-Satellite Terminal**

Against a backdrop of the first HT-to-HT QSO using AO-10 as reported in these columns recently and concurrent with the popular ARRL Field Day event comes word of the first successful Walkie-Talkie-Satellite QSO. Moreover the claim by KB4CRT of Tampa, Florida, is that there were no gateways or other “assists” involved.

That’s the claim of John Silberman, KB4CRT, who, in an interview with ASR says that on the morning of 23 June 84 he carried his entire AO-10 station on his back, strapped to his waist, lashed to his arms, stuck in his pockets, and in his hands, etc. The accompanying photos taken by John’s colleague Robert Utterwyk, WB4IOA, document the event in KB4CRT’s back yard.

According to John, “There were no gateways, connections to the AC power mains, nor car batteries nor anything else that would prevent ambling freely around” carrying the complete terminal with him. It was literally a WT or walkie-talkie, the precursor of the HT or handi-talkie.

The historic QSO was achieved at 0942 UTC, 23 June 84 with none other than ON7HP, who now lays claim to his own first. (See related story on ON7HP’s claim 100 countries on AO-10 elsewhere in this issue.) The SSB QSO had signal reports exchanged of 5/7 (ON7HP) and 5/2 (KB4CRT).

KB4CRT’s equipment was described to ASR as follows. For the 70 cm uplink John used an IC-402 with a 20 watt solid state amplifier powered by two lantern batteries. On receive John used an ARR GaAsFET preamp powered by some penlight cells. Both the preamp and the battery were taped to the antenna mast. The receiver was an FT-290 portable. The antenna was a combination 2m/70cm beam built by J-Beam. The 70 cm linearly polarized beam had 12 elements and a claimed 12 dBd gain according to KB4CRT. The 2 meter beam, orthogonal to the 70 cm yagi, had 6 elements and a claimed gain of 8.5 dBd according to KB4CRT. The 2 meter beam was also linearly polarized.

After chatting with Peter, ON7HP, KB4CRT went on to QSO DB8KJ, DJ0PQ and G6CHP just to prove the first one had “not been a fluke!” Asked what inspired him to this interesting but admittedly bizarre demonstration, John replied it was “just for fun” and “to show it could be done!” He adds, “With the news about gateways, I wanted to take it one step further.”

A pilot, John says he’s now scheming how to become the first aeronautical mobile to work through AO-10.

**Second Member Recruitment Drive Kicks Off In August**

AMSAT General Manager Bill Lazzaro, N2CF, announces that the Second Annual Member Recruitment Drive commences 1 Aug. and will run until 31 Dec. 84. A sizeable prize offering is promised with the grand prize presently under wraps but rumored to be one of the new, super-deluxe rigs. Last year’s prizes included the Yaesu FT-726R as Grand Prize. It was snared by N3CEG in a down-to-the-wire shootout with KW2U.

While some modifications to the rules are under consideration by N2CF and K0SI, the basic premise remains
unchanged from last year: sign up new members. The more
new members you bring in, the bigger your prize. And every
one will get a prize for even one new member signed up.
Complete rules and prize details next time. But it’s time
to extend your hand and welcome aboard new members.
AMSSAT needs them and you can benefit doubly: By help-
ing to strengthen AMSSAT and by winning yourself a dandy
prize; maybe even the BIG one! Come 1 Aug. you should
be on your way. Send an SASE to HQ for membership ap-
lications and get started on your road to that Grand Prize
or one of the many other prizes!

Amateur Satellites and
Emergency Communications

Special to ASR by N4AZI, David C. Eanes

Public service in the form of emergency communications
has long been a part of the amateur radio scene. It forms
a raison d’etre for the Amateur Radio Service in the United
States and other nations as well. Public service forms the
basis for Amateur Radio spectrum allocations in the in-
ternational arena.

Amateur Radio typically uses virtually every resource
available to it for emergency communications and message
handling. But until recently Amateur Radio satellites have
not been a tool that could be used for emergency com-
munications. The reason is obvious. A 10 or 15 minute
orbit is much too furtive an opportunity to count on. Now
with AO-10 operational and with the promise of more Phase
III satellites and even a hint of geosynchronous, Phase IV
birds at hand, it may be time to examine the potential for
emergency communications inherent in OSCAR.

We believe this valuable resource should be developed
for a number of good reasons. First, it is tradition. Just as
emergency communications (EC) forms the basis for being
the Amateur Radio Service, it should for an integral part of
its sister, the Amateur Satellite Service. Second, we have
a valuable and reliable resource in AO-10 that should be
used to its fullest potential. With the advent of Phase IV
perhaps just a few years away, it’s not too early to set the
foundation for systems and procedures that will fully come
into play when a geosynchronous resource is available. We
can use AO-10 now as the development ground for those
systems and procedures while in the interim maximizing
the utility of our present resources. Finally, with many new
modes of communication such as packet networking and
gateway access to satellites being developed, we have the
ability to assemble a working model of a national and in-
ternational EC network unprecedented in capacity, ac-
curacy, timeliness and reliability.

We therefore propose the institution of an AMSAT Special
Project Team dedicated to the formulation of a comprehen-
sive program we will call the Amateur Satellite Emergency
Communications System (ASECS). This team would begin
at once the development of a program for EC and opera-
tions to be implemented on AO-10 and later satellites. We
would appreciate sharing your thoughts on these initial con-
cepts and invite your expressions of interest in being a part
of this effort. You may contact me directly at the address
below or via AMSAT HQ or Vice President/Operations

Will this man be “Ham-In-Space” number 3? Perhaps! This is
Dr. Ron Parise, WA4SJR, who was recently selected as Shuttle
Payload Specialist.

KOS1. David C. Eanes, N4AZI, 4866 Drusilla Lane, Baton
Rouge, LA 70809.

UoSAT Bulletin 82 6th July 1984

The following has recently been released by G3YJO at
Surrey.

Amateur Satellite Technical Planning Meeting

The Meeting, held near Cheltenham, England, from June
30th to July 3rd, was finally attended by: G3YJO, W3GEY,
DJ42C, KA9Q, KE3D, HA5WH, W4PUJ, NK6K,
VE1SAT/VE6, GB4DQX, DJ1YQ, DJ5KQ, ZL1AOX, ZS6BNT.
The group discussed the following topics:

* PACSAT — presentation of project status, design sum-
mary, schedule.
* UoSAT — presentation of programme status, attitude con-
rol results, experiment plans.
* AO-10 — spacecraft status, 1984/5/6 eclipse studies, oper-
ating schedules and modes.
* ARIANE 4 — launch opportunity status, Phase III con-
figuration, Phase IV (geostationary) proposal.
* Technologies — propulsion technologies, attitude con-
rol/stabilisation technologies, new processors/controllers,
ranging, modulation techniques/protocols/data standards,
separation systems for new missions.
* Organization — discussion of improved international co-
rdination on satellite technical standards, spectrum utilisa-
tion, launch opportunities, spacecraft operation, informa-
tion dissemination, fund raising.

The formation of an ‘Amateur Satellite Service Council’
was proposed to expedite the above with representation
from all bona fide amateur satellite groups worldwide.
Details of the draft proposal will be included in a later
Bulletin after further refinement.

The Meeting was considered to have been most fruitful and resulted in the definition of future goals and missions, while ensuring the maximum potential is realized from current programmes.

Phase IIC

The proposed Phase IIC spacecraft configuration is as follows:
* Mode-B, as AO-10
* Mode-L, similar to AO-10 but with anticipated +20 dB amplification
* Packet Communications
* S-Band Beacon

Much of the necessary flight hardware already exists for the basic spacecraft and it is proposed that, in addition to contributing the power module as on AO-10, HASWPH and the Technical University of Budapest may undertake the mechanical integration of the Phase IIC spacecraft.

UoSAT-OSCAR 11 Status

The majority of our efforts this week have been concerned with the refinement of automated attitude control manoeuvres on OSCAR-11 using the magnetorquers controlled by the on-board 1802 microcomputer.

The first algorithm used last week only used the sign of the z-component of the earth's magnetic field (measured at the spacecraft) and the result of running this was that the craft 'locked' to the magnetic field very successfully, but with residual oscillations of up to 40 degrees. The newer program, taking into account the changing absolute magnitude of the field by using a simple measure of the transverse component as well, has reduced the oscillations to around 15 degrees. Analysis of whether this is small enough to permit boom deployment is continuing, but a third algorithm is ready should further manoeuvres prove necessary.

UoSAT-OSCAR 11 Operations Schedule

We will be using dwell telemetry, with channels 01, 02, 03, 61 and 67 transmitted in a one-line frame with the standard checksum, thus providing very fast data for ground analysis. (Note channel 67 has been added to monitor the computer command. The MSB of channel 67 is the magnetorquer demand flag (set when commands sent if they are enabled), the other 3 bits in the first digit giving type of firing (based on a z-field change or a transverse field change) and the bottom 8 bits giving a measure of the transverse change.)
AO-10 Schedule Overhaul Tied to Eclipses, Service Upgrade

In the first major overhaul of the AO-10 operating schedule since the satellite transponders were first placed in service 6 Aug 83, AMSAT technical planners have revealed plans for significant improvements.

The improvements affect the General Beacon and both Mode L and Mode B transponders. The revisions are expected to be implemented in early August. Improvement in the General Beacon involves upgrades in schedule, content and currency while the transponder operating schedule will be thoroughly revised.

According to Engineering Vice President Jan King, W3G3Y, the changes are an effort to respond to a number of complex scenarios including the onset of a major eclipse season, the longest seen by AO-10 to date, beginning in early September. (See accompanying graphs.) Other factors contributing to the overall plan included the strong desire to improve the usefulness of the beacon, communicate more and varied data on it, accommodate Mode L users and encourage further inroads there. W3G3Y pointed out to ASR that these and other objectives have to be accomplished within "some rather stringent engineering constraints."

The plan to upgrade AO-10 service comes as one of a series of major decisions resulting from a meeting of distinguished technical leaders who met recently in England. (See ASR #82 for a preliminary report by G3YJO.) Meeting there the first week of July, the group developed consensus views on topics ranging from AO-10 to Phase IIC, PACSAT, Phase IV and more. More on these other topics soon.

Details of the AO-10 planned improvements as presented to ASR by W3G3Y are as described below. W3G3Y cautions that a bit of fine-tuning and tweaking will be necessary pending the result of sun-angle studies.

Beginning in August the General Beacon (145.810 MHz) will begin a round-robin program of CW, RTTY and PSK telemetry designed to provide virtually all key system operating conditions consistent with listeners' station sophistication. The more complex your station, the more information will be available to you. The operating schedule will be as follows:

- 0-5 minutes past the hour CW
- 5-15 PSK
- 15-20 RTTY
- 20-30 PSK
- 30-35 CW
- 35-45 PSK
- 45-50 RTTY
- 50-60 PSK

CW transmission speed will be about the same as the present. The RTTY format will be 50 baud, 170 Hz shift. ASR is told a machine which copies standard 45.45 baud (60 wpm) baudot will copy AO-10 RTTY OK. The PSK telemetry will be the same as has always been used (400 baud). W3G3Y says a serious effort will be made to make information and perhaps hardware available for stations that wish to copy the PSK telemetry. A computer will be required and a substantial homebrew software development effort may be required to develop the interface, however.

The format of the CW message will be a simple two-part standard: header and text. The header will be composed of 4 elements: 1. AGC level; 2. MA (Mean Anomaly in units of 1/256 orbit); 3. Message serial number; 4. Spacecraft identifier, ie, AO-10. The header will be followed by a text message of varying content. The entire message, header and text, will be enveloped by the 5 minute limit.

The RTTY format will contain all of the CW bulletin information. In addition, however, it will also contain the telemetry "Y-blocks" which reveal much about the AO-10 operating conditions. The values are expressed in standard engineering units. For example, milliamps, volts, degrees, etc.

The PSK format may be tweaked a bit but there are no details yet available on the nature or magnitude of PSK telemetry changes.

W3G3Y indicates that specific user-oriented features will be included as operator aids. Such features would logically include Keplerian elements for AO-10, he suggests. Suggestions as to what other operating aids might be included are solicited. Suggestions may be forwarded to AMSAT HQ.

Plans for the new transponder schedule, according to King, had to account for seasonal changes in sun angle as well as the eclipses. These factors drive the overall spacecraft attitude calculations which in turn dictate transponder schedule. Also figured in are the interesting and complex relations between power consumption (Mode L consumes much less than Mode B because of its lower than expected sensitivity) and antenna beam pattern. The Mode
B pattern is much more tolerant of off-pointing than is the Mode L system. King explained that formerly the bore-sight angle of the satellite was zero (dead-on) when the satellite was at apogee. Now, however, the sun angle dictates off-pointing of apogee. The solar cells produce most power when the sun is normal (perpendicular to) the plane of the solar panels. With the changing seasons, the angle must be adjusted. Above all of course, the power budget must remain positive. That means that for a given period of time (measured in time scales of an orbit or two) the available battery energy must be non-negative. Since recoverable battery power is less than what you put into it (there is always some loss to heat and other subtle effects) the batteries must see a net positive influx of energy on the time scales depicted.

W3GEY points out that since Mode B is a strong consumer of power, Mode L can be viewed as a low power mode analogous to Mode C on AO-7 and that off-times should be scheduled to maximize energy capture and storage.

The plan is schedule which results is shown below. King advises that some fine tuning will be necessary but that the overall scheme of things will be as depicted.

Notes: Anomalistic period (time between successive perigees) is 699.536283 min. One "MA tick" is the period divided by 256, ie. 2.7325636 minutes. Onset of Mode L will be subject to refinement. Exact value will be announced. Recharge time will be 128 MA ticks after Mode L onset and be about 16 ticks long.

The General Beacon update will occur about weekly. This is made possible in part by the fact of four new command stations having been qualified recently. They are VE1SAT/VE6, KA9Q, DK1KQ and ZL1AOX. All attended a special seminar at Marburg, West Germany (Headquarters of AMSAT DL) following the meeting in England. The new command stations will be taking up their duties soon.

The maximum eclipse this year will be about 70 minutes long and will occur on about 1 Oct. Next year an even more severe eclipse period will occur when on about 20 Aug. a 105 minute eclipse is predicted. KA9Q is developing a profile of the eclipse cycles to be fed into the analysis process which determines the energy budget.
Northwestern Division ARRL Convention Includes Space Features

The Northwestern Division ARRL Convention held in Seaside, Oregon 1, 2 and 3 June featured several highly recognizable amateurs in a distinctly “spacey” theme throughout. Roy Neal, K6DUE, gave the banquet talk. The subject was future Space Shuttle “Ham-In-Space” plans. Roy, who was instrumental in Owen Garriot’s STS-9 premier as a “Ham-In-Space” last Autumn, presented Lance Collister, WA1JXN, with the QSL for the first QSO with W3LFL.

Over 3500 attended the convention according to Area Coordinator, Dave Barnard, W7LSV, who manned the AMSAT booth with help from Joe, W7TYN and Dave, WA7VKC.

Speakers provided interesting talks on a variety of topics. Of particular interest to OSCAR and VHF/UHF enthusiasts were talks by Tim Pettis, KL7WE on antenna design and testing, Lance Collister, WA1JXN, on getting started in EME and Bob Herndon, W7XN, on OSCAR. W7XN’s talk was characterized as a practical presentation that was interesting and well-received by both the experienced and novitate satellite users according to W7LSV.

Hams from Montana, Idaho, Alaska, Washington, California, British Columbia and Oregon made up the bulk of attendees. Many AO-10 acquaintances met at the AMSAT booth to exchange greetings and stories.

W7LSV remarks on the value of establishing and staffing an AMSAT booth with local support. He says it’s “an excellent way of getting to know fellow satellite enthusiasts in person while helping the AMSAT program! What most impressed a number of visitors was the fact that the AMSAT booth was not manned by the folks from back East but was the result of local effort! Many people [erroneously]

assume AMSAT has the office staff to be everywhere and do everything.” Dave goes on to point out that Area Coordinators, with the help and support of local folks can often organize a very significant effort. He says that local support is essential to building a balanced organization with strong leadership on the one hand and strong grass-roots support on the other.

The Oregon State Convention is held annually. On alternate years it is the basis of the ARRL Division Convention. AMSAT congratulates Area Coordinator Dave Barnard, W7LSV of Tualatin, Oregon, for his initiative and insight and for inoculating the Northwest with his enthusiasm. Thanks as well to W7TYN, WA7VKC and to all those who made the event a success including K6DUE!

AMTOR Debuts On AO-10

What is claimed to be the first AMTOR QSO on AO-10 came, according to 9M2CR, on 2 Mar. 84 when he and DC8AM QSOed on orbit 540. It worked perfectly but the question is “Why?”

AMTOR has stringent timing requirements. A short sequence of characters is sent by one station. It then waits for an acknowledgement. The timing of the transmission and acknowledgement is precise. The delays involved in AO-10 would seem to preclude use of AMTOR.

But what Colin, 9M2CR and his contact, Horst, DC8AM found at 0140 UTC on March 2 was that the propagation delay for the stations involved with AO-10 near apogee having sub-satellite point of 23N, 267W was just right for AMTOR because the “handshake” control signals were slewed “neatly one time-frame [later].” The total roundtrip propagation delay of about 500 milliseconds compares favorably with 3-character block time of 450 milliseconds, says 9M2CR.

However, when errors cause retransmission, the delays involved cause a double retransmission.

Colin is quite pleased with the results of his early tests. Tests with YB8AQT have shown most errors are caused by local 2 meter QRM.

AMTOR is a digital communications mode between RTTY and packet in complexity and efficacy. Like packet, it pro-

Larry Price, W4RA, President of ARRL, and Lance Collister, WA1JXN, at the ARRL Northwestern Division Convention.
vides virtually error-free copy because of the ACK/NAK (acknowledge/not acknowledge) feature which prompts immediate retransmission of the lost characters. Like RTTY, AMTOR is a slow mode designed to be used over HF channels where vagaries of propagation fading (primarily due to multi-path effects) are significant.

With the introduction of AMTOR to the AO-10 venue, it joins other modes such as SSTV, RTTY, packet as well as SSB and CW on the bird.

Annual Meeting Place, Date Set
Special to ASR by W6SP, Chairman

The Second Annual AMSAT Technical Symposium and the 1984 Annual Membership Meeting have been firmly scheduled for Saturday 10 November 1984. The specific day was selected following careful consideration of all available individual preference comments.

The location will be the Amfac (formerly Airport Marina) Hotel at the corner of Lincoln and Manchester, on the north side of Los Angeles International Airport (LAX). The address is 8601 Lincoln Blvd., Los Angeles, Ca 90045. Telephone: (213) 670-8111. The Amfac provides the following amenities: Free van service from LAX scheduled each ten minutes; 24-hour restaurant and cocktail lounge; ample free parking; golf and tennis across the street; exercise facilities and swimming pool; numerous meeting rooms; catering arrangements; 750 rooms and 7 suites. Prices are moderate and major credit cards are accepted. A block of "corporate rate" rooms has been set aside for AMSAT use. Room reservations should be made directly with the hotel.

Facilities Chairman is Dennis Dinga, N6DD. Dennis will be handling arrangements for the planned luncheon and dinner on the day of the meeting. His address is P.O. Box 4111, Diamond Bar, CA 91765.

Dr. Cleyon Yowell, AD6P will serve as Symposium Technical Chairman. A call for papers has been issued. Submissions should be sent to Cleyon at: The Aerospace Corporation, Mail Station M4-930, P.O. Box 92957, Los Angeles, CA 90009. His telephone is (213) 615-4234.

Short Bursts

- Ohio's Area Coordinator corp continues its path to leading the nation in terms of breadth and depth. Newest additions announced by WBCY and W8PGP are: WABRYD, Jerome F. Marchal, Assistant Area Coordinator for Southern Ohio (Cincinnati District); N8ATB, Joseph H. Berman, Assistant Area Coordinator for Southern Ohio (Athens District). Congratulations to the new appointees! WBCY is Chief Area Coordinator and W8PGP is Area Coordinator for Southern Ohio.
- It is with deep sadness that we report the passing of Dean Morrison, W8TT, on Sunday, 8 July, at a hospital in North Kansas City, MO. He was 57. A Kansas City resident most of his life, Dean died suddenly. An AMSAT Life Member, Dean had filled in on the Mid-America (75 meter) Net the Tuesday before his untimely death. He was also a ARRL Life Member and was a TAPR member. Our sympathies to his family and we share the grief of his numerous OSCAR-friends the world over. W8TT SK.
- The ARRL National Convention was held in New York City 20-22 July. Presenting at the several AMSAT forums were N2CF, K051, KB2M, KA9Q and WA2LQQ. Helping at the booth were K2UBC, WA2UJM and K1AM. Certificates of Merit for helping to get the STS-9 W5FL mission going were awarded to WX3O and WA2LQQ. Not present for their awards were W3IWI, WA4PUJ. Details and photos next time.
Satellite Technical Meeting Reported
A Special Report to ASR by W3GEY and DJ4ZC

A meeting of many of the national groups interested in the construction of amateur satellites was held during the period June 30 through July 3 at Hotel de la Bere in the vicinity of Cheltenham, England. In attendance were the following invited representatives: Ian Ashley ZL1AOX, Dick Daniels W4PUJ, Robin Gape G8DQX, Bandi Gschwindt HA5WH, Werner Haas DJ5KQ, Gordon Hardman KE3D, Phil Karn KA9Q, Jan King W3GEY, HansPeter Kuhlen DK1YQ, Karl Meinzer DJ4ZC, Harold Price NK6K, Randy Smith VE1SAT/VE6, Martin Sweeting G3YJO and Dave Woodhall ZS6BN1. Not in attendance were invited representatives from the technical groups of JAMSAT and RACE.

On the agenda were the following main items:
2) Review of the PACSAT mission.
3) Review of the UO-11 spacecraft status.
4) Review of the Ariane-4 launch opportunity.
5) Review of new technologies required for future amateur satellites.

Due to the final orbit obtained by AO-10, a set of operating procedures were required that would deal with the upcoming eclipse and sun angle constraints expected over the next two year period. The schedule selected is responsive to the reduced power per orbit and the requirement to off-point the satellite from its optimum attitude in order to minimize thermal and power effects caused by poor sun angles. At the same time attempts were made to respond to a variety of user operating requests.

A modified general beacon (145.810 MHz) schedule was also adopted that more equally shares time between Morse code, 30 baud RTTY and 400 BPS PSK telemetry and reduces the time between successive transmissions of any type.

The details of these schedules will be announced by usual amateur satellite society sources within the next few weeks. They will be in effect by early August as this is the time required to finalize the spacecraft maneuver and implement the needed software.

Regarding future changes to the satellite's schedule, the amateur satellite technical group present adopted the following proposal for review and adoption by the worldwide amateur satellite societies:

Proposal
For the Formation of an International Amateur Satellite Service Coordination Committee.

This group, recognizing that:
1) The launch of a satellite system represents the creation of a significant resource for the use of all radio amateurs;
2) The mission requirements of the groups providing a new satellite system are of primary importance;
3) The operational aspects of the amateur satellite service must be carefully identified, planned and managed; and
4) The freedom of the individual national and international groups to negotiate and plan new missions independent of external constraints must be maintained,

Proposes the formation of an international amateur satellite service coordinating committee, whose mandate shall be to:
1) Establish technical and operational standards for the amateur satellite service;
2) Plan and coordinate the orbital operations of each portion of a system which may be released by the groups which launched the system; and
3) Interface with the International Amateur Radio Union to ensure that the best interests of all radio amateurs are given due consideration in this planning process,

And further proposes that:
Membership in this committee be limited to those groups who have as a primary interest the provision and utilization of amateur satellite services, as evidenced by their charters or constitutions, and to such further groups as the committee shall determine advisable. (End of Proposal)

No decisions regarding PACSAT were taken by the assembled group. Considerable discussion was held con-
cerning the need for coordination of packet radio standards world wide. Considerable concern was raised that the JAS-1 packet experiment is unlikely to be compatible with the PACSAT standards on the basis of data rate and modulation type. In general, it was felt that more work was necessary to adopt true international standards for this mode of communications.

No decisions regarding UO-11 were taken by the assembled group. M. Sweeting reported that the spacecraft would be put into service and the experiment program initiated as soon as the boom deployment was complete which was expected in approximately two weeks time. (Boom was deployed successfully 24 July.—Ed.)

The Ariane-4 launch opportunity was reviewed. ESA has offered AMSAT-DL a firm launch contract for 290,000 European Accounting Units on the Ariane-4 test launch. The contract is expected to be signed in late July.

Three candidate missions were discussed. These included an Astroid encounter probe, an advanced Phase IV satellite system concept and a modified Phase III satellite. The first two candidates were given lower possibility of success due to time and financial constraints. This is particularly true due to the high launch cost being imposed by ESA on this launch. The Asteroid encounter probe was not discussed further. The Phase IV concept presented by W3GFE was given serious consideration for future opportunities and W3GFE, DJ4ZC and G3YJO will continue to discuss and define this concept.

The Phase III satellite to be incorporated on Ariane-4 will contain all of the hardware included aboard AO-10 but with the following additions or modifications:

1. A modified kick motor using a plasma propulsion technology.
3. An S-Band beacon experiment.
4. A packet radio and beacon unit.

The later unit will be a store-and-forward device with approximately 1 megabyte of memory. In addition, it may have a mode of operation allowing straight regeneration of data as would be of use by gateway nodes internationally. The same unit will be capable of using the large memory for storage of beacon messages which will be transmitted in 300 or 1200 bps FSK or PSK. The packet mode is expected to use 2400 bps PSK.

The Phase III satellite will be constructed by all of the groups attending the meeting. Work assignments were made so that progress on the new satellite may begin immediately.

A variety of spacecraft technologies were discussed during the last day of the conference. The intent was to identify technologies needed for future amateur satellite missions. Included in the presentations were propulsion technologies, attitude control technologies and improvements in ranging/orbit determination technology.

It was felt by most of the participants that the meeting accomplished its intended objectives and was much needed. The conference again demonstrated the value of international cooperation and participation as the amateur satellite service matures.

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## RSGB/AMSAT UK Bulletins

### On AO-10 Scheduled

The bulletins broadcast by AMSAT UK originate from taped text compiled from news input to the Radio Society of Great Britain (RSGB) and AMSAT UK. All broadcasts are on AO-10 Special Service Channel (SSC) H2 with a downlink frequency of 145.962 MHz. The bulletins are broadcast during IARU Region 1 convenient hours, i.e., they are optimized for Europe and Africa.

It should be noted that under the BROADCAST license issued GB3RS/GB2AUK by the Dept. of Trade and Industry, no two-way communication is permitted by the news broadcaster. However, after the broadcast is complete, clear and precise reporting of reception is solicited. Stations should call 10 kHz down, i.e., approximately 145.950 to .952 kHz from the H2 SSC.

Any radio amateur or AMSAT group wishing to input news items of interest to Region 1 members or other AMSAT UK groups should send the information in English to RSGB-HQ or AMSAT UK before the Thursday prior to the Sunday bulletin.

G3AAJ — Region 1 AMSAT SSC Coordinator

### Dates and Times With Pointing Angles For 51N, 0 W

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## Project OSCAR Calendars

### Spur Big Donation

Project OSCAR, Inc. recently announced the sale of Orbital Calendars has once again been a successful fund raiser. In addition to the proceeds of the sale of these Calendars which are sold by AMSAT at various hamfests and conventions, a check for $1,000 has been sent to AMSAT. Project OSCAR has sent these monies to be used as AMSAT's Officers decide best serves the Amateur Satellite Community in furthering the Amateur Satellite Program. Congratulations to all who helped make the Calendar a success again this year! AMSAT sincerely thanks all Project OSCAR members for their continued high level of support!
New Area Coordinators Announced

Chief Area Coordinator Jim McKim, WØCY, has announced the recent appointment of three additional Area Coordinators. They are:
Don E. Knollinger, WB8ZTV, Moundsville, WV; Bruce Power, WD4HWO, Tallahassee, FL; and Stephen Peterson, K7L, Salt Lake City, UT.
AMSAT heartily congratulates the new appointees and wishes them well as they take up their new duties in helping others get aboard the AMSAT bandwagon.

UO-11 Boom Deployed

An historic milestone on the UoSAT-OSCAR 11 "Comeback Trail" was marked recently with the successful deployment of the gravity gradient boom of UO-11. The following report was filed recently by UoSAT Programme Manager Martin Sweeting, G3YJO, at the University of Surrey.

UoSAT Bulletin-85 27th July 1984

UoSAT-OSCAR 11 Gravity Gradient Boom Deployment

Following several days final preparation and rehearsals, the UO-11 gravity gradient boom was deployed under on-board 1802 computer control at 10:35 gmt during orbit 2113 on the 24th July.
The automatic magnetorquing manoeuvres, continuously executed by the 1802 over the last few weeks, had aligned the spacecraft closely to the geomagnetic field vector and reduced residual motions (wobble) to a very low value. Following final confirmation of auspicious deployment conditions at AOS at Surrey on orbit 2113, the 1802 was given instructions to terminate the magnetorquing routines and deploy the boom for 15 minutes taking the spacecraft out of range of UoS. Spacecraft telemetry indicated reasonable boom motor current and correct operation of the 1802. The 1802 simultaneously recorded X, Y, Z, +5V current and boom & computer status channels automatically throughout the operation while the boom was being deployed and during the following orbit, to monitor gravity gradient capture and spacecaft operations.
The stored data was dumped at UoS on the next orbit (2114) and examination confirmed the correct operation of the deployment routine and preliminary analysis of the stored Navigation Magnetometer data indicated successful gravity gradient capture.
Gravity capture could, however, occur successfully WITHOUT correct boom extension due to the excellent initial controlled attitude of the spacecraft reliant solely on the asymmetric body shape — any residual energy and the effect of perturbing forces, however, would be likely to cause this condition to deteriorate quite rapidly if the boom had not deployed to a significant extent.

Data gathered over the following days confirmed, however, that the spacecraft maintained successful gravity gradient stabilisation and showed no evidence of severe libration.
The most obvious effect of gravity gradient capture is that the spacecraft will now maintain the communication antennas and camera pointing at the earth. Residual energy before boom deployment will translate itself into subsequent libration after GG lock which will be monitored and minimised using magnetorquing routines similar to those used during initial attitude control manoeuvres. The digital sun and earth horizon sensors will now be activated to determine the spacecraft's attitude and degree of libration.
Once the spacecraft GG attitude behaviour has been analysed, it is probable that the spacecraft will be spun very slowly around the Z-axis in order to improve the internal temperatures — currently running somewhat cool. Introducing a very slow Z-spin does, of course, interact with the GG stabilising forces but only to impart a small forward or backward 'tilt' of a few degrees dependent on spin rate.
Gravity gradient stabilisation of UO-11 is the culmination of many months of preparation and many weeks of spacecraft activities — most of which has not been visible to the outside world! It has been very demanding and has necessitated the use of considerable facilities and required a particular, dedicated effort from the UoSAT Team — particularly Stephen (Attitude, Stabilisation & Navigation Analysis), Roger GBNE (Spacecraft Software) and Neville GBNOB (Ground Station Software). A more detailed account of the Attitude Control and GG activities will be prepared in due course.
A day-by-day account follows:
Saturday 21/7/84
TORQUEH (the 1802 program which actively controls the magnetorquers in conjunction with reading the navigation magnetometer, records and replays whole orbit data and runs command timing loops) was further exercised as well as reinitialising its ODATA function at 21:29:40.
Sunday 22/7/84
TORQUEH was re-loaded following minor modifications. Yet further confirmations of spacecraft attitude taken.
Monday 23/7/84
Morning — Tests of final ground "deployment decision" software were made by switching the magnetometer on permanently and watching the fields changing. Residual oscillations of under 10 degrees were encouraging.
Evening — A full rehearsal of the boom deployment operation was run over 3 passes. The boom deployment commands were substituted by commands which were equally visible on the telemetry status points but otherwise harmless! After the ODATA was dumped, active magnetorquing was re-enabled.
Tuesday 24/7/84
Orbit 2112 — While holding the telemetry system in dwell mode (which prevents ODATA from recording since all channels are not found), the TORQUEH ODATA segment was reset, and active magnetorquing resumed. The spacecraft was left until LOS transmitting dwell telemetry to the ground analysis software.
Orbit 2113 — Sending one command told the 1802 to turn the z-magnetorquer on continuously, to allow the ground software to take a precise fix of the spacecraft attitude. After about 3 minutes of data, Stephen finally confirmed a suitable attitude, and the telemetry system was switched out of dwell mode to enable ODATA recording to start at 10:35:00 (approx). The channels recorded were 1, 2, 3, 4, 14, 16, 17. The last two record hexadecimal numbers — sorry if your ODATA program expired at this new facility!
At 10:35:20, a command to the 1802 turned the boom motor on for a 15.0 minute deployment and we watched the telemetry anxiously. An anomaly on the 5V current sensor prevented us seeing the true current, but the 14V bus was as expected and the motor was left running as the spacecraft disappeared below our horizon.
Orbit 2114 — Telemetry at AOS looked good, with the boom motor off and a good battery voltage. After taking the stored ODATA dump, the magnetorquers were disarmed and ODATA was reset at 12:19:23 to record channels 1, 2, 3, and 52. The real-time dump of the ODATA looked most encouraging.
By the evening, the next ODATA dump to be analysed confirmed the stable gravity gradient lock. More rapid dumps (always using channels 1, 2, 3, 52) were made after resets at 18:37:53 and 20:09:45.
Wednesday 25/7/84
Another ODATA dump was initialised at 09:35:30.
The DSR was powered up on orbit 2127 and a CCD image taken. This was blank (following a day's analysis with hastily-assembled test equipment!) due either to incorrect pointing (we still have an unquantified amount of libration) or incorrect exposure. More experiments will be scheduled as soon as possible.
ODATA resets were initiated at 11:19:23 and 12:53:44 and 19:12:00.
Thursday 26/7/84
ODATA resets were at 10:12:00 (approx) and 11:58:18. Attempts to power up the sun sensors were partially successful due to a known problem with their current trips. During the evening, the
spacecraft was set to re-transmit audio from the 438 MHz uplink to test this uplink at the new attitude. Results were most encouraging.

Friday 27/7/84

The 2.48 Hz beacon was tested and found to be much improved in the new attitude. This downlink should prove to be very useful for engineering and high speed data for ground stations which are well-equipped with good receiving and decoding equipment.

UO-11 Mission Plan

Gravity gradient stabilisation marks the end of the major spacecraft commissioning phase of UO-11 and now allows us to progress with the commissioning of the experiments. This will commence with evaluation of the DCE and CCD Camera, however a more detailed plan will be available shortly.

UoSAT-OSCAR 9 Schedule

The 2.4 GHz beacon will be in use this weekend.
Saturday — Bulletin/1200 bd telemetry/Digitalker
Sunday — Bulletin/1200 bd telemetry/Digitalker
Monday — Whole-orbit radiation data
Tuesday — Checksummed telemetry
Wednesday — CCD image
Thursday — Whole-orbit telemetry data
Friday — Load bulletin

Based on the response to our questionnaire, we are considering generating Digitalker for the educational 'market' on Mondays, now that we have started transmitting CCD images on Wednesdays. Radiation data will be scheduled occasionally.

General News — UoSAT Newsletters

The following information has been printed at UoS. The full pack has been sent to all enquirers who have written to us since February this year. It is available on request.

Newsletter — General status of UoSAT activities at June 1984
Datasheet 1 — UoSAT Project Summary
Datasheet 2 — UoSAT-1 Technical Data Summary
Datasheet 3 — UoSAT-1 Orbit Geometry, Tracking and Ground-station details
Datasheet 4 — UoSAT-1 Telemetry
Datasheet 5 — UoSAT-2 Project Summary
Datasheet 6 — UoSAT-2 Technical Description
Datasheet 7 — UoSAT-2 Reception, Data formats and Telemetry equations
Datasheet 8 — UoSAT-2 FSK demodulation using BBC Micro.
Questionnaire — As transmitted on this bulletin
Sheets describing the DSR data format and how to assemble this data to make up CCD images are under preparation as time allows.

Weather Satellite Status

- The NOAA-8 spacecraft is being decommissioned following a failure of the primary oscillator which commands the timing of the gyro and attitude control system. Engineers have not been able to switch over to the redundant oscillator as the primary oscillator has not yet failed completely.
- The NOAA-6 spacecraft has been re-activated to replace the failed NOAA-8 data.
- NOAA-7 will complete its planned operational lifetime this summer, but is continuing to perform well.
- The NOAA-9 spacecraft is currently scheduled for launch on 23 October 1984.

Thanks for Reports & Questionnaire Returns

ZL1MO, G6AAL, IV3TKI, ZL1AOX, G3WDI/Kessingland VCP School, G4BZB, OZ1RO, HB9AYX, K1KSY, Sir William Turner's 6th Form College, G3TKW, G3UVC/Southampton C.H.E., Birger Lindholm, OZ1WN, G3PII, ON1BTH, JAJ20, HB9RJ,HB9RRK, PY2NKH, G3VOM, DD20/JDB2OS.

This week: PE1HLB, VK2ZYE, I2KBD, VK2RX, VK2XPW, VK2AVH, ON4HW.

Keplerian Orbital Elements from KA9Q.
New Voice Technique Debuts On AO-10

Amateur Radio turned another major corner recently with the first test of a new voice processing technique on AO-10. The test was performed 24 Aug. 84 under the first phase of a three phase program, Project Companion.

Amplitude Compressed SideBand (ACSB) is a technique which offers strong potential for impressive improvements in intelligibility of voice signals under less than ideal conditions. Project Companion is a joint endeavor of AMSAT, ARRL and Project OSCAR.

In the 24 Aug. test, Greg Bonaguidie, WA1VUG, of the ARRL’s Technical Department operated a specially modified ACSB transmitter at the ARRL HQ station W1AW in Newington. The ACSB equipment was loaned from the principal ACSB patent holder, Sideband Technology, Inc. of Rochester, N.Y. At STI an AO-10 receiver tuned to W1AW and taped the transmissions both with and without the ACSB processing enabled. According to ARRL Technical Department Manager Paul Rinaldo, W4RI, the results were dramatic. “It took a pretty crummy signal and made it sound very good,” Paul told ASR.

An improvement in intelligibility equivalent to a 10 dB improvement in signal to noise ratio is touted for ACSB under AO-10-like conditions according to Rinaldo and AMSAT Engineering Vice President Jan King, W3GEY. King is working with ACSB as part of a commercial enterprise, Skylink, which proposes to provide commercial satellite communications to, among others, vehicles in sparsely populated areas where more conventional mobile telephone services (such as cellular mobile telephone) are not economically viable. ACSB is seen to offer substantial improvements for the mobile user as well as the Amateur Satellite user.

ACSB is an improvement of amplitude compression techniques in use for years. Two stages of compression and the injection of a low-level pilot tone at the transmitter distinguish modern ACSB from earlier techniques, however. At the receiver two stages of decompression expand the dynamic range of the audio. The pilot tone provides two very important functions. First, its amplitude at the receiver is a gauge to the amount of expansion required to restore the signal to the original. Second, the pilot tone functions as an AFC post to correct for Doppler shift. In the 24 Aug. test, W4RI reported the SSB signals were perfectly tuned and locked thanks to the AFC effect. Moreover, Rinaldo adds, the fast attack/release of the expander did much to alleviate the effects of spin modulation. ACSB can be received on unmodified, regular SSB receiver but to realize the advantages of the new technique, an ACSB-modified receiver is required.

Amateur interest in ACSB has been growing recently. Stimulating talks by Jim Eagleson, WB6JNN and Paul Shuch, N6TX of Project OSCAR have fueled the interests more. The Project Companion team was conceived from a desire to coalesce similar interests. ARRL is seeking a means of transmitting voice bulletins directly to amateurs by using AO-10 and a network of VHF/UHF gateway repeaters. A signal-to-noise ratio of 20 dB is the approximate target for the grade of service required. ACSB can help insure the signal quality remains high even in marginal conditions. AMSAT similarly is seeking ways to improve quality of transmissions on AO-10. Project OSCAR is seeking a new-technology project which will improve satellite communications. All three recognize the potential of ACSB for breaking new ground; fulfilling one of Amateur Radio’s charter issues.

N6TX and WB6JNN are the Project Engineers for Project OSCAR; W4RI and WA2LQQ are Project Engineers for ARRL and AMSAT respectively. Project Companion has three phases and the project will run 18 to 24 months. In Phase 1, technology demonstrations using off-the-shelf commercial equipment will demonstrate what advantages are afforded using ACSB as compared to normal SSB. In Phase 2, up to one hundred ACSB units will be fielded for tests on AO-10 and other venues as appropriate. In Phase 3, amateur-designed ACSB units using the experience gathered up to that point will be designed and the technique will be proliferated. Once the technique is established, Project Companion officials have little doubt the technique will be commercialized in the ham market by the major manufacturers. There are now a half dozen ACSB suppliers in the commercial marketplace.

W4RI writes about ACSB and Project Companion in the August edition of QEX, the ARRL Experimenters Exchange. Paul points out that an overview of ACSB together with a bibliography is to be found in the 1984 ARRL Handbook. If you care to be involved with ACSB development or testing, contact W4RI, WB6JNN, N6TX, or WA2LQQ. Authors familiar with ACSB are solicited for articles in Orbit and QST.
Short Bursts

- The first flight of ESA's Ariane 3 was an unqualified success. Lifting off from its Kourou pad on 4 August, the new version of Ariane successfully deposited ECS-2 and Telecom 1A into the proper geostationary transfer orbits. It was the tenth launch of the Ariane vehicle and the first to use two strap-on solid fuel boosters. Addition of the boosters and other propulsion system improvements have raised the payload to transfer ellipse capability to 2585 kg (5,687 lb) for a single payload or two satellites each weighing 1195 kg (2,629 lb). AMSAT's Phase IIIIC payload may ride an Ariane 4, a further growth from the Ariane 3.
- Jack Somers, WA6VGS, Deputy Chief Area Coordinator, is making "OSCAR Information" sheets available for hamfests and conventions. Showing the bandplan and frequency charts, the handouts are FREE for the asking and are available in reasonable quantities (100, 200, 300 ??) upon request. Also enclosed is an informative sheet on how to use the AMSAT QSL bureau. The cost of the charts is absorbed by Henry Radio to which AMSAT is grateful. Write: Jack Somers, WA6VGS, c/o Henry Radio, 2050 Bundy Dr., Los Angeles, CA 90025.
- The August issue of "SSTV Today" edited by Ron Flynn, KB8LU has a nice writeup on AO-10 and SSTV. In an article by Flynn together with Roger Schultz and Jim Wilson, the authors do a fine job of explaining how to get started on AO-10. Well worth the reading, we'd say!
- AMSAT is now on MCI mail. Mail name is AMSAT. Mail ID number is 170-2860.
- The Marshall Amateur Radio Club Experiment, MARCE, will be launched on a Space Shuttle 1 Oct. 84 in GAS (Gateway Special) #007. The experiment will telemeter data on a downlink frequency of 435.033 MHz. This signal may be monitored directly or may, in just the perfect circumstance, be relayed to earth by AO-10. If AO-10 picks up the MARCE telemetry on 435.033, AO-10 will relay on the Mode B downlink at 145.972, the Special Service Channel (SSC) H1. Data will be sent as synthesized voice numbers on a FM carrier. A telemetry decode aid sheet is available from ARRL. An SASE to GAS #007, CTD, ARRL, 225 Main St., Newington, CT 06111 will obtain the sheet for you. Further details and orbital predictions in a future ASR. Full details on the experiment are on page 46 of the September 84 QST.
- The first gateway operation in the New York metropolitan area was accomplished on 18 August at 0100 UTC. KC2ZF organized a group in Staten Island using a 220 MHz repeater. Thirty miles north, WA2LQQ operated a gateway to AO-10, Mode B, using the repeater's autopatch capability. More than a dozen satellite contacts were made in short order. The highlight was a FB QSO with an HG in Budapest.
- At presstime, the anticipated AO-10 schedule change remained anticipated.
- First flight of Space Shuttle Discovery is due 29 August. WB4ZXS will transmit Shuttle audio on AO-10 SSCH2, 145.962 MHz.
- First successful 2 meter meteor scatter packet QSO is reported by K1HTV and WB8RPK. Although it took 2 hours and 45 minutes to accomplish, the QSO probably will stand as a first. The event took place during the peak of the Perseid meteor shower on 12 Aug. 84. K1HTV is in Maryland while WB8RPK is in Iowa; a path of about 1200 miles. Others participating in the Perseids PacScat tests were WB6YMH, K8RZ, N8AN, K8C, WA8YWW, W9UUU, K1KSY, KQ1E, W9RLI, AA2Z, K8KA, W3IW, KA0AB, W8BN, W8WB, KB2M and WA2LQQ.
- A new ARRL newsletter, "Gateway," has debuted. The topic is packet radio and the editor is ARRL's K8KA. "Gateway" is available for $6 (ARRL members) and $9 (non-members) for 25 issues. First class mail (U.S., Canada and Mexico) will cost $11 (m) and $14 (n). Overseas costs are $14 (m) and $17 (n). Write ARRL HQ.
- AMSAT Director election ballots go into the mail around 1 Sept. If you don't get one, chances are your membership has run out. Isn't it time you did something about that?!!
- Interested in contributing to AMSAT with your effort rather than your $$$. Get in touch with WD4FAB. He may be able to get you working on something that will benefit both AMSAT and you.
- Bob Grove, WA4PYY, recently cited by AMSAT for his enthusiastic support of the amateur satellite program writes: "It has been my privilege to report to our thousands of readers [in Monitoring Times] the exemplary program of AMSAT. Their contribution to amateur radio and to technology in general is a model of cooperation, commitment and dedication. We shall continue to support this fine organization and encourage similar efforts by other experimenter groups to follow their example."

Letters To The Editor Department

Among the pleasures of editing a widely read newsletter are the occasional golden nuggets that appear in one's mailbox. Here's a pretty good "fer instance."

Dear Rip:

I have just returned from a trip to the Peoples Republic of China where I was very pleased to learn that BY1PK in Beijing (formerly Peking) is set up for OSCAR 10 operations. I was there with my wife and three children and we spent a fascinating afternoon at the BY1PK station. Our guide, after quite a bit of investigation, finally discovered the address and telephone number of the Institute where the station is located and set up an appointment for us to meet the three key men, Mr. Ton, Mr. Wang, and Mr. Yan.

We were about half an hour late because our driver could not find the Institute, and I was very embarrassed that Mr. Wang had been waiting out on the street for us. He led us up the five flights of stairs for some tea and discussion of Amateur Radio.

Going into the building we could see an array of 435 MHz and 145 MHz circularly polarized antennas with azimuth and elevation rotors and a large tribander. Thus, when we sat down for tea, I immediately asked about their OSCAR 10 operations. Unfortunately, communication was quite difficult since our guide knew no ham radio terms and since the Chinese hams spoke only Chinese. We did understand, however, that they had no way of figuring out where the satellite was. I offered to send them a printout for the next 18 months, and they were extremely happy.

With this promise, we moved into the shack — and to
my amazement, not only did they have an array of very fancy and complete hf, vhf and uhf equipment, but also on a table to the left was an Apple II which VE7BC had given to the station. I exclaimed immediately that they could use the Apple to locate OSCAR 10, but they said that the computer did not work since it was missing a part.

Meanwhile, however, my 11 year old daughter had located a pile of about 10 disks, had inserted one of them, and was playing Pacman. Thus the computer was working. To boot, one of the disks was marked "W3IW"!!! My 15 year old son had soon pushed his sister aside trying to run Tom's program, but the disk would not boot. We needed DOS and there was no Apple disk to be found. A careful testing of all the disks which were there, however, led to the discovery of DOS 3.3 on one of the game disks and we were in business.

The next problem was that the only orbital elements on the disk were for OSCARS 7, 8 and the famous "submarine trajectory" into the water which Tom inserted in the early version of his program. Where could we find a new set of elements? I knew that QST had published them last year, and I had seen a copy of QST in the shack, but I was afraid that they had stopped publishing them this year. I was wrong, however. The March QST set forth a full set of Keplerian elements, signed by Phil Karn and ten minutes later, after computing the latitude and longitude of Beijing in west degrees from the big world map on the wall centered on China, the little Apple was printing out up-to-date tracking. Unfortunately, the satellite was not within range.

Our next challenge was to teach the Chinese how to run the program and with our French speaking guide, to whom we translated the program, and the Chinese Hams taking notes in their language, it took about two hours before they were running the program. Once it was running, however, it would be hard to describe their joy. They insisted that I sit down and play on hf.

By this time it was 5:30 in the afternoon, or 16:30 GMT. The band was open to the west coast and I had a wonderful time. Unfortunately for DX lovers, I prefer talking to working a pileup and I spoke to five hams and unsuccessfully tried to raise a fellow ham from 9-land. Only Californians seemed awake.

Our new Chinese friends would have been very happy for me to stay, but we had another commitment. They had me sign a form in Chinese which I could not understand but which they explained gave me the right to operate the station and they invited me back as soon as possible.

Obviously, I now hope to work them on OSCAR 10 but I am afraid that that will be very difficult since their English pretty much rules out ssb contacts, and my cw is nil. I have written them, however, and hope to hear back.

Best 73's,
K9LF

**TAPR Opens Office In Tucson**

Tucson Amateur Packet Radio (TAPR) President Lyle Johnson, WA7GXD, sends the following:


The office address is:

- Tucson Amateur Packet Radio
- 1016 East Pennsylvania Avenue
- Suite 302
- Tucson, AZ 85714

The mailing address remains:

- Tucson Amateur Packet Radio
- P.O. Box 22888
- Tucson, AZ 85734-2888

The telephone number is:

(602) 746-1166

The office hours are:

- 9:00 AM - 5:30 PM (Mountain Standard Time)
- Monday - Friday

The gentle voice at the TAPR end of the line belongs to Karen Makus. Karen is a non-technical person, so please don't ask her how to write a terminal program for your packet station! However, in her role as Office Manager, she will do everything she can to expedite servicing your information requests, providing spare parts support for your TAPR TNC, filling orders and the like.

Technical questions will be routed to volunteer staff for answering, so please mail such questions to the TAPR PO Box.

It is our goal to provide 48 hour (or faster) turnaround on all standard transactions (memberships, renewals, TNC and parts requests, general information needs, etc.) and faster service on non-standard ones.

We at TAPR wish to thank you for your continued support, and look forward to being of greater service to you through our new facility.

**Kettering’s Perry Retires**

Geoffrey Perry, Headmaster of the Kettering Boys School north of London, England has retired. For 27 of his 30 years at Kettering he had led students in a fascinating, sometimes brilliant study of foreign satellite activity. His expertise in Soviet satellite monitoring made him a favorite among the world's journalists. He would often provide tantalizing hints based on his observations made with the barest of equipment. His receivers were World War II vintage for the most part. His total computer capacity was often held in his hand; a hand calculator. Nevertheless he learned much about the Soviet satellite operations with the help of a bright crop of eager students.

Notoriety first came to Perry and Kettering when in late 1977 he and his students predicted the demise of Cosmos 954, a Soviet ocean surveillance radar satellite. Cosmos 954 was nuclear powered and posed a significant threat. In January 1978 the U.S. notified its allies of the imminent reentry of Cosmos 954. Kettering had predicted January 25. It fell on Northwest Territories, Canada, on January 24.

Then in November, 1979, Perry noticed unusual activity in a Soviet photo reconnaissance satellite. Something clearly was about to happen in the Himalayas. One month later the Soviets invaded Afghanistan.

Perry was the subject of a "60 Minutes" television broadcast on the U.S. CBS network on 21 Feb. 82. Journalists were
especially fond of Perry insasmuch as he was unshackled
by the secrecy normally shrouding the topic. And although
the consensus of journalists was that he probably didn’t
learn much about Soviet space hardware that wasn’t already
known, he was in fact the only source willing to talk. Perry
was said to have commanded notable respect mainly on
the basis of his extraordinary deductive ability and his un-
cannny talent for extracting the most information from
minimal instrumentation.

A group under Perry called the "Kettering Group"
numbering about 10 around the world will continue the ac-

News From Surrey

The following is excerpted from a recent UoSAT Bulletin
from G3YGO.

UoSAT Bulletin-89 24th August 1984

General News

Future UoSAT Missions are being proposed and studied,
varying in scope from UO-9 and UO-11 orbits to Phase III
and involvement in Geosynchronous orbits. We would be
very interested to hear of any (reasonable) suggestions or
areas of interest that you may have — please direct to
G3YGO.

One such future mission possibility being considered is
the use of an Ariane-4 launch to place a constellation of
six (or maybe cut down to three) small amateur satellites
into geosynchronous orbit. The spacecraft would be
transferred into geosynchronous orbit by a common ‘car-
rier’ module, ferrying the spacecraft through the drift phase
of the orbit and then depositing them, two at a time, at posi-
tions around the equator. It is proposed that each spacecraft
carry at least a Mode-L transponder. A project of this scale
would clearly have to be undertaken by an international
AMSAT team, probably US/DL/UK and each group would
also furnish additional experiments in keeping with their
interests. This is an ambitious idea (and costly) but could
advance amateur radio communications by a further quan-
tum leap, however it is early days yet and this scale of mis-
ion may not prove practicable or even desirable. What are
YOUR thoughts?

A Masters Degree in ‘Satellite Communications Engineer-
ing’, based heavily around the experience gained through
the UoSAT Projects, will commence at the University of Sur-
rey this October — although welcome, this adds, however,
to the already overloaded UoSAT Team! Details again
available from G3YGO.

Three Active Magnetospheric Particle Tracer Expt. (AM-
TE) spacecraft were launched successfully by NASA DELTA
from Cape Canaveral on Thursday 16th August — after three
aborted launch attempts following ground station computer
malfunctions and the discovery of debris in the vehicle.
A small UK spacecraft, contributed by the UK SERC, was
mounted between the two large US and DL spacecraft —

UoSAT contributed to the Particle Wave Experiment on this
site. The spacecraft have been in orbit over a week now and
are reported to be functioning very well.

UoSAT-OSCAR-9 Schedule

The Bulletin/Digitalalker/Telemetry on UoSAT-1 will run
through to Wednesday 29 August due to a UK national holi-
day on Monday and a UoS holiday on Tuesday! It is hoped
that a more normal service will resume soon on UoSAT-1.

The preparation of the Bulletin is being re-organised to
spread the workload and items of relevant interest for the
Bulletin are always welcome — the weekly deadline is 10.30
local time each Friday — and should be sent to the UoSAT
Team in writing.

We have received a suggestion that it might be useful to
include line numbers in the Bulletin. This would be useful
for those using computers to gather the Bulletin as it would
allow them to assemble a complete Bulletin from noisy data
on multiple orbit passes without manual editing. This feature
would, however, reduce the space available for text — what
are YOUR thoughts please?

Special ‘Notice Board’ items for demonstrations/displays
using UoSAT are also welcome as they can add ‘interest’
to such activities.

The H.F. Beacons Expt. will be in use this week.

UoSAT-OSCAR-11 Operations

Saturday — #2479, channels 1,2,3,52 reset at
11:49:30
#2464, channels 1,2,3,52 reset at
19:46:45

Sunday — #2498, channels 1,2,3,52 reset at
18:49:30

Monday — #2507, channels 1,2,3,52 reset at
09:48:25

Tuesday — #2521, channels 1,2,3,52 reset at
08:47:40
#2522, channels 0,1,10,20,30,50,51
reset at 10:32:00
#2528, ODATA ran incorrectly - no
data
#2529, channels 1,2,3,52 reset at
21:40:50

Wednesday — #2536, channels 1,2,3,52 reset at
09:29:48
#2537, channels 17,18,19,27,28,29
reset at 11:07:55
#2542, channels 40,50,51,52,53,57
reset at 18:59:31

Thursday — #2551, channels 40,50,51,52,53,57
reset at 10:11:25
#2552, channels 1,2,3,52 reset at
11:47:00
#2556, channels 1,2,3,11,38,49 reset at
18:04:55

Friday — #2565, channels 1,2,3,52 reset at
09:10:50
Interim Operating Schedule
Put Into Effect

The new AO-10 operating schedule went into effect on 3 Sept. when DJ4ZC at Marburg loaded the new software to the spacecraft. The new schedule affects the Mode B and Mode L operating regimes. Similarly, it revises dramatically the program of events on the various beacons.

The new transponder schedule is being described as an interim measure designed to provide adequate safety margins while providing good service continuity to the user community. The interim operating schedule was required to compensate for a significant series of eclipses occurring each orbit throughout September and October. (See graphs in ASR #83.) The maximum duration eclipse in this series is attained on or about 21 Sept. at which time AO-10 will be out of sunlight for 1.2 hours per orbit. This amounts to not less than a 10% reduction in available solar-derived energy. (Poor Sun-angle effects make the cumulative effect somewhat larger than the 10% reduction.) Beginning towards late October the eclipse duration will mitigate. DJ4ZC, in his text on both the General Beacon CW bulletin and in the PSK message blocks suggests a further schedule revision will occur in October. Presumably this will represent a schedule responsive to the improved eclipse situation.

The interim transponder operating schedule is as follows:

<table>
<thead>
<tr>
<th>Mean Anomaly Start</th>
<th>Minutes Past Perigee</th>
<th>Mean Anomaly End (Inclusive)</th>
<th>Minutes Past Perigee (Inclusive)</th>
<th>Transponder Operating Mode</th>
<th>Episode Duration (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>87.5</td>
<td>99</td>
<td>270.7</td>
<td>B</td>
<td>183.2</td>
</tr>
<tr>
<td>100</td>
<td>270.7</td>
<td>116</td>
<td>317.2</td>
<td>L</td>
<td>46.5</td>
</tr>
<tr>
<td>117</td>
<td>317.2</td>
<td>189</td>
<td>516.8</td>
<td>B</td>
<td>199.6</td>
</tr>
<tr>
<td>190</td>
<td>516.8</td>
<td>255</td>
<td>699.5</td>
<td>Off</td>
<td>182.7</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>31</td>
<td>87.5</td>
<td>Off</td>
<td>87.5</td>
</tr>
</tbody>
</table>

Based on prior discussions, if a schedule revision in late October provides increased operating time, the period after mean anomaly 190 may be available. In the illustrative example shown in ASR #83, Mode B was extended through 218. Whether this can be achieved will depend on how well the spacecraft battery fares the eclipses. If the engineers have done their homework well, the battery will be in excellent shape. On the other hand, in the extremely unlikely event that a miscalculation has been made, the spacecraft could suffer irreparable damage to its primary battery. Thus caution is the watchword here.

The above schedule is for Monday through Saturday. On UTC Sundays, Mode B will replace Mode L such that Mode B will run continuously from 32 through 189.

The Beacon schedule revision is a long termed one; it is not expected to be revised any time soon. The new Beacon schedule is responsive to the expressed desire of many to make better use of the Beacon facility. Consequently the new beacon schedule will contain much useful information such as Keplerian element sets by which one may calculate the satellite's accessibility. Moreover, an RTTY segment is now included in both the Mode B and Mode L
Beacon transmissions. The new Beacon schedule is as follows:

<table>
<thead>
<tr>
<th>Minutes Past Hour</th>
<th>Beacon Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>00-04</td>
<td>CW</td>
</tr>
<tr>
<td>05-14</td>
<td>PSK</td>
</tr>
<tr>
<td>15-19</td>
<td>RTTY</td>
</tr>
<tr>
<td>20-29</td>
<td>PSK</td>
</tr>
<tr>
<td>30-34</td>
<td>CW</td>
</tr>
<tr>
<td>35-44</td>
<td>PSK</td>
</tr>
<tr>
<td>45-49</td>
<td>RTTY</td>
</tr>
<tr>
<td>50-59</td>
<td>PSK</td>
</tr>
</tbody>
</table>

This is the Mode B Beacon (145.810 MHz) schedule. When Mode L is on (MA 100 - 116), the schedule will be the same except RTTY will be substituted for CW where denoted by "***". The Mode L Beacon is heard most often on the Engineering Beacon frequency, 436.04 MHz. CW is sent at approximately 13 wpm. RTTY is standard 170 Hz shift FSK at 50 baud. PSK is 400 baud ASCII.

There will be two separate CW bulletins sent. QTC001 is sent on the hour while QTC002 is sent on the half hour. The message on 3 Sept. was as follows (per JR1SWB):

HI HI DE AO10 QTC001 AT MA 219 AGC NO NEW OPERATING SCHEDULE IS EFFECTIVE OCT AND SEPT. TRANSPONDER IS ON BETWEEN 32 AND 190 MODE L EVERY DAY MA 100 TO 117 EXCEPT SUNDAY NORMAL OPERATION WILL RESUME AFTER ECLIPSE SEASON AO10 HI HI

HI HI DE AO10 QTC002 NEW BEACON OPERATIONS EFFECTIVE NOW ON THE HOUR, TEL AND QTC. ON THE HOUR PLUS 30. ORBITAL

ELEMENTS ON THE HOUR PLUS 15 AND 45. RTTY TEL AND QTCS AO10 HI HI

Each RTTY bulletin will contain both CW bulletins text (QTC001 and 002) as well as telemetry data showing various spacecraft operating conditions. The parameters and their values will be published here soon. The RTTY bulletins will contain, specifically, the Z block (similar to the Y block of PSK telemetry), G block #1 (QTC001), another Z block and a final G block (QTC002). That is, the G blocks will be the same as the CW text except that LF/CR will be inserted.

ASE Software Update

AMSAT Software Exchange (ASE) Manager Bob Diersing, N5AHD, reports there is a bug in the IBM PC and Radio Shack TRS-80 Model III versions of the W3IWI orbital prediction program. Bob says it is an easy patch to make, however. Line 2020 reads as follows: 2020 IF K = K9 THEN 2040 : GOSUB 10110 : K8 = 9D9 : K9 = 9D9

The constants assigned to K8 and K9 might also appear as: K8 = 9000000000# : K9 = 9000000000#
The line should be changed to read: 2020 IF K = K9 THEN 2040 ELSE GOSUB 10110 : K8 = 9D9 : K9 = 9D9

Thus the only change is to substitute 'ELSE' for the colon in line 2020 between 2040 and GOSUB.

Bob explains that this bug lay latent for longer than most because it results in significant errors only after very long prediction runs (on the order of weeks). He credits Barry McLarnon, VE3KLV and others for bringing the bug to his attention.
Not Through Rose-Colored Glasses

Special To ASR
Opinion By Harold Price, NK6K
AMSAT Assistant Vice President, Engineering

Heard on Oscar 10 recently: "Well, I support the satellite, I pay my dues. Why don't we take a hard look at what Oscar 10 actually costs, per hour of use."

Let's look at that. We'll assume that, like a ground based repeater, its users must pay for its original installation and continuing costs. We all hope to get at least five good years out of OSCAR 10. We'll also assume we're getting 20 hours/day of communications time. That gives us 36,500 hours of communications time for the expected life of the spacecraft. There are about 150 kHz available for communications. Ignoring the complicating factor of CW (narrower bandwidth but much slower communication rates) there is room for 30 5 kHz wide voice channels. That gives 1,095,000 circuit hours to use as a basis to establish a 'charge rate' to recover the costs of installation. Various sources have placed the cost of 'installation' of OSCAR 10 (construction and launch) at $240,000. To recover this cost on the basis of hours of use, each hour of use would cost $0.21. To review: 5 years x 365 days/year x 20hr/day = 36500 hours 150 kHz / 5 kHz/channel = 30 channels 36500 hrs x 30 channels = 1,095,000 channel hours. $240,000 / 1,095,000 ch-hr = $0.21/ch-hr. This means an average user, using OSCAR 10 only 4 hours/week would have to pay $43 a year to simply recover the cost of construction and launch, assuming the s/c was fully utilized. Now, as we know, we aren't getting 30 channels of use 20 hours/day. A better estimate would be 10 channels. As we have seen in the real world lately, if you use less of a fixed cost utility, the cost per use goes up. Without going thru all the calculations again, 1/3 the use means the cost per channel hour must be three times as great. The average user pays $129.00/year. This figure does not include continued command cost, costs incurred by the ground telecommand network, the damage to mode L which is giving us a little less than 20 hours/day, or administrative costs such as selecting and announcing a new operations schedule. It most definitely does not include the construction and launch cost of a replacement for OSCAR 10. With these items thrown in, the average user, to support the current service and accumulate funds for a replacement should be donating about $300.00 each year. Heavy users should send in more, especially those who are always louder than the beacon and those who pile up on DX. Obviously, we can't charge for the use of OSCAR 10. Just as obviously, we can't launch another one based on the support we're getting for this one. The AMSAT membership dues won't cover it. Not all of the users of satellites are members, and most of that money goes toward membership services, not new satellites. It's something to think about the next time you send off your yearly dues to your local repeater/autopatch group.
Orbit Predictions

By KA9Q

Satellite: OSCAR-9
Catalog number: 12888
Epoch time: 84249.38892769
Sat Sep 1 09:08:36.40 1984 UTC
Element set: 677
Inclination: 97.5968 deg
RA of node: 221.1855 deg
Eccentricity: 0.0002408
Arg of perigee: 164.0344 deg
Mean anomaly: 196.1002 deg
Mean motion: 15.26295495 rev/day
Decay rate: 1.913635 rev/2
Epoch rev: 16116
Semi major axis: 6862.0000 km
Anom period: 94.346082 min
Apogee: 487.097 km
Perigee: 483.729 km
Ref perigee: 243.41800939
Sat Sep 1 09:51:33.257 1984 UTC
Beacon: 145.8250 MHz

Satellite: OSCAR-10
Catalog number: 14129
Epoch time: 84249.9724851
Sat Sep 1 23:20:22.143 1984 UTC
Element set: 122
Inclination: 25.6768 deg
RA of node: 160.4720 deg
Eccentricity: 0.0656575
Arg of perigee: 302.6109 deg
Mean anomaly: 12.7862 deg
Mean motion: 2.0580098 rev/day
Decay rate: 9.16e-07 rev/2
Epoch rev: 919
Semi major axis: 2610.673 km
Anom period: 699.538196 min
Apogee: 355.68222 km
Perigee: 329.332 km
Ref perigee: 2435.95322389
Sat Sep 1 22:55:31.170 1984 UTC
Beacon: 145.8100 MHz

Satellite: OSCAR-11
Catalog number: 14781
Epoch time: 84238.1095802
Sat Aug 25 02:37:41.492 1984 UTC
Element set: 40
Inclination: 98.2346 deg
RA of node: 300.0812 deg
Eccentricity: 0.0014750
Arg of perigee: 73.2178 deg
Mean anomaly: 287.0634 deg
Mean motion: 14.61895340 rev/day
Decay rate: 7.7e-07 rev/2
Epoch rev: 2577
Semi major axis: 7062.277 km
Anom period: 98.562257 min
Apogee: 213.749 km
Perigee: 692.915 km
Ref perigee: 2428.12336647
Sat Aug 25 02:57:38.863 1984 UTC
Beacon: 145.8260 MHz

Satellite: RS-3
Catalog number: 12997
Epoch time: 84245.00250300
Sat Sep 1 00:03:16.259 1984 UTC
Element set: 101
Inclination: 82.9566 deg
RA of node: 91.0443 deg
Eccentricity: 0.0005038
Arg of perigee: 188.5482 deg
Mean anomaly: 171.4626 deg
Mean motion: 12.15588021 rev/day
Decay rate: 4e-08 rev/day 2
Epoch rev: 12014
Semi major axis: 2276.3127 km
Anom period: 118.461187 min
Apogee: 1656.004 km
Perigee: 1583.391 km
Ref perigee: 2434.96532155
Fri Aug 31 23:07:10.902 1984 UTC

Satellite: RS-4
Catalog number: 13000
Epoch time: 84242.60334243
Wed Aug 29 14:26:48.785 1984 UTC
Element set: 216
Inclination: 82.9593 deg
RA of node: 101.8481 deg
Eccentricity: 0.0017274
Arg of perigee: 263.4606 deg
Mean anomaly: 76.4061 deg
Mean motion: 12.06667495 rev/day
Decay rate: 0 rev/day 2
Epoch rev: 11894
Semi major axis: 8026.669 km
Anom period: 119.336938 min
Apogee: 1662.321 km
Perigee: 1664.390 km
Ref perigee: 2432.58537284
Wed Aug 29 14:03:27.317 1984 UTC

Satellite: RS-5
Catalog number: 12999
Epoch time: 84239.02880601
Sun Aug 26 00:41:10.471 1984 UTC
Element set: 186
Inclination: 82.9592 deg
RA of node: 105.3413 deg
Eccentricity: 0.0001040
Arg of perigee: 321.2177 deg
Mean anomaly: 38.8554 deg
Mean motion: 12.05050874 rev/day
Decay rate: 3e-08 rev/day 2
Epoch rev: 11835
Semi major axis: 8033.819 km
Anom period: 119.495316 min
Apogee: 1672.311 km
Perigee: 1655.594 km
Ref perigee: 2429.09729486
Sun Aug 26 00:28:24.625 1984 UTC

Satellite: RS-6
Catalog number: 13002
Epoch time: 84247.06483140
Mon Sep 3 01:31:55.32 1984 UTC
Element set: 87
Inclination: 82.9569 deg
RA of node: 92.0534 deg
Eccentricity: 0.0004959
Arg of perigee: 203.3380 deg
Mean anomaly: 156.5436 deg
Mean motion: 12.13862715 rev/day
Decay rate: 4e-08 rev/day 2
Epoch rev: 12014
Semi major axis: 7996.217 km
Anom period: 118.656886 min
Apogee: 1660.926 km
Perigee: 1581.829 km
Ref perigee: 2437.07299939
Mon Sep 3 00:40:19.147 1984 UTC

Satellite: RS-7
Catalog number: 13001
Epoch time: 84245.10146566
Sat Sep 1 02:26:06.633 1984 UTC
Element set: 170
Inclination: 82.9569 deg
RA of node: 98.1893 deg
Eccentricity: 0.0021026
Arg of perigee: 233.9609 deg
Mean anomaly: 125.9506 deg
Mean motion: 12.08868173 rev/day
Decay rate: 4e-08 rev/day 2
Epoch rev: 11944
Semi major axis: 8017.724 km
Anom period: 119.137625 min
Apogee: 1670.210 km
Perigee: 1636.494 km
Ref perigee: 2435.07251995
Sat Sep 1 01:44:25.723 1984 UTC

Satellite: RS-8
Catalog number: 12998
Epoch time: 84246.07360509
Sun Sep 2 01:45:12.434 1984 UTC
Element set: 189
Inclination: 82.9595 deg
RA of node: 103.6099 deg
Eccentricity: 0.0018806
Arg of perigee: 359.119 deg
Mean anomaly: 0.7907 deg
Mean motion: 12.02947164 rev/day
Decay rate: 4e-08 rev/day 2
Epoch rev: 11899
Semi major axis: 8043.221 km
Anom period: 119.70006 min
Apogee: 1680.892 km
Perigee: 1649.266 km
Ref perigee: 2436.07287601
Sun Sep 2 01:44:56.659 1984 UTC

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Short Bursts

- The Marshall Amateur Radio Club Experiment (MARCE) was launched on STS 41G at 1103 UTC, 05 Oct. 84. No transmissions from the telemetry package had been heard at press time. The Shuttle had some problems of its own with a stuck Ku-band antenna. This required pointing the shuttle towards the relay satellite (TDRS) to dump data to earth. This may have affected the MARCE GAS #007 package but the extent is not known at present.
- Dave Eanes, N4AZI, has been named AMSAT Emergency Communications Manager. He will be developing a series of Emergency Communications protocols and plans to use Amateur Radio space resources in concert with ARRL and other officials. Dave reports to Operations VP KB0CCL in his new capacity. Welcome to Dave!
- Chief Area Coordinator W0CY announces the appointment of Frank Jaworski, K1FI/J of Fort Wayne as the new Area Coordinator for the Fort Wayne area of Indiana. Congratulations to Frank on his appointment....and welcome aboard!!
- Tests of ACSB on AO-10 continue from ARRL HQ. Phase 1 tests will continue with at least 3 stations on; one from each of the groups participating in the joint program. Besides W1AW (ARRL), there will be WB6JNN (Project OSCAR) and WA2LQQ (AMSAT). Phase 2 of the program foresees up to 100 experimental stations putting ACSB through its paces. Phase 2 will get under way likely first quarter, 1985.
- UoSAT OSCAR 9 celebrated its third birthday on 6 October! Happy Birthday!
- Mysterious signals from space on 2301 and 2304 MHz are being reported by W4HHK and WA4HGN according to W9KDR at ARRL HQ. Contact aforementioned individuals at 901-853-7373 or Box 73, Collierville, TN 38017 for additional details and guidance.
- UO-11 has captured a clearly resolved CCD image — the best yet according to G3YJO. See UoSAT Bulletin.
- RS-6 is apparently dead. W8JLE says he learned from G3IOR that the Russians were monitoring RS-6 even as it failed. Meanwhile, RS-3 may be showing some feeble signs of returning to life.
- W3IW1 has a part-time Bulletin Board System (BBS) on AO-10. It time shares with terrestrial service but is usually available to AO-10 users when the bird is within view of
Washington, D.C. evenings. Downlink frequency is in the vicinity of 145.835 or about 5 kHz up from the nominal packet exchange frequency of the L1 SSC, 145.830.

- According to AD6P, the program of events and presentations for the Space Symposium in Los Angeles this 10 November is coming together very well. Fascinating and inspiring papers on many subjects will be presented. Be there!

- Earlier this year we had planned to publish candidate Director's statements here in ASR. However, several factors have now delayed these plans. Two candidates have not sent statements. Two exceeded the word count limit. Since we cannot edit these statements and in the absence of two of them, we reluctantly must abandon our plans to publish as the least unfair course. We'll try again next year. Meanwhile, read your ballots carefully for the candidates' statements.

- Ron Dunbar, W6PN, has won the prestigious Chambers Award of the Central States VHF Society. Pictures of the event soon. Congratulations to Ron!

Opportunity Knocks; VP Departs

AMSAT Vice President for Operations Doug Loughmiller, KO5I, has submitted his resignation in order to devote full time to his new professional responsibilities. John Champa, K8OCN, has been named interim Director of the AMSAT. In a communication with AMSAT General Manager Bill Lazzaro, N2CF, Doug explained that his company has offered him a major promotion and relocation but that while in training for his new management assignment, his free time would be very limited. According to N2CF, KO5I felt that with so many aspects of the Operations organization in transition, he could not devote the time required to do the job justice. Thus, says N2CF, Doug felt it best to pass the reins to another.

John Champa, K8OCN, currently serves at the Board of Directors' pleasure in the capacity of Senior Vice President, an ad hoc designation created to facilitate John's special liaison work with external organizations such as the World Space Foundation, The Independent Space Research Group and others. In his additional capacity as Operations VP John will be responsible for the Field Organization including the Area Coordinators and Net Operations. Together these two groups comprise more than 100 volunteers making them the largest entities in AMSAT.

K8OCN will complete the term of KO5I which runs until the Board of Directors' Meeting on 15 Nov. 84. AMSAT sources suggest the Board may request K8OCN continue on as Ops VP for a full term.

Besides serving as Ops VP, KO5I had been a regular Net Control Station on the AMSAT International Nets on Sundays. He was part of Net Manager W8GQW's crack team of NCS on 15 and 20 meters. KO5I also filled in occasionally for W8CY in the 75 meter Mid-America Net operation. Doug has already moved to his new assignment in Charlotte, N.C.

Speaking on behalf of AMSAT, Executive Vice President WA2LQQ said: 'Doug has been a vital cog in the AMSAT organization for several years. He will be sorely missed. Persons of his talent are very rare and we can never find enough of them. We wish Doug well in his new job and hope that when his duties allow, he will again seek us out and rejoin us actively in a position of responsibility.'

KO5I was featured in ASR's Spotlight in 1982 (ASR# 25, Jan. 18, 1982.)

WØCA Sweeps AMSAT-Stoner Cup
By Wide Margin

Nick Laub, WØCA, showed what can be done when a competent operator, a first rate station and some free time can be parlayed. It comes out a big score! That's just what happened when WØCA, operating from his summer home in northern Minnesota racked up nearly 4 million points in the AMSAT-Stoner 25th Anniversary Challenge Cup. Second place finisher was SV1OE. K3SA took third.

WØCA finished with 3,959,296. That was more than double that of SV1OE who garnered 1,580,128. Third place was well back with 316,370 by K3SA.

Walt Rader, doing yeoman duty as scorer, says three stations were disqualified for excessive duplicate grids.

First in the Competitor Class was W2MTA with 77,214. Second went to JH1UUT with 13,653 points.

Meanwhile, Don Stoner, W6TNS, of Mercer Island Washington, has told ASR that he will be in Los Angeles at the Annual Meeting to present the AMSAT-Stoner 25th Anniversary Challenge Cup to the winner, WØCA. Nick and his wife will both be traveling to Los Angeles for the presentation. The Challenge Cup is named after W6TNS in honoring him as the nominal 'inventor' of the OSCAR concept. An article of Don's in his QM magazine column in 1959 is generally credited with being the catalyst behind the formation of Project OSCAR and the building and launch of OSCAR 1 in December 1961.

<table>
<thead>
<tr>
<th>Challenger Class Finishers: Top Ten</th>
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<tbody>
<tr>
<td>1. W8CA                3,959,296</td>
</tr>
<tr>
<td>2. SV1OE               1,580,128</td>
</tr>
<tr>
<td>3. K3SA                316,370</td>
</tr>
<tr>
<td>4. J1CG                160,678</td>
</tr>
<tr>
<td>5. W7OC                119,928</td>
</tr>
<tr>
<td>6. W8QS                77,622</td>
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<td>7. W3KH                67,355</td>
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<td>8. K4TWJ               27,956</td>
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<tr>
<td>9. W4AHZ               20,398</td>
</tr>
<tr>
<td>10. W4HWO              18,468</td>
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</table>

<table>
<thead>
<tr>
<th>Competitor Class Finishers: Top Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. W2MTA                 77,214</td>
</tr>
<tr>
<td>2. JH1UUT                13,653</td>
</tr>
</tbody>
</table>
VITA Announces Grant For PACSAT R&D

VITA, the Volunteers In Technical Assistance, has announced the receipt of a $5,000 unrestricted grant from the Tektronix Foundation of Beaverton, Oregon. According to VITA, the grant will be applied to PACSAT for continued research and development (R&D) work.

VITA has joined with AMSAT in a joint project to develop a system of digital store and forward satellites. VITA will use the technology to provide information directly to consumers in Third World Nations in order to improve the general quality of life by providing access to technical experts. These experts could help remotely with complex technical projects via the communications link the satellite would provide. AMSAT seeks to apply the store and forward PACSAT concept to Amateur Radio work.

Tektronix is a major manufacturer of test equipment. Their major products are oscilloscopes and spectrum analyzers.

According to VITA, several other grant applications are pending including a seed grant from the International Development Research Centre in Ottawa, Ontario, Canada. AMSAT has also applied for a research grant from NASA for PACSAT work. AMSAT expects to have word on that application's success this month.

Awards To Honor Service, Innovation, Commitment

AMSAT Executive Vice President WA2LQQ has announced a series of awards to honor public service through satellite, technical innovation and commitment to Amateur Satellite activities.

The first award to be instituted is the 'Bruce Sherman Memorial Satellite Public Service Award.' Named in memory of KA2JTS [see related story], this award will be made annually at the AMSAT Annual General Meeting to the individual who, through his or her use of Amateur Space resources or related facilities connected with Amateur Space, best signifies the spirit of public service which Bruce Sherman himself personified. The awardee shall be selected from among qualified nominees by a select panel of senior AMSAT members. The award will consist of a citation, a plaque signaling the award and a notable cash honorarium. The first awardee will be selected in 1985 and the premiere award will be made at the 1985 Annual General Meeting. The plaque will be displayed at the 1984 Annual General Meeting.

According to WA2LQQ, 'This award is to symbolize the love we have for our lost colleague and brother and concurrently to recognize and encourage others of similar persuasion.'

In a second award institution, the Technical Achievement Award program is nearing fruition. In this area AMSAT is formulating a broad technical achievement recognition program designed to foster innovation, sound engineering and emphasis on the technical aspects of Amateur Satellite activities.

The AMSAT Technical Achievement Awards Program will have several components. First, there will be an annual award for the most innovative development in the Amateur satellite field for the year. Second, there will be a series of on-the-air tests to assess your satellite receiving capabilities. If you qualify, you'll receive a handsome certificate award citing your achievement.

Here are the details on the Technical Achievement Awards Program.

The AMSAT Technical Achievement Award will be made annually to that individual or those individuals who, in the prior year, have contributed most notably and significantly to the development of any aspect of AMSAT-related technical activities. This may be achieved through innovation, invention, discovery, a pivotal paper or worthy enterprise in the field. The awardee shall be selected from among qualified nominees by a select panel of senior AMSAT members. The award will be made annually at the AMSAT Annual General Meeting and will consist of a citation, a plaque signaling the award and a notable cash honorarium. The first award shall be made at the 1985 Annual General Meeting. The plaque will be displayed at the 1984 Annual General Meeting.

The second component of the Technical Achievement Award Program will be the ZRO Memorial Ground Station Engineering Award. This award, available in progressively higher grades representing incrementally improved station performance, will be available to all AMSAT members who can demonstrate superior satellite station performance in any of several parameters. The first series of ZRO Memorial Ground Station Engineering Awards will be made for Mode B receive sensitivity performance. Later, additional challenges will be added. This award is dedicated to the fond memory of Kaz Deskur, K2ZRO, of Endicott, N.Y. who died earlier this year. Kaz (Kay) had been an AMSAT pioneer and was father of the famous Satellab...one of the first of the manual tracking systems available for the early OSCARs. The first trial runs for the ZRO Memorial Award will be announced shortly.

According to WA2LQQ, the overall Technical Achievement Awards Program which includes the ZRO Memorial Award, will be expanded from time to time to include other aspects of recognition for superior technical innovation and achievement within the field of Amateur Satellites and Amateur Space technology.

In remarks on the 75 meter net recently, WA2LQQ said: 'We are pleased to establish and underwrite these awards on behalf of AMSAT in that we personally knew and deeply admired both commemorated individuals [KA2JTS and K2ZRO] and wish that through these living memorials the memory of these two distinguished friends shall live on and be known broadly. We are happy and proud to recall how each of these colleagues positively affected our life. We only regret that notoriety for their achievement follows their untimely demise. May they rest in peace and be eternally blessed in His presence.'

Tribute To A Friend Gone Too Soon

Editorial by WA2LQQ

People come into Amateur Radio for a wide variety of reasons. Some see it as adventure; new places to talk to...new people to meet...new perspectives on the wide world.

Others, I'm convinced, see Amateur Radio as a learning
experience. They seek to learn how radios work, what makes the ionosphere work, how radio signals get from here to there... and back... how to track satellites.

Still others, I suppose, see this fascinating hobby as a challenge to be met head-on. These folks, likely as not, will find challenges equal to their fortitude in contests and various other competitive avenues.

Amateur Radio as society in microcosm; an interesting way to meet and make new friends; to socialize with folks of similar propensities; perhaps even similar eccentricities!

A select few find in Amateur Radio not a channel for competitive urges nor a conduit for manifold ego fulfillment. Rather these select few focus on Amateur Radio as a logical, perhaps even tailor-made vehicle for the expression of their fundamental public service orientation. Seems that just as a compass, freed of its tether always points North, these folks, free to do what they like best, choose to serve others as their direction in life.

These folks are truly extraordinary in an extraordinary hobby.

We were fortunate enough to have known a young man who approached his Amateur Radio hobby as he did most of his other activities: as a way to serve his fellows and his community.

As Captain on the town Volunteer Fire Department, he would dash from his bed into a formidable fire if service called.

As a licensed Emergency Medical Technician, he bid life stay in broken bodies; shattered hopes; lost dreams.

As friend and neighbor he was always at hand to help set a guy, hoist an antenna, give a pull or a push, or just to console and commiserate.

We buried Bruce Sherman, KA2JTS, recently. His death was the culmination of a senseless series of events that ended in a classic collision of good and evil when his path crossed that of a stolen car. Both Bruce and the driver of the stolen car (who was later determined to have been drunk) were killed instantly. The crash, at closing velocity exceeding 130 mph, was simply not survivable.

How many times had Bruce pulled open a wreck to free the victims? Now his colleagues on the Fire Department and Rescue Squad could only grieve at our collective mortality; at the irony. Having saved others, having prepared to help all, Bruce could not have saved himself from the onrush of destiny. There was (is) nothing to be done. He was gone, Forever.

Looking beyond this tragedy is difficult now. 'Twill likely always be so. More difficult still is finding meaning in this awful twist of fate; this gasping irony. Few answers are satisfying.

The fuller story of how this young man served his fellow man for years despite his youth is a clear message to all who listen and know the meaning of devotion to others; of public service.

Suffice it here to say Bruce was an inspiration to us and to all who knew him. He will be missed always as a friend, colleague, brother and so much more. Truly his kind pass here only rarely.

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UoSAT Bulletin-95  5th October 1984
UoSAT Spacecraft Control Centre, University of Surrey

UoSAT-OSCAR-9's Third Birthday

UO-9 was launched at 11:27 gmt on 6th October 1981 from Vandenberg AFB, California into a 554 km sun-synchronous, polar earth orbit by NASA DELTA-2130.

A great deal has happened since that day, both on the spacecraft and on the ground. UO-9 took a little while to 'tame' — the difficult command links caused the commissioning phase to stretch longer than anticipated and gave rise to the well-remembered months of 'steady tone' while Uo6 and SRI fought to regain use of the spacecraft. Those months (5) were put to good use upgrading the ground station and, following the successful recovery of the spacecraft, great strides were made with the activation of the on-board experiments and particularly navigation and attitude con-
The complex and difficult despin and attitude manoeuvres culminated in temporary gravity-gradient stabilisation, however the magnetometer cables on the boom became tangled during deployment and the boom had to be retracted. The spacecraft was then spin stabilised and the remaining experiments activated. A weekly schedule of daily experiments have been executed for the last two years including a weekly news Bulletin Service; CCD image data; Radiation Experiment data, computer-generated telemetry, DIGITALKER and whole-orbit telemetry surveys. The Bulletin service has been especially successful for maintaining the user community in close contact with spacecraft operations; future mission proposals and more general space news. The DIGITALKER experiment has had a profound impact in schools and colleges worldwide due to its vivid demonstration of low-cost, simple satellite groundstations. The CCD camera has not yielded the hoped-for image quality, but regular image dumps have stimulated interest in image processing and acted as a development tool for the UO-11 CCD Experiment. The best image thus far was received this week!

UoSAT-1 has not exhibited any measurable degradation since the failure of the secondary computer memory devices in the summer of 1982 and the rate of decay of the orbit has been much less pronounced than was anticipated — giving rise to an extended orbital lifetime of, perhaps, another two years?

**HAPPY BIRTHDAY UOSAT-1**

**OCTOBER 6 1984**

from the UoSAT Team and
the many experimenters worldwide

The UoSAT Team at Surrey would like to take this opportunity to thank the many experimenters for their participation, support and patience (!) during the mission thus far and we look forward to more exciting projects.

**General News**

**AMPTE-UKS Spacecraft Update**

The three Active Magnetospheric Particle Tracer Expt. (AMPTE) spacecraft launched successfully by NASA DELTA from Cape Canaveral on Thursday 16th August are reported to be functioning well. UoSAT contributed some signal processing modules to the UK satellite. Lithium releases have been completed on Sept. 11 and 20th and the major barium release of 10E25 ions is currently scheduled for Christmas day 1984. This release should give rise to a spectacular artificial 'comet' visible to the naked eye from the ground.

Some experiments have been scheduled with UO-11 — more later in the Bulletin.

**NOAA-9**

The launch of NOAA-F (9) has been set for the 12th of November.

**UoSAT-Oscar-9 Schedule**

This weeks schedule is as follows:

- **Friday** — load Bulletin
- **Saturday** — Bulletin/DIGITALKER/1200 bps telemetry
- **Sunday** — Bulletin/DIGITALKER/1200 bps telemetry
- **Monday** — Bulletin/DIGITALKER/1200 bps telemetry
- **Tuesday** — CCD Camera — next week Radiation data
- **Wednesday** — Whole orbit telemetry survey
- **Thursday** — Computer check-summed telemetry

The 21 MHz Beacon will be in use this week.

**CCD Image!!**

A routine CCD image taken last Wednesday afternoon contained a close-up view of northern Italy with both coastlines quite clearly defined — the best yet! Does anyone else have hard copy of this image data? As this image was more interesting than usual, it will be repeated next Wednesday (10th) instead of Radiation data.

**UoSAT-Oscar-11 Operations**

9600 bps data was received successfully for the first time from the UO-11 435 MHz downlink at UoS today (Friday) — work continues!

The real-time clock in the standard telemetry frame on UO-11 was reset to GMT (within 4 secs) on orbit 3077 (Fri-

VE2ASL gives a presentation on AO-10 last April to the Sherman Radio Club in Sherbrooke, Quebec. Bob is a regular contributor to the RAQI Journal. His most recent article explains how to get started in AO-10 work.
day 28th) to facilitate the data-logging of telemetry. The clock was reset using the spacecraft on-board computer feeding time information to the telemetry system. Sorry it has taken us so long to get around to this task!

Particle/Wave Experiments — UO-11 and the AMPTE spacecraft will be in conjunction for a couple of weeks at the end of October allowing the simultaneous measurement of P/W interactions with UO-11 and UKS. Preliminary tests will be carried out on Monday 081084 to evaluate the P/W experiment in preparation for this experiment. These conjunctions occur only once every six months so we must get going! More details will be given soon.

No CCD images were taken this week as work continues on preparing for the 9600 bps downlink and carrying out DCE rf tests from UoS.

The Particle/Wave experiment channel plate control counter has been checked prior to testing of the Electron Spectrometer next week. A meeting with AMPTE ex-

<table>
<thead>
<tr>
<th>Day</th>
<th>Orbit</th>
<th>Channels</th>
<th>Reset Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday</td>
<td>3082</td>
<td>1,2,3,52</td>
<td>18:09:55 (Telemetry rate set to 300 bps for longer survey) (six orbits stored at lower sample rate)</td>
</tr>
<tr>
<td>Saturday</td>
<td>3108</td>
<td>1,2,3,52</td>
<td>Six orbit survey dump</td>
</tr>
<tr>
<td>Sunday</td>
<td>3120</td>
<td>1,2,3,52</td>
<td>13:05:10</td>
</tr>
<tr>
<td>Monday</td>
<td>3121</td>
<td>1,2,3,52</td>
<td>08:50:20</td>
</tr>
<tr>
<td></td>
<td>3122</td>
<td></td>
<td>435 MHz downlink afsk test ODATA dump (OBC told to change dlink from ODATA to TLM after 6.5hrs)</td>
</tr>
<tr>
<td>Tuesday</td>
<td>3136</td>
<td>1,2,3,52</td>
<td>10:02:39 (OBC told to change dlink from ODATA to TLM after 9.5hrs)</td>
</tr>
<tr>
<td>Wednesday</td>
<td>3047</td>
<td></td>
<td>despin to Zspin 4.5 min.</td>
</tr>
<tr>
<td></td>
<td>3151</td>
<td></td>
<td>DCE encoder checkout for LSK</td>
</tr>
<tr>
<td></td>
<td>3152</td>
<td>1,2,3,52</td>
<td>13:18:22 (OBC told to change dlink from ODATA to TLM after 8.5hrs)</td>
</tr>
<tr>
<td>Thursday</td>
<td>3164</td>
<td></td>
<td>DCE rf tests using VHF up &amp; UHF down</td>
</tr>
<tr>
<td></td>
<td>3165</td>
<td></td>
<td>DCE rf tests using VHF up &amp; UHF down</td>
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<tr>
<td></td>
<td>3166</td>
<td>1,2,3,52</td>
<td>12:16:40 (OBC told to change dlink from ODATA to TLM after 8.5hrs)</td>
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<tr>
<td>Friday</td>
<td>3179</td>
<td></td>
<td>set up 9600 bps test data</td>
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<tr>
<td></td>
<td>3180</td>
<td></td>
<td>435 MHz beacon 9600 bps psk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>nrzi data test (5 mins)</td>
</tr>
</tbody>
</table>

Thanks for Reports & Questionnaire Returns

N6CSI, ZL1GGZ, ZL1PK, ZL1BHX, ZL1UJT, ZL1MO, JE3MXU, F6BVP, G6AAL, WB9ANQ

This week: W7AVE, JA2WO,

Messages

W7AVE DE G3YJO — thanks for the letter, intrigued by your method of decoding 1200 bps Bulletin using 300 bps system! Thanks for the donation too!

Member Recruitment Drive In Full Swing

AMSAT's Second Annual Member Recruitment Drive is now in full swing with the hamfest season having reached a peak in the last few weeks. As was the case last year, the Grand Prize, a Yaesu FT-726R, seems to have galvanized a large number of would-be claimants of the radio into frenzied activity. At press time the leader apparently was K1JM who zoomed into the lead over last year's Grand Prize winner, N3CEG.

Rules for this year's contest are similar to last year's with minor differences. Read the rules below carefully.

At press time donors to the prize bucket were growing with the following on line: Henry Radio, Advanced Receiver
OFFICIAL RULES:
1984 AMSAT Member Recruitment Contest

1. Contest runs until 31 Dec. 84. Member applications must be postmarked before 31 Dec. 84.
2. Points are awarded for new members as follows. One point for an annual member; two points for a member society; three points for a life member. Credit not granted for family members except when additional family members pay the full annual member rate.
3. Scores will be announced publicly periodically. Scores will not be available at AMSAT Headquarters except after the contest is over.
4. Only AMSAT Members may participate. If you become a member, you get one point. If you renew, you get one point. If you upgrade to Life Member (from regular annual member) you get three points. If you upgrade to Sustaining Life Member from Life Member you get one point.
5. Only entries on Official AMSAT Membership Applications will count. Locally reproduced copies of these applications are OK. Applications may be obtained in reasonable quantities for a business sized SASE to AMSAT HQ, P.O. Box 27, Washington, D.C. 20044.
6. Prizes will be awarded as follows. All prizes will be placed in a pool. The first place finisher will have his (her) choice of any prize in the pool. After the first prize is selected, the second place finisher may select from the remaining prizes. And so on until all prizes are awarded. All prize winners will be announced in ASR and other media as appropriate. A complete list of the available prizes will be published in ASR.
7. Good luck to all.

Research, VHF Shop, Spectrum West, Lunar Electronics, KJI Electronics, KLM/Mirage, Electronic Equipment Bank, Encomm. Others may be lined up as we proceed. And of course, the Grand Prize, the Yaesu FT-726R goes to the recruiter with the best score as of 31 Dec. 84. So get going.

We'll be tantalizing your appetites with plugs for the donors and their products over the next few weeks, so get going soon so as to not be disappointed when the big prizes are given out. One of them COULD BE YOURS for just a few hours effort!

Satellite: OSCAR-9
Catalog number: 12888
Epoch time: 84273.37378639
Sat Sep 29 08:50:14.452 1984 UTC
Element set: 690
Inclination: 97.6040 deg
RA of node: 249.6657 deg
Arg of perigee: 0.0000428
Mean anomaly: 258.4210 deg
Mean motion: 15.2632330 rev/day
Decay rate: 2.403e-05 rev/day 2
Epoch rev: 16543
Semi major axis: 6661.590 km
Anom period: 94.337625 min
Apogee: 506.524 km
Perigee: 500.645 km
Ref perigee: 2463.39216358
Sat Sep 29 09:24:51.573 1984 UTC
Beacon: 145.8250 MHz

Satellite: OSCAR-10
Catalog number: 14129
Epoch time: 84277.08052018
Wed Oct 3 01:27:08.943 1984 UTC
Element set: 133
Inclination: 25.7678 deg
RA of node: 175.2081 deg
Arg of perigee: 0.6053937
Mean anomaly: 10.5933 deg
Mean motion: 2.05844218 rev/day
Decay rate: 1.2e-06 rev/day 2
Epoch rev: 983
Semi major axis: 26106.554 km
Anom period: 699.558148 min
Apogee: 35353.433 km
Perigee: 1929.946 km
Ref perigee: 2467.04729498
Wed Oct 3 01:06:33.938 1984 UTC
Beacon: 145.8100 MHz

Satellite: OSCAR-11
Catalog number: 14761
Epoch time: 84265.21359828
Fri Sep 21 05:07:34.891 1984 UTC
Element set: 43
Inclination: 98.2103 deg
RA of node: 327.0799 deg
Eccentricity: 0.0013527
Arg of perigee: 351.4782 deg
Mean anomaly: 8.6131 deg
Mean motion: 14.63903966 rev/day
Decay rate: 1.08e-06 rev/day 2
Epoch rev: 2973
Semi major axis: 7062.246 km
Anom period: 98.501682 min
Apogee: 694.114 km
Perigee: 675.008 km
Ref perigee: 2455.21196170
Fri Sep 21 05:05:43.490 1984 UTC
Beacon: 145.8260 MHz

Satellite: RS-3
Catalog number: 12997
Epoch time: 84271.42323535
Thu Sep 27 10:08:01.134 1984 UTC
Element set: 103
Inclination: 82.9542 deg
RA of node: 76.3816 deg
Eccentricity: 0.00091111
Arg of perigee: 322.9157 deg
Mean anomaly: 227.0857 deg
Mean motion: 12.155889559 rev/day
Decay rate: 4e-08 rev/day 2
Epoch rev: 12335
Semi major axis: 7987.323 km
Anom period: 118.461311 min
Apogee: 1664.742 km
Perigee: 1573.115 km
Ref perigee: 2461.45256229
Thu Sep 27 10:51:41.381 1984 UTC

Orbit Predictions
By KA9Q
<table>
<thead>
<tr>
<th>Satellite: RS-4</th>
<th>Satellite: RS-7</th>
<th>Satellite: noaa-7</th>
</tr>
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<tbody>
<tr>
<td>Catalog number: 13000</td>
<td>Catalog number: 13001</td>
<td>Catalog number: 12553</td>
</tr>
<tr>
<td>Epoch time: 84264.5751276</td>
<td>Epoch time: 84275.14840318</td>
<td>Epoch time: 84268.00965980</td>
</tr>
<tr>
<td>Thu Sep 20 13:48:11.27 1984 UTC</td>
<td>Mon Oct 1 03:33:42.34 1984 UTC</td>
<td>Mon Sep 24 00:13:54.37 1984 UTC</td>
</tr>
<tr>
<td>Inclination: 82.9547 deg</td>
<td>Inclination: 82.9545 deg</td>
<td>Inclination: 99.0574 deg</td>
</tr>
<tr>
<td>RA of node: 89.8604 deg</td>
<td>RA of node: 81.7359 deg</td>
<td>RA of node: 240.5074 deg</td>
</tr>
<tr>
<td>Eccentricity: 0.0017040</td>
<td>Eccentricity: 0.0021848</td>
<td>Eccentricity: 0.0013124</td>
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<tr>
<td>Mean anomaly: 124.1516 deg</td>
<td>Mean anomaly: 190.8136 deg</td>
<td>Mean anomaly: 186.4389 deg</td>
</tr>
<tr>
<td>Mean motion: 12.0666420 rev/day</td>
<td>Mean motion: 12.0866423 rev/day</td>
<td>Mean motion: 14.13083789 rev/day</td>
</tr>
<tr>
<td>Decay rate: 4e-08 rev/day</td>
<td>Decay rate: 4e-08 rev/day</td>
<td>Decay rate: 1.23e-06 rev/day</td>
</tr>
<tr>
<td>Semi major axis: 8026.664 km</td>
<td>Semi major axis: 8017.723 km</td>
<td>Semi major axis: 7224.158 km</td>
</tr>
<tr>
<td>Anom period: 119.337257 min</td>
<td>Anom period: 119.137600 min</td>
<td>Anom period: 101.904785 min</td>
</tr>
<tr>
<td>Apogee: 1676.623 km</td>
<td>Apogee: 1657.816 km</td>
<td>Apogee: 855.746 km</td>
</tr>
<tr>
<td>Perigee: 1649.268 km</td>
<td>Perigee: 1622.781 km</td>
<td>Perigee: 836.784 km</td>
</tr>
<tr>
<td>Ref perigee: 2454.5464575</td>
<td>Ref perigee: 2465.1872624</td>
<td>Ref perigee: 2458.04377468</td>
</tr>
<tr>
<td>Beacon: 137.6200 MHz</td>
<td>Beacon: 137.6200 MHz</td>
<td>Beacon: 137.6200 MHz</td>
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</tbody>
</table>

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<tr>
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<tbody>
<tr>
<td>Catalog number: 12999</td>
<td>Catalog number: 12998</td>
<td>Catalog number: 13923</td>
</tr>
<tr>
<td>Epoch time: 84270.16226739</td>
<td>Epoch time: 84271.02350192</td>
<td>Epoch time: 84247.13108875</td>
</tr>
<tr>
<td>Wed Sep 26 03:33:39.502 1984 UTC</td>
<td>Thu Sep 27 00:33:50.565 1984 UTC</td>
<td>Mon Sep 3 03:08:46.68 1984 UTC</td>
</tr>
<tr>
<td>Element set: 191</td>
<td>Element set: 293</td>
<td>Element set: 92</td>
</tr>
<tr>
<td>Inclination: 82.9532 deg</td>
<td>Inclination: 82.9545 deg</td>
<td>Inclination: 98.7036 deg</td>
</tr>
<tr>
<td>RA of node: 88.4127 deg</td>
<td>RA of node: 90.0979 deg</td>
<td>RA of node: 277.1915 deg</td>
</tr>
<tr>
<td>Eccentricity: 0.0009736</td>
<td>Eccentricity: 0.0019055</td>
<td>Eccentricity: 0.0016362</td>
</tr>
<tr>
<td>Mean anomaly: 105.7276 deg</td>
<td>Mean anomaly: 52.7595 deg</td>
<td>Mean anomaly: 174.9235 deg</td>
</tr>
<tr>
<td>Mean motion: 12.05954867 rev/day</td>
<td>Mean motion: 12.02947950 rev/day</td>
<td>Mean motion: 14.22249264 rev/day</td>
</tr>
<tr>
<td>Decay rate: 4e-08 rev/day</td>
<td>Decay rate: 4e-08 rev/day</td>
<td>Decay rate: 3.8e-07 rev/day</td>
</tr>
<tr>
<td>Semi major axis: 8033.833 km</td>
<td>Semi major axis: 8043.217 km</td>
<td>Semi major axis: 7192.471 km</td>
</tr>
<tr>
<td>Anom period: 119.496634 min</td>
<td>Anom period: 119.705927 min</td>
<td>Anom period: 101.235263 min</td>
</tr>
<tr>
<td>Apogee: 1683.026 km</td>
<td>Apogee: 1693.773 km</td>
<td>Apogee: 826.261 km</td>
</tr>
<tr>
<td>Perigee: 1667.382 km</td>
<td>Perigee: 1663.120 km</td>
<td>Perigee: 802.725 km</td>
</tr>
<tr>
<td>Ref perigee: 2460.1789607</td>
<td>Ref perigee: 2461.01131900</td>
<td>Ref perigee: 2437.09691921</td>
</tr>
<tr>
<td>Wed Sep 26 03:18:34.220 1984 UTC</td>
<td>Thu Sep 27 00:16:17.961 1984 UTC</td>
<td>Mon Sep 3 02:19:33.819 1984 UTC</td>
</tr>
<tr>
<td>Beacon: 137.5000 MHz</td>
<td>Beacon: 137.5000 MHz</td>
<td>Beacon: 137.5000 MHz</td>
</tr>
</tbody>
</table>

Amateur Satellite Report is published and mailed First Class bi-weekly for the Radio Amateur Satellite Corporation. The purpose is to enhance communications about the Amateur Radio Satellite Program. Subscription rates for the United States, Canada, and Mexico are $22.00; Foreign is $30.00. The rate covers 26 issues (typically one year). Send check or money order in U.S. funds (drawn on U.S. banks only please) to “Satellite Report,” 221 Long Swamp Road, Welcott, CT 06791. Information contained herein may be quoted without permission provided credit is given to Amateur Satellite Report, Welcott, CT 06791. Amateur Satellite Report is Copyright Protected and duplication of this publication in any way including by the photocopy process or by electronic means (computer data banks, etc.) is not permitted under any circumstances. Amateur Satellite Report is endorsed by the ARRL as the special interest newsletter serving the Amateur Radio Satellite Community. The editorial opinions expressed are not necessarily those of the ARRL.
Antenna Accident Claims OX3FS; Had Spotted UO-11 In May

Finn Steenstrup, OX3FS, of Sondre Stromfjord died 21 Oct. 84 of injuries sustained in a fall from the supporting pedestal of a large dish antenna. He had been instrumental in the successful recovery of UO-11 earlier this year when the 2 meter beacon fell silent after only 3 orbits.

According to Dr. Robert Leonard, KD6DG, Finn fell from a height of about 30 feet to a concrete slab when, apparently, a harness failure occurred. He had been scaling the side of the conical pedestal as part of a routine maintenance activity when the mishap occurred. Dr. Leonard is Director of the Radio Physics Laboratory of SRI International, Menlo Park, CA. SRI International runs the facility at Sondre Stromfjord as one of series of experimental facilities around the world.

UO-11 was launched into a perfect orbit 1 Mar. 84 but fell silent on only its third orbit. (ASR #73, 74.) It was thought a cold regulator or oscillator was causing a current-starved oscillator to generate sufficient noise to block reception of ground-originated commands. UO-11 remained silent while scientists and engineers at the University of Surrey rebuilt the command station in an effort to shower UO-11 with more RF to overcome the presumed white noise of the reluctant oscillator.

Making matters somewhat more complex was a lingering uncertainty regarding the spacecraft's precise location. Skin track radar seemed to confirm the NASA 'two-line' Keplerian element sets, but, recalling an earlier mixup in the booster and the spacecraft (AO-8), additional location confirmation was desirable. After several weeks of unsuccessful command efforts from Surrey and with concern for the spacecraft growing, Martin Sweeting, G3YJO, and his team at Surrey developed a scheme to help confirm the orbital predictions. He calculated that given the known local oscillator power and other factors of UO-11's 1.2 GHz command receiver, a sufficiently sensitive L-Band receiver could likely detect the feeble emissions of UO-11's L-Band command receiver.

Acting upon these calculations, AMSAT's WA2LQQ contacted Dr. Leonard at SRI International in Menlo Park. Recalling the effort Dr. Leonard and his team had expended with commanding the UO-9 beacons off (ASR 42, 22 Sep. 82), WA2LQQ inquired whether the same 150 foot dish at Menlo Park might be turned to the task of locating UO-11. Immediately Dr. Leonard countered with a suggestion that an L-Band receiver was already in operation under the auspices of SRI in Greenland and that it probably was fitter than the 150 foot dish in California (cover of ORBIT #12, Jan/Feb 83) for the task at hand.

Within days Dr. Leonard had contacted Finn Steenstrup in Greenland. Steenstrup, a ham for years was up to the challenge and wasted no time. Based on a communication link established from Surrey to Menlo Park via Telemail and thence to Greenland by telephone, the frequencies and ephemeris information was passed on where and when to listen. Then on 11 May the weak (+7dBm at the source) signal was heard on two successive orbits. This confirmed two essential facts: UO-11 lived and was where it was expected.

Elated by this good news the team at Surrey, just completing their command station upgrade, successfully commanded the 2 meter beacon on on 15 May thus ending a potential nightmare for the hardworking Surrey team. Launching UO-11 itself had been a minor miracle given the extraordinarily tight schedule afforded. Now, with the successful recovery aided by SRI International and OX3FS, the UO-11 telemetry could begin to be exploited. (ASR #77)

It was while working on the selfsame 100 foot radar dish at Sondre Stromfjord Greenland that OX3FS fell to his death. He had been the Station Chief there and had been, according to reports, delighted to help his fellow hams in the UO-11 effort. Finn Steenstrup was a professional engineer holding BSEE and MSEE degrees. He worked for SRI International as a Senior Research Engineer for the past 5 years. He worked for the Radio Physics Laboratory of which Dr. Leonard, KD6DG, is head. According to initial reports of the accident he fell about 30 feet when his harness broke. He was taken to a nearby air base where he was treated for broken bones. He expired in hospital about four hours after the accident. The body was flown to Denmark for autopsy, there being no suitable facility at Sondre Stromfjord. The report was unavailable at presstime but Dr. Leonard suspected internal injury such as a ruptured spleen or spinal cord or cranial injury will likely be found as the cause of death. Finn is survived by a wife and son at home and a daughter studying at the University of Michigan. He was
44 years old. Amateur Radio is a special fraternity by any reasonable measure. Many around the world who now enjoy using WO-11 owe a small debt to the enthusiasm and professional talents of a fine man they never knew. AMSAT's Executive Vice President WA2LQQ expressed the grief of the Amateur Satellite community on behalf of AMSAT and the University of Surrey Satellite Laboratory to Dr. Leonard and by extension to the Steenstrup family. AMSAT will offer the Steenstrup family a modest memorial token on behalf of grateful satellite users around the world. Dr. Leonard will accept on behalf of the Steenstrup family at the Second Annual Space Symposium, Saturday 10 Nov. 84 in Los Angeles.

**Short Bursts**

- Chief Area Coordinator Jim Mckim, WA0CY, has announced the appointment of an additional Area Coordinator for southern Florida. Mike Crisler, N4IFD of Miami is the new Area Coordinator and will have a splendid demo station at the big Miami Hamfest. Mike's address is 81341 W. 137th Ave., Miami, FL 33183.
- When mentioning the scoring of the Stoner Challenge Cup recently, we mentioned the scorer but omitted his call. AMSAT is indebted to Walt Rader, WA3DMF, for his great help in scoring the contest!
- Talk about sound alike...Recently we learned that a satellite being launched for a consortium of Arab nations. Naturally it will be called Arabsat. (No Ethel, NOT Sheiksat). Now we have learned of another one for Pakistan. Of course it will be called...PAKSAT! Thus there will soon be PACSAT and PAKSAT aloft. All's well 'cause we have it from the statisticians that AMSAT is behind it all. (AMSAT is the American Statistical Association!)
- K8OCL will be writing a regular column for the QCWA News promoting AMSAT. Watch for it.
- Defend Amateur Radio Towers (DART) is a Non-Profit effort based in New York to defend the rights of tower owners in a precedent-setting circumstance in Dix Hills. Inquiries may be addressed to DART, P.O.B. 2851, Huntington Station, NY 11746.
- On the mend after bypass surgery, WØPN (triple) and LUTAHC (quadruple). Both Ron and Art are up and about. Art recently was sufficiently spirited to visit New York City on business! Ron extends thanks for greetings extended to him from as far as Europe and New Zealand.
- The North American Teleconference Net airs next on 2 Dec. with pioneer packeteers Lyle Johnson, WA7GXD, and Harold Price, NKeK, on tap. With the burgeoning interest in packet evident worldwide, this TRN event is a must.' have your repeater contact the Midway Radio Club, Kearney, Nebraska for information on linking up with the net.
- Another ham has appeared in the ranks of U.S. Astronauts. As it turns out he was there all the time! Just hadn't emerged into public view until recently. The new find is John-David Bartoe, N4NYZ. He is a Payload Specialist and will fly along with Dr. Tony England, WØORE when the latter flies next spring. According to Roy Neal, K6Due, the proposal to take SSTV along on the mission is doing very well through the review cycle. There are now 5 hams among the astronauts; four are Americans and there is one Dutchman.
- Word from UA3CR via G3IOR is that RS-6 expired at 0430 UTC, 19 Sep. after having completed 19,778 hours of operation and 12,175 orbits. Do svitdaniya!
- Leading the Member Recruitment Drive and primed to claim the Grand Prize Yaesu FT-726R is Andy Deskur, KA1IM. Still time to catch him though, or to claim one of the other terrific prizes. Join up a few members today!
- University of Surrey now has two (count 'em) telephones for satellite information. Info on UO-9 is available at 483-61707. UO-11 info is available at 483-61202.
- AO-10 completed its 1000th orbit on 14 Oct. Nice milestone to recall!
- SU1AS has been heard on AO-10. G3IOR now estimates 103 countries have been active on AO-10.
- A beginners' net is hosted each Wednesday evening at 9:00 EST on 3855 kHz by KA9LCF. Questions you need answers to? Stop by every Wednesday.
- Questions abound as to why the MARCE package on Shuttle mission STS 41G was unheard on the ground. According to lead experimenter Ed Stluka, W4QUA, everything seemed in order when the GAS can was opened at the Kennedy Space Center. An investigation is being conducted by the Goddess Space Flight Center.
- The W3IWI Packet Radio Bulletin Board System (PRBBS) is running on AO-10 in conjunction with an FCC STA issued 18 Oct. 84. Participating in early tests with Tom were VE1PAC/VE6, K7PYK, W4DAQ and N5AHD. Tom's PRBBS on SSC H1 runs a Xerox 820, WØRLI software and a TAPR TNC to a 202-type modem using 1 kHz FSK.

**New AO-10 Sked Anticipated To Relieve Battery Load**

Increased battery load resulting from increasing Mode B transponder usage, especially on weekends, has led satellite controllers and engineers to recommend a modest rollback in operating time. According to VE1SAT/VE6, who is in charge of AO-10 for this period, discussions with DJ4ZC suggest an adjustment may be in order to avoid approaching automatic cutoff regimes. Presently AO-10's transponders are on for all but about 45 minutes per orbit. With the heavy weekend usage now evident, this 'nap time' recharge period must be increased to provide a net positive energy equation for each orbit. The recommendations to AMSAT Management were to increase the 'Off' time slightly and, since Mode L is a very light user of power, to implement Mode L on Sundays in the same period as it appears throughout the week, i.e., 1010 thru 117. Sunday is a very heavy usage day.

The changes in the transponder schedule are anticipated on or about 1 Dec. 84. Users should watch the AO-10 beacon bulletins (145.810 and 435.040) for news of imminent change. Keeping well-tuned to your AMSAT Nets will help as well.

Further refinements in the schedule are anticipated early next year when a minor series of eclipses will occur. (See accompanying graph and ASR 83).
Another Mystery Satellite

Signals from an interloper in the Amateur bands have excited UHF experts and EMEers worldwide. What has them aghast is the 2304 MHz signal originating from (apparently) a Russian early warning satellite. According to WB5LUA and KA1GT, the signals are strong enough to be heard using only a coffee can feed waved around in the general direction of the Russky bird!

Detailed reports sent to ASR from W4HHK and others document a powerful satellite signal in what appears to be a near-polar, Molniya-type orbit. As reported in these pages two years ago (ASR 26 and 28), such signals were at that time attributed to Cosmos 1217, a Russian early warning satellite. KA1GT mentioned the sighting in his QST (Apr. 82) 'New Frontier' column. Identification of the source as Cosmos 1217 was made by an anonymous official source.

It is quite clear now, however, that the source(s) being observed now is (are) not Cosmos 1217. At least it is not 1217 alone. A check with Dick Flagg of the famous Kettering Group of satellite sleuths confirmed the observations reported do not correlate with the position of 1217 as computed from the NASA 2-liners for 1217. According to Flagg, Cosmos 1217, object 12032, has orbital elements as follows:

Ref Epoch: 84 295.576043
Drag: 1.1E-5
Incl: 66.82
RAAN: 330.87
Ecc: 0.6822
Arg Per: 302.2
MA: 9.344
MM: 2.009
Rev: 2926

The signal is strong enough (50 to 52 dB above cold sky at OE7PHJ!) to provide a serious impediment to EME work when it's in view. Nevertheless, according to ITU allocations, the 2304 band is for radiolocation (primary) and amateur (secondary). If, as suggested previously in ASR, this really is an early warning satellite creating all the racket, there may be very little that can be done. Certainly, it would seem, the bird is squawking on a frequency allocated to it by the ITU however onerous its screech may be to the Amateur Radio Community.

Early warning satellites of the type thought to comprise Cosmos 1217 and similar birds of the feather detect ballistic missiles in the boost phase by detecting the infrared signature of the exhaust plume. Whether this function is within the definition of 'radiolocation' is arguable. Semantics notwithstanding, it's probably been with us for some time as K2UYH's 432 and Above EME News reported similar signals as early as December 81.

AO-10 Current Transponder Operating Schedule

Pursuant to the schedule effective 16 Oct. 84, the following is the transponder operating schedule:

<table>
<thead>
<tr>
<th>Mean Anomaly</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>235-099</td>
<td>B</td>
</tr>
<tr>
<td>100-117</td>
<td>L (Except Sunday; B)</td>
</tr>
<tr>
<td>118-218</td>
<td>B</td>
</tr>
<tr>
<td>219-234</td>
<td>Off</td>
</tr>
</tbody>
</table>

As noted elsewhere herein, watch for future changes on/about 1 Dec 84. Watch the beacon on AO-10 for announcements and details.
Ohio AMSAT Management Team To Meet

AMSAT Area Coordinators and staff from around Ohio will hold a management conference on 1 Dec. 84 in Chillicothe, OH, according to Ohio Area Coordinator and meeting organizer Dick Burgraf, W8PGP. The conference will be hosted by the AMSAT Southern area and is open to all visitors and interested parties. Specific topics to be covered include how the volunteer program operates, member recruiting techniques, effective AMSAT presentations, organizing and staffing an AMSAT booth at a convention or hamfest, starting and operating an AMSAT net on your local repeater, where and how to obtain answers to your questions, how to be a good satellite Elmer and practical suggestions on getting started in OSCAR satellites.

Special Guest luncheon speaker will be John Champa, K8OCL, AMSAT Senior Vice President. John will speak on 'AMSAT Field Organization: The Critical Role of the Area Coordinator.' The meeting will be held at the L-K Restaurant, 1135 E. Main St. in Chillicothe. It is just off state route 23 and 35 at the East Main Street exit. Talk-in will be on 146.25-85.

Further information may be obtained from W8PGP at 988 Prosperity Road, Waverly, OH 43180. You may call Dick at 614-947-5483. Remember...all are welcome. AMSAT congratulates the initiative of the stalwart Ohio team for leading the way towards a rejuvenated Area Coordinator Team. Well done, chaps! (A $10 donation will cover lunch and hand-out materials).

1984 SET Yields Satellite First

The 1984 Simulated Emergency Test was highlighted by the first SET formal messages being sent to ARRL Hq. via satellite. K8OCL in Dearborn, Michigan and N4AZI in Baton Rouge, Louisiana originated the messages and transmitted them through OSCAR 10 to WINU in Connecticut. WINU then called ARRL Hq by landline.

The text of these historic messages was: 'AMSAT Satellite Emergency Communications System activated for 1984 SET on Oscar 10 SSC H1 X ASEC5S will be available for all future drills and emergency situations.'

A new era in emergency communications has begun with the 1984 SET. ASEC5S is the AMSAT Satellite Emergency Communication System. Dave Eanes, N4AZI is AMSAT Emergency Communications Manager while K8OCL is Acting Vice President for Operations. (Tks ARRL letter).

Space News On Computer

Space News, a bi-weekly newsletter, has now begun operating a computer information service to disseminate news of discoveries and developments as rapidly as possible. The constantly updated computer files are part of the CompuServe Information Service. While there is no charge specifically to access the Space News files, you must be a subscriber to CompuServe in order to use the system, and normal time charges will apply. Information on CompuServe is available from 5000 Arlington Center Blvd, Columbus, OH 43220 or call 1-800-848-8990 (not a computer line).

Once you have accessed CompuServe, at the first '!' prompt, type 'PRO'; this will take you to the programming area and 'OK' will appear when the transfer is complete. Then, type 'R ACCESS' to get to the public access files. To access Space News service, input 'R SPACENWS.TXT [70376,534].

The screen, at this point, will appear like this: PRO OK R ACCESS PUBLIC FILE ACCESS SYSTEM USE? FOR HELP ACCESS: R SPACENWS.TXT [70376,534] and the information files will then follow, with the latest news always appearing first. To stop the output, enter 'CONTROL-C'. To re-enter the normal CompuServe area, or at the end of the file, enter 'EXIT', then 'R DISPLA'. Feel free to correspond with Space News using the above Personal Identification Number and CompuServe electronic mail (EMAIL).

In March 1985, SPACE News will devote a special expanded issue to computers and their uses in astronomy and space science, featuring both software and hardware applications. Any ideas, comments, or suggestions on this are welcome. (Tks SPACE News)

Metroplex To Buy Satellite Air Time For News Relay

According to Westlink's Bill Pasternak, WA6ITF, New Jersey's Metroplex repeater organization will be purchasing the use of a voice channel on a geosynchronous satellite such as Telstar 301 or Satcom 4 to provide national distribution of the Metroplex News, Westlink News and the quarterly Teleconference Radio Nets. The time is being purchased as 52 half hour blocks (1 per week) and four 2 hour blocks for the TRNs. Downlinking will be to hams with TVRO equipment who will patch the audio channel into the local repeater for the ham community served. The FCC has informally given the green light to the scheme inasmuch as both the source and the audience of the program material is amateur radio. In this account it differs negligibly from amateur radio use of autotapch facilities. Both use common carrier channels for the transmission of explicitly Amateur Radio materials.

In a paper to be read at the AMSAT Second Annual Space Symposium on 10 November, Dr. Al Dayton, K4JFO, discusses 'Advanced Gateway Concepts' in which he proposes to link up hundreds or thousands of repeaters nationwide using a hams-only C-Band geosynchronous satellite with as many as 24 transponders aboard.

Weekend Net Squeeze

The AMSAT 15 meter and 20 meter International Nets have been a mainstay of the organization for years. Now, however, several factors are coming into play which may affect the future of these weekend fixtures.

Propagation is declining rapidly. Consequently the served areas are not consistently reached. Second, traffic levels, especially contest activity on 20 and 15, seem to be increasing. Contests diminish the effectiveness of the nets at best.
Dave Kifer, N8ETY, recently constructed this handsome model of AO-10 from prints originated by AMSAT DL. The model is about 77 cm (2.5 feet) across and made its first public appearance at the Cleveland Hamfest recently.

At times they totally destroy the nets. Third, the staff of Net Control Stations has declined through attrition without replenishment. Although replacements have been earnestly sought for nearly a year, only W7FF has come forward. He has replaced W6CG on the SW Pacific Net. NCS remaining for the 20 and 15 meter nets are N4HY and W8GQW. With W8GQW about to embark on his winter sabbatical to Arizona, N4HY is faced with the prospect of handling the nets alone. With his travel/business schedule uncertain, the 20/15 nets are in, to be kind, critically understaffed condition.

Consequently, Net Manager W8GQW has recommended to AMSAT Management that a series of service modifications be adopted that more realistically reflect communication needs and organizational capabilities. Wray suggests that the 20/15 meter nets be reduced in frequency to once or twice per month and that concurrent with that, a regular bulletin service from AMSAT be offered on AO-10. AMSAT UK now provides a service of this kind. (See ASR 84).

Moreover, Wray points out, the requirements for 20 and 15 meter coverage have changed dramatically since the service was initiated. AMSAT now has extensive news dissemination capabilities through ASR, OSCAR NEWS (AMSAT UK), AMSAT JOURNAL (AMSAT DL) and others. There are numerous national and regional nets active (e.g. UK nets, Argentina, Australia, etc.). Moreover, with the addition of intercontinental electronic mail, there may be, says W8GQW, less need for the 20/15 meter nets than previously.

Net Manager W8GQW invites comments on his thoughts in this regard to his home at 1617 West McKaig, Troy, OH 45373.

**Moscow on the Hudson: New York City Earth Station snags Soviet TV**

Sovietologists and others at Columbia University have a unique research tool thanks to satellite technology. Under the direction of the W. Averell Harriman Institute for Advanced Study of the Soviet Union, the first commercial earth station for Russian Molniya television satellites has been installed atop the school's 15-story International Affairs Building. Columbia is now the first major university in the Western hemisphere to have access to the same television shows that millions of Russians watch every day.

Earlier engineering surveys of the site at 118th Street in Manhattan had ruled out the installation due to interference from nearby telephone-company transmitters and other sources. The company Orbita Systems, however, was successful in setting up the station in time for its inauguration on October 4th.

The installation includes a 3.6-m parabolic dish antenna, a modified commercial microwave receiver, a SECAM color monitor, and a special receiver to demodulate the Russian satellites' unique digital audio transmissions. The antenna is controlled by an Apple IIe computer, which was programmed to automatically track the Russian satellites as they appear over the northern horizon.

The Soviet Molniya satellites use a so-called 'sound-in-syncs' digital pulse code to carry the audio during the picture's horizontal blanking interval. That is very much different from the conventional FM subcarrier used by most Western television satellites. Also different is the picture transmission, which is a modified version of the French 625-line SECAM color standard. The downlink from the Molniya birds requires a circularly polarized antenna.

**Hamtronics Readies New Wish List**

Included among the offerings in the new 1985 Hamtronics catalog are several items of interest to the satellite enthusiast. In addition to transmitting and receiving converters for the 145- and 435-MHz bands, the catalog describes a line of GaAs FET receiver preamplifiers for improving Mode B reception. Especially of interest to those following the U.S. manned spacecraft program are a series of receivers designed for reception of Space Shuttle communications. The 1985 Hamtronics catalog is available free and can be obtained by calling (716) 392-9430 or writing to Hamtronics, Inc., 65-F Moul Rd., Hilton, NY 14468-9533. For overseas delivery, include $2 or four International Reply Coupons (IRCs). Please tell them you saw it in ASR.

**Sneak a Peak at Russian TV**

Tired of the ordinary fare on American television? Want to see for yourself what the Soviet government is showing its citizens during prime time? If you own a backyard earth station (and many hams do) you may be able to get a glimpse of Russian television without any added expense. Here's how:

The easiest way to find a Molniya bird is to monitor between 4 PM and 7:15 AM EST. Tune your receiver to 3.875 GHz, just above U.S. transponder 9, and aim your antenna north, in the direction of Mansel Island, Hudson's Bay, Ontario, Canada. Molniya's apogee is about 40,000 km above Mansel and the satellite will appear to hang almost stationary for about one hour at that location.

If you have an azimuth-elevation mount, try swinging the antenna a few degrees around until you find the satellite's
downlink. Once you find the satellite, you will be able to track Molniya through most of its 6-hour loop until it is turned off at the U.S.-Canadian border.

Since it is transmitted at 25 rather than 30 frames/s, as in the U.S., the picture from Molniya will roll vertically. Simply adjust the television set’s vertical hold to stabilize the picture. The set’s vertical linearity might also have to be adjusted since the picture’s 625-line scan might make the Russians appear tall and skinny. There may also be some jitter and tearing of the picture but it should be watchable.

Home viewers were previously able to pick up another Russian satellite—GhoriZont—but that geosynchronous satellite no longer transmits a strong signal towards the U.S. The satellite’s mission was redefined in mid-September and the powerful transponders are now assigned to digital services.

The four Molniya satellites travel in an eccentric polar orbit. Every six hours, one of the satellites skims through the Southern hemisphere and rises in the sky as it travels over the U.S. up the Mississippi River. Television relay to the Soviet Union begins as the bird reaches mid-Ontario. During its transmission, the satellite continues to soar higher, reaching its 40,000 km apogee some two hours after transmission began.

At the end of its six-hour stint, as the satellite reaches its turn-off point just north of the Great Lakes, transmission is handed over to the next satellite, which is beginning its loop north of Duluth, Minnesota. Because of its polar orbit, the Molniya satellite can provide one-hop distribution to almost anywhere in the densely-populated Northern hemisphere. By comparison, a geosynchronous system requires three satellites.

**UoSAT Spacecraft Control Centre**

**University of Surrey**

**General News**

**UoSAT-OSCAR-11 QSL**

The first printing of these QSL cards was rejected but replacements are promised for next week! Patience will be rewarded!

**UoSAT-OSCAR-9 Competition**

We should like to remind schools etc. that the Department of Electronic Engineering of the University of Surrey has offered a prize of 100 pounds, or equivalent, to the student group it considers to have been the most successfully active utilising the telemetry and experiments from the UO-9 spacecraft. The competition was announced in the UoSAT School’s Booklet, ‘UoSAT - A Guide to its Capabilities, Operation & Usage’, published by UoS in 1982 and is open to all student groups from educational establishments worldwide. Submissions for the competition, which is intended to encourage the educational usage of the spacecraft, should be in the form of a detailed report showing clearly the experimental programme development, receiving & display equipment, computer software and the results of the experiments carried out. Particular notice will be taken of examples showing the use of the spacecraft in demonstrating space technology in the classroom. Photographs, where appropriate should be included, as well as examples of graphical plots and computer displays of data. The closing date for the competition is 31st December 1984.

**Second Annual Amateur Radio Satellite Symposium And 1984 AMSAT Annual Membership Meeting**

G3YJO and G8NOB (Martin & Neville) will be attending the Meeting and it is likely that an additional item on UoSAT will be included in the Programme.

**Meteorological Spacecraft News**

**NOAA-9**

The launch of NOAA-F (9) is now set for the 8th of November.

**UoSAT-OSCAR-9 Schedule**

This week’s schedule is as follows:

- **Friday** — Load Bulletin
- **Saturday** — Bulletin/DIGITALK/H/1200 bps telemetry
- **Sunday** — Bulletin/DIGITALK/H/1200 bps telemetry
- **Monday** — Bulletin/DIGITALK/H/1200 bps telemetry
- **Tuesday** — CCD Camera - next week Radiation data
- **Wednesday** — Whole orbit telemetry survey
- **Thursday** — Computer check-summed telemetry

The 21 MHz Beacon will be in use this week.

**UoSAT-OSCAR-11 Operations**

**Digital Communications Experiment**

NK6K and LSK have spent much time this week preparing for activation of the DCE by carrying out digital communication calibration tests using the 435 MHz beacon in

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"Gaithersburg (MD) Hamfest brought out the AMSAT HQ crew. (l-r) N2CF, N3CEG, W3IW, W4PUJ, Martha."
1200 bps afsk. The UO-11 DCE will be a major topic of discussion (2days) following the AMSAT Meeting in LA next week with G3YJO & G8NOB.

The 435 MHz downlink is functioning well with an output rf power of 750mW to 1 watt, consuming around 225 mA from the +14v unregulated bus. Very strong signals are received from this beacon, 1200 bps afsk telemetry has been copied at UoS without difficulty using an IC471, no preamp and a linear polarised vagi.

Experiments continue with the 9600 bps nrzi psk data on the 435 MHz downlink in preparation for DCE, CCD & Particle/Wave Experiments.

Particle/Wave Experiments — UO-11 and the AMPEX spacecraft are in conjunction for two weeks allowing the simultaneous measurement of P/W interactions with UO-11 and UKS. A number of regular P/wave surveys over the North polar regions have been carried out using the OBC and the DSR this week. Most of the data was dumped using the 145 MHz downlink whilst work continues on the 435 MHz psk downlink system. These conjunctions occur only once every six months so we must make the most of it!

A daily account of UO-11 operations follows:

<table>
<thead>
<tr>
<th>DAY</th>
<th>ORBIT</th>
<th>CHANNELS</th>
<th>RESET TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday</td>
<td>3488</td>
<td>1,2,3,52</td>
<td>13:17:25</td>
</tr>
<tr>
<td></td>
<td>3491</td>
<td>435 MHz DCE 1200</td>
<td>bps afsk test</td>
</tr>
<tr>
<td></td>
<td>3492</td>
<td>435 MHz DCE 1200</td>
<td>bps afsk test</td>
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<tr>
<td></td>
<td></td>
<td>OBC switched back to 145 MHz after 1hr25m</td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td>3502</td>
<td>45,52</td>
<td>12:15:50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>435 MHz DCE 1200</td>
<td>bps afsk test</td>
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<tr>
<td></td>
<td></td>
<td>OBC switched back to 145 MHz after 6hrs</td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td>3516</td>
<td>P/wave survey</td>
<td>11:18:45</td>
</tr>
<tr>
<td></td>
<td>3517</td>
<td>DSR P/wave dump</td>
<td>OBC switched back to Tlm after 9hrs</td>
</tr>
<tr>
<td>Monday</td>
<td>3530</td>
<td>Spacecraft despin to 3m50s</td>
<td>11:56:40</td>
</tr>
<tr>
<td></td>
<td>3531</td>
<td>Spacecraft despin to 5m</td>
<td>P/wave survey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>435 MHz DCE 1200</td>
<td>bps afsk test</td>
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<tr>
<td></td>
<td></td>
<td>OBC switched back to Tlm after 9hrs</td>
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<td></td>
<td>3538</td>
<td>45,52</td>
<td>23:04:45</td>
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<td></td>
<td>435 MHz DCE 1200</td>
<td>bps afsk test</td>
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<tr>
<td></td>
<td></td>
<td>OBC switched back to 145 MHz after 7hrs</td>
<td></td>
</tr>
</tbody>
</table>

Thanks for Reports & Questionnaire Returns

W7AVE, V3CE, HB9RRK, Z51BI, DL7OU, H.J.Meerza, G4BBH, JA2WO, HB9RJV, VK2AVH, HB9RRK.
This week: ZL2AHK, VE3CIE.

Packet Bulletin Board Tests On AO-10

On October 18th, the Federal Communications Commission granted a Special Temporary Authorization (STA) permitting 21 amateurs to operate TelePorts capable of automatically relaying digital (packet radio) communications between terrestrial packet radio networks using amateur satellites.

As a first phase of the new AMSAT/ARRL TelePort STA, a unique packet radio test was carried out on Sunday, October 28. An automatic packet radio bulletin board system (PRBBS) operated by Tom Clark (W3IW) was placed in experimental operation on the AMSAT-OSCAR-10 satellite. The W3IW PRBBS was successfully used by several amateurs across the U.S. and in Canada. Earlier this year, successful PRBBS tests thru the same satellite had involved 'gateway' links to existing terrestrial PRBBS systems in California.

The following stations participated in this test and successfully logged onto the W3IW PRBBS: Randy Smith (VE1PAC/VE6), Medley, Alberta; Wes Morris (K7PYK),
Scottsdale, Arizona; 'Mac' Jordan (W4DAQ). Demopolis, Alabama; Bob Diersing (N5AHID), Corpus Christi, Texas. A number of other stations were also monitoring and reported good copy.

Both VE1PAC and K7PYK sent and received several messages and files during their connections with the PRBBS. K7PYK maintained contact for about an hour and managed to acquire about 50 kilobytes of documentation from W3JWI. W3JWI and VE1PAC tested full-duplex PRBBS operation thru the AMSAT-OSCAR-10 satellite and achieved sustained data throughput of about one kilobaud despite the 0.25 second round-trip propagation time to the satellite.

The packet radio hardware used at W3JWI is normally used as a local area PRBBS serving Baltimore-Washington. It consists of a Xerox 820 computer running WRLI software and an TAPR BETA TNC. The packet radio links were running at 1200 baud data speeds and used 1000 Hz shift FSK modulation generated by '202A' style modems.

Both W3JWI and N5AHID are among the 21 amateurs approved for the TelePort STA.

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**Orbit Predictions**

By KA9Q

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**Satellite:** OSCAR-10
Catalog number: 14129
Epoch time: 84302.80544058
Sun Oct 26 19:19:50.66 1984 UTC
Element set: 139
Inclination: 25.6950 deg
RA of node: 170.5952 deg
Eccentricity: 0.6043569
Arg of perigee: 318.3303 deg
Mean anomaly: 8.8966 deg
Mean motion: 2.05849013 rev/day
Decay rate: -9.3e-07 rev/day ± 2
Epoch rev: 1036
Semi major axis: 26106.133 km
Anom period: 699.584185 km
Apogee: 35507.212 km
Perigee: 3952.369 km
Ref perigee: 2492.79343259
Sun Oct 28 19:02:32.575 1984 UTC
Beacon: 145.8100 MHz

**Satellite:** OSCAR-11
Catalog number: 14781
Epoch time: 84294.64685474
Sat Oct 20 15:28:18.169 1984 UTC
Element set: 45
Inclination: 99.2291 deg
RA of node: 356.3783 deg
Eccentricity: 0.0012301
Arg of perigee: 256.234 deg
Mean anomaly: 103.7499 deg
Mean motion: 14.61913264 rev/day
Decay rate: -2.8e-06 rev/day ± 2
Epoch rev: 3403
Semi major axis: 70652.219 km
Anom period: 98.501056 min
Apogee: 712.522 km
Perigee: 695.148 km
Ref perigee: 2464.62494125
Sat Oct 20 14:59:54.923 1984 UTC
Beacon: 145.8260 MHz

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Capacity Crowd Heats Space Symposium, Annual Meeting

If crowd size and reaction are satisfactory indications, AMSAT’s second Annual Amateur Radio Satellite Symposium and the 1984 AMSAT Annual Membership Meeting were outstanding successes. More than 200 attended the 10 November meetings in Los Angeles’ Amfac Hotel, just a few miles from Los Angeles International Airport. The day-long program featured speakers from around the world and drew attendees from as far as Australia (VK5AGK), Tasmania (VK7PF), New Zealand (ZL1AOX), England (G3YJO), G8NOB) and Japan (JA1ANG).

In every sense the events were an unqualified success in no small part due to the excellent organization and preparation of the team of W6SP, AD6P and N6DD, who put the planning package together and saw to it that everything went according to plan. Here’s a synopsis of the day’s events as recalled by this reporter.

Registration for the symposium began promptly at 0800 with Office Manager Martha Saragovitz and Laura Yowell (XYL of AD6P) staffing the registration desk under the overall guidance of N6DD. Registration went smoothly despite the occasionally long queues. Promptly at 0900 AMSAT Chairman and Symposium Facilities Chairman John Browning, W6SP, opened the session with brief remarks. He was followed by Cleyon Yowell, AD6P, Symposium Technical Chairman with equally brief remarks. With the preliminaries passed, the technical session itself began.

First off was Al Dayton, KA4JFO, who described ‘Advanced Gateway Concepts’ to the enthusiastic audience. Al described a plan whereby a group of Amateur Radio clubs and organizations would purchase a geosynchronous satellite, complete with several ‘C’ band transponders, and give access to the average ham through numerous gateway stations. The gateways, or teleport would serve large communities of Amateurs, according to Dr. Dayton.

Next, AMSAT Director Harry Yoneda, JA1ANG, presented a fascinating preview of the exciting JAS-1 satellite being built entirely in Japan by JARL and JAMSAT and scheduled for launch by NASA, Japan’s national space agency. The paper, written by JK1VXJ with technical assistance from JR1SWB, was translated and reported by JA1ANG. The audience learned of plans for a February 1986 launch of JAS-1.

According to JA1ANG, JAS-1 will have two missions to perform: One will be to provide amateurs with a JA mode—that is Mode J Analog mode—transponder similar to AMSAT’s Mode J that AO-8 carried with 2 meters up and 70 cm down. Second is to provide a JD mode—that is a Mode J digital store and forward transponder utilizing packet radio technology. Launch by the Japanese H1 launcher, JAS-1 is expected to have a 1500-km orbit inclined 50 degrees to the equator, according to JA1ANG.
ARRL Technical Department Manager Paul Rinaldo, W4RI, described progress in Amplitude Comandered Sideband (ACSBI techniques. Paul described initial experiments performed recently at ARRL Headquarters. He then explained Project Companion, a joint ARRL-AMSAT-Project OSCAR effort designed to encourage the use of the spectrum efficient ACSB technique on the ham bands. Paul explained that by using special compression techniques, along with some other 'tricks,' very substantial improvements in signal-to-noise ratio and intelligibility have been noted by land-mobile users of advanced ACSB radios. Tests performed by the Federal Communications Commission (FCC), both in the laboratory and in the field, showed excellent results, Rinaldo said. Paul's talk was supplemented by those of Jim Eagleson, WB5JNN, and Paul Shuch, N6TX, both of Project OSCAR. The two have been among the parade leaders in getting ACSB on the ham bands. Jim showed several interesting graphs indicating quantitative improvements realizable with ACSB. He then played several taped QSOs dramatically showing the improvements of ACSB over conventional SSB. Jim pointed out that ACSB, like FM, had a pleasing quieting effect. He also showed some circuits he has developed for effective audio compression.

At 1100 Bob Diersing, N5AHD, gave an excellent presentation on 'Computers and the Satellites.' Bob focused on systems he has developed to track and decode the telemetry of the UoSAT satellites. His block diagrams and flow charts enthralled the audience. Bob revealed many of the techniques he has developed and which have distinguished him as one of the outstanding UoSAT telemetry experts in this hemisphere.

Following N5AHD's presentation, a first-rate buffet lunch was served in a room immediately adjacent to the lecture hall. Again, thanks to N6DD and the hotel staff, a good time was had by all. After most had finished their meal, Vern Riportella, WA2LQQ, introduced two special commemorative plaques. Both were in honor of Finn Steenstrup, OX3FS, an employee of SRI International who died recently in an
accident in Greenland. Finn had helped in the recovery of UoSAT-OSCAR 11 earlier this year. Accepting the plaques on behalf of the Steenstrup family and SRI International was Dr. Bob Leonard, KD6DG, Director of SRI’s Radio Physics Laboratory located in Menlo Park, California. OX3FS had worked for KD6DG at an SRI experimental radar site at Sondre Stromfjord, Greenland. Martin Sweeting, G3YJO, of the University of Surrey, Guildford, England, presented a memorial plaque on behalf of Surrey and the UoSAT team. WA2LQQ presented a second plaque on behalf of AMSAT and Amateur Radio. Dr. Leonard expressed the thanks of the Steenstrup family and SRI International and spoke of Finn’s enthusiasm for his work and his involvement with the UO-11 effort.

At 1300 a distinguished group from the World Space Foundation spoke on the Solar Sail Project. Introduced by AMSAT’s John Champa, K8OCL, were foundation president Robert Staehle, as well as Mark Bergham and Chauncey Uphoff. Each explained a different aspect of the Solar Sail Project including its history, purpose, initial tests, program outline and some of the options that would rely on Amateur Radio for telemetry and communications. One would have the Solar Sail in a nearly geosynchronous orbit. Another would have the sail in a lunar orbit. K8OCL explained the agreement between AMSAT and the World Space Foundation to explore means of cooperation in future projects.

Next, another distinguished group presented a review of the latest happenings and progress on the PACSAT project. Speakers here included Harold Price, NK6K, Wally Lindstruth, WA6JPR, Rick Fleet, WABV/GK, and Phil Karn, KA9Q. Each described various aspects of the PACSAT program. Price, PACSAT Project Manager, narrated a slide presentation that was (as is customary for N6NK) both entertaining and informative. WA6JPR described some of the experiments that he and others are performing in California. Fleet discussed some of the propulsion motors being considered for PACSAT. This is an especially important aspect of PACSAT engineering since the anticipated Shut-
tle launch will be too low for PACSAT; it will need to be boosted up by several hundred kilometers. Phil Karn, KA9Q, described progress on advanced modems and solicited help in designing PSK modems that will resist the anticipated radar interference the satellite is expected to encounter when in orbit.

Martin Sweeting, G3YJO, UoSAT Programme Manager, next summarized the status of both UoSAT-OSCARs 9 and 11. He said that both spacecraft were behaving well and that UO-11 had been well-stabilized, resulting in improved better link performance. A brief slide presentation showed the preparations that led to the launch of UO-11 last March.

Tom Clark, W3IWl, explained some of the economic factors that determine what projects can be built and what expenses AMSAT absorbs in order to keep the organization running. Tom pointed out especially the cost of publications in terms of its proportion to the overall budget. Tom said that in round numbers AMSAT spends $250,000 annually for all purposes.

Bill Tynan, W3XO, gave a progress report on future 'Ham-In-Space' activities. Bill noted that approval of the joint ARRL-AMSAT proposal for W0ORE to fly a suite of Amateur Radio equipment was thought to be imminent. Among equipment expected to be approved, according to W3XO, was a 2-meter scanning receiver, 2-meter-to-10-meter scanning repeater, slow-scan television (SSTV) with a 10-meter downlink and other features. Bill said it appeared everything was in order for a 1985 flight of W0ORE but that the exact date of the Shuttle flight was not fixed at that time.

Closing the technical program, WA2LQQ spoke of future advanced satellite projects. Rip claimed that an appraisal of Amateur Radio indicates that the time may be right to begin serious consideration of a system of geosynchronous Amateur Radio satellites for continuous global coverage. He cited some of the basic Phase IV conceptual work recently completed by W3GEY (who was unable to attend) as well as the so-called gateway concept, examined earlier by KA4JFO and others. In closing the technical program,
WA2LQQ encouraged AMSAT at large to recapture its former self-confidence and accept the challenge of developing and fielding a satellite system more generally available and convenient than present day efforts.

A social 'hour' followed immediately where many old and new fast friends gathered to reflect on the day's program as well as to toast each other for past accomplishments and QSOs shared.

A banquet followed at 1800 hours. Once again the splendid organization of N6DD and the hotel staff were very much in evidence. The room was perfect, the meal was superb; not your ordinary rubber-chicken circuit fare, this. Perfectly prepared and attractively presented, the 125 lucky diners were well-treated to some of the best banquet facilities southern California had to offer.

Later in the banquet, W6SP began the presentation of awards. The awards ceremony featured the presentation of the AMSAT-Stoner 25th Anniversary Challenge Cup to grand prize winner Nick Laub, WØCA. The cup, a silver champagne bucket a walnut base standing nearly two feet tall, was presented by none other than Don Stoner, W6TNS. It had been Don who 25 years earlier had openly mused about amateurs launching their own satellite. In the view of many, this musing, in an April 1959 CQ magazine article, led to the development of Project OSCAR, OSCAR 1 and ultimately to a whole family of OSCARS, UsSATs, JAsSs, ISKRAs and Radio Sputniks. W6SP expressed AMSAT's thanks to the Northern California DX Foundation which sponsored the Challenge Cup as well as the other awards to participants in the contest held earlier this year. WA2LQQ expressed thanks as well to Steve Place, WB1EYI, of ARRL HQ for conceptual help with the contest as well as KO5I, K8OCL and N2CF for establishing the contest mechanism.

An award was presented in absentia to Rich Zvirko, K1HTV, honoring him for his many years of service as both an AMSAT Director and Vice President for Operations. AMSAT President W31WI accepted the award for K1HTV. The plaques honoring the memory of Finn Steenstrup were then
introduced to the banquet. Two other awards were introduced. They were the Sherman Memorial Satellite Public Service Award and the AMSAT Technical Achievement Award. Both will be awarded for the first time in 1985. Julian McCassey received a special award from AMSAT recognizing his fund-raising activities in the Los Angeles area that resulted in donations of nearly $2000.

At 1900 the Annual Membership Meeting began with President Tom Clark, W3IW1, presenting a capsule picture of major achievements over the last four years. Tom indicated where we are going and focused on our present organizational size as a bit of a quandary: too big to be a club, too small to be like ARRL. Following Tom's historical review, General Manager Bill Lazzaro, N2CF, gave a status report. Bill said our present size is 5,500 and that we show a strong growth (36%) of annual members. He said expenses need to be trimmed and more monies allocated to spacecraft projects if the growth is to be sustained for long periods. Bill concluded that the organization is generally in stable and good condition despite the slight overexpenditure in the last calendar year. Moreover, he said, prospects for health and progress were excellent.

Following the presentations by the President and General Manager, an open discussion among the members and officers present transpired. The discussion was animated, at times intense, enthusiastic and worthwhile according to those present. Major topics broached included organizational objectives, information flow between groups and individuals, publications, perspectives of 'U.S.' AMSAT by those not living in the U.S. and the need to be more sensitive to external matters, namely diplomacy. At 2300, with many questions left unfielded, the meeting was adjourned only to continue in hallways, vestibules and the bistro downstairs.

To this reporter it seemed that no one left disappointed. Conversely, although there was occasional controversy and some fine technical points that were not unanimously accepted, the entire day seemed magnificently important. It was a subtle statement of AMSAT's maturity. To stage such an event, to organize such a happening, to attract the caliber of talent abundantly in evidence, is mute testimony to a new level of AMSAT accomplishment. AMSAT is more alive now than ever in its past and may have taken, in this marvelous one-day epoch, a singular stride in a rite of passage to a mature, well-rounded, self-confident organization of which greater things may yet be born!

Artificial Comet To Brighten Christmas Morn

Early risers on Christmas day will be treated to an unusual gift courtesy of a three-nation space experiment. The test—costing $78 million and involving three satellites and ground observers—will study the Earth's magnetic field and how it affects the solar wind. For that test, a satellite will release four canisters of barium 70,000 miles above the Pacific Ocean, creating, in effect, a man-made comet. The spectacular display that results will be visible throughout the western U.S., northern Mexico, southwestern Canada, Hawaii, and perhaps as far west as Tahiti.

Last August 16, three satellites were launched from the Kennedy Space Center in Florida, one each from the three countries participating in the experiment—the U.S., West Germany, and Great Britain. At approximately 4:08 AM PST on Christmas morning the West German satellite will eject the canisters and their barium load. The comet will be visible about ten minutes later when sunlight causes the barium atoms to radiate colored light.

Recording the event will be telescopes in New Mexico, Arizona, and Hawaii, plus instruments in two airplanes. The display will be visible to the naked eye in an area west of a line running from Chicago to the southern end of Texas. It will not be visible in areas where the sun has already risen.

Digital Conference Calls For Papers

The American Radio Relay League has issued a call for papers for its Fourth Amateur Radio Computer Networking Conference scheduled for March 30, 1985 in San Francisco, CA. The conference will be held on the first day of the West Coast Computer Faire, which runs from March 30 through April 2.

Technical papers are requested on all aspects of amateur packet radio and other forms of digital communications via terrestrial, ionospheric, meteor-scatter, and satellite media, including AMSAT-OSCAR 10 and the planned PACSAT. Topics suggested include network and system architecture, proposed standards, hardware, software, protocols, modulation and encoding schemes, applications, as well as practical experience.

The deadline for receipt of camera-ready papers is March 1, 1985. They should be mailed to Marian S. Anderson, WB1FSB, American Radio Relay League, 225 Main St., Newington, CT 06111. Those planning to present a paper should request an author's kit and should immediately inform the ARRL of the title of the manuscript. Proceedings will be sold at the conference and by mail from the ARRL headquarters.

AMSAT Board Stakes Out Major Goals; Names New Officers

Meeting in Los Angeles for the first time, AMSAT's Board of Directors moved in significant ways to articulate goals and install new officers. The 16 November meeting at the
Amfac Hotel, the scene the prior Saturday of the Satellite Symposium and Annual Membership Meeting, had many significant agenda items. The following is the briefest of summaries. Full details will be published at a later date when the minutes of the meeting are made available by AMSAT HQ.

As introduced by Jan King, W3GEY, four organizational goals were endorsed by the Board. These goals are:
1. Recognizing the relative abundance of low-earth orbit launch opportunities and their particular relevance to store-and-forward communications techniques on an as-available basis, AMSAT will strive to make effective use of low-cost spacecraft technology to exploit such opportunities.
2. Recognizing the potential value and utility of continuous satellite communications to provide effective public services, AMSAT will strive to develop space systems to fulfill this need.
3. Recognizing the growing value of space science and space research activities to our organization, AMSAT will strive to participate and cooperate with other organizations in pursuing appropriate science and research activities.
4. Recognizing the value of communications services provided by the Phase 3 satellite program, AMSAT will continue to support the program.

Officers elected included John Browning, W6SP, Chairman of the Board, Vern 'Rip' Riportella, WA2LQQ, President, John Champa, K8OCL, Executive Vice President and Acting Vice President for Operations; Jan King, Vice President for Engineering. Art Feller, KB4Z, was elected Treasurer and Martha Saragovitz was re-elected Corporate Secretary. Additional officers named subsequently included the following appointments: Bill Brown, K9LF, Vice President, Special Projects; Bill Tynan, W3XO, Vice President for Manned Spacecraft Operations.

In other actions, the Board: Resolved to commend W3IWI on his devotion and creativity as President; decided to meet again not later than March 1985; decided to fund Phase 3C at $50,000 per year for each of two years with 32% of the budget for projects; commended WD4AFB for his project of recruiting and finding tasks for talented volunteers; support the creation of an International Amateur Satellite Service Coordinating Committee as discussed at the Cheltingham, England meeting in July; decided that Phase IV needs more study and groundwork before major commitments could be made towards it; heard of possible Phase 3C integration options; learned that an Ariane 4 launch in mid-1986 was looking favorable for Phase 3C; that Phase 3C could contain Mode B and L transponders, a Mode L digital transponder and an S-band beacon (2.3 GHz); learned that a PACSAT satellite was at least 1.5 years away and possibly could be launched from a Shuttle from Vandenberg AFB given that the V'berg launches have a higher orbital inclination and would be thus more useful to Amateurs; heard of improvements in the Area Coordinator team, communications within Operations and the possibility of an Operations Management newsletter; learned of the Teleport STA granted to 21 stations; resolved to commend the ARRL on its superb effort and leadership in connection with the WARC-79 frequency allocations and to endorse the efforts of the ARRL to preserve the 220 MHz band and to have the 1270 MHz space allocation implemented;

decided to poll the membership on the matter of sale of mailing lists to outside agencies for the purpose of raising revenues; resolved to support an ARRL DXCC-satellite award providing the award was non-endorsable and that the concept was endorsed as well by AMSAT-DL; discontinued ORBIT magazine after #19 and initiate a new, less costly publication early next year.

**New Transponder Schedule Reflects Eclipse, Usage Balance Realities**

In a continuing balancing act under a very dynamic situation, the AO-10 command team, currently led by VE1SAT has implemented a series of schedule changes for the AO-10 transponders. As explained to ASR in late November by VE1SAT, a number of variables are combining to require a rollback in total transponder operating time. Some of the variables are amount of sunlight, sun angle, transponder usage, antenna patterns required for coverage traded off against sun angle and resultant energy acquired, etc. All told the situation is complex and changing. By mid-November VE1SAT reported a trend of gradually reduced battery voltage. Consequently, on 12 Nov., the schedule originally planned for implementation on 1 Dec. was put into effect 18 days early. The following summarizes the schedule situation as planned for the next period.

<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Nov.</td>
<td>Mode B MA 246-099</td>
</tr>
<tr>
<td>1 Dec.</td>
<td>Mode B MA 100-117 (Daily)</td>
</tr>
<tr>
<td>1 Jan Mar</td>
<td>Mode B MA 015-051</td>
</tr>
<tr>
<td>Mar 20th</td>
<td>Mode L MA 052-068</td>
</tr>
<tr>
<td>Mar 21st</td>
<td>Mode B MA 069-220 Off MA 221-014</td>
</tr>
<tr>
<td>Mar 22nd</td>
<td>Mode B MA 069-200 Off MA 201-014</td>
</tr>
</tbody>
</table>

As always, it will be helpful for you to watch the beacons for announcements of schedule changes and other notices of interest to satellite users.

**Name-The-Publication Contest**

As reported elsewhere, the AMSAT Board of Directors has elected to discontinue ORBIT magazine as AMSAT's main publication. Instead, AMSAT will return to a less costly publication with the first issue of the new publication due out in the mails 15 Jan. 85 according to General Manager Bill Lazzaro, N2CF. Meanwhile, AMSAT is sponsoring a "sprint" contest to name the new magazine. Have an idea or two? Send in your suggestions and you might win a new GaAsFET preamp for yourself. Send to: Name Contest, AMSAT, P.O. Box 27, Washington D.C., 20044. The contest will run until a suitable name is chosen; approximately 31 Dec. 84. So send in your entries soon. Please limit your suggestions to 10 names per mailing. But you may send as many mailings as you care to. Decision of the judges is final, please.

**Mystery Satellite No Longer Unidentified**

Thanks to some fine satellite-sleuthing by W4HHK, WB5LUA and Mr. Dick Flagg of Florida, the so-called 'mys-
tery' satellite which has been tearing up the EMEers on the 13 cm band has been identified. According to Flagg, a member of the Kettering Group, a small satellite-interest group with members spread across the globe, the mystery satellite is not one but two new Russian early warning satellites. As reported previously in these pages, (ASR #89/90) Cosmos 1217 had been identified as having been transmitting on 2304 MHz. The new satellites have been identified as catalog numbers 84-033A (Cosmos 1547) and 84-107A (Cosmos 1604/)). Also, as was noted earlier, the 13 cm ham band is allocated to 'radio-location' primary with amateur secondary. Thus there appears little constructive amateurs may do to dispose of the 'intruders'. On the other hand, as pointed out by Bob Atkins, KA1GT, the identification of these satellites and the predictability of their passage in the Molniya orbit they apparently use suggest their use to amateurs as beacons and alignment tools for both active electronics and mechanical hardware such as dish mounts, feed horns and the like.

ASR congratulates W4HHK, WB5LUA, Dick Flagg and the many others who tracked down the new sputniks. Especially noteworthy in the effort was the excellent logging and tracking as well as signal analysis of ARRL TA Paul Wilson, W4HHK of Collierville, TN. Based on Paul's logs of look angles (azimuth and elevation), Dick Flagg was able to approximate the orbit closely enough to establish a rough satellite ephemeris. Later this was compared to various known satellite orbits. When the match was made, the correlation was very good according to Flagg.

Flurry of Appointments Follows Board Meeting

Following the AMSAT Board of Directors meeting, a series of appointments was announced by AMSAT HQ. Jim McKim, W8CY, formerly Chief U.S. Area Coordinator has been promoted Assistant Vice President, Operations (AVP/O) for Administration. Jack Somers, WA6VGS, formerly Deputy Chief U.S. Area Coordinator has been elevated to the Chief Area Coordinator slot. Within the Engineering group, three Assistant Vice Presidents were reappointed: Harold Price, NK6K (AVP/E-PACSAT); Phil Karn, KA9QJ (AVP/E-Systems) and Steve Robinson, W2FPY (AVP/E-R&D).

In related appointments, the following Area Coordinators were recently named: Andy Deskur, KA1M (Eastern and Mid Massachusetts and Southern New Hampshire); Tom Wrenach, N9HR, additional AC for the Milwaukee area; Ramon Traver, W2AJM, Southern New York; Dave Kiler, N8ETY, Northeast Ohio replacing WB9CQW who's retiring for health reasons; Larry Koziel, K8MU for Michigan replacing the retiring veteran Dick Cotton, W8DX, who put in many, many years of dedicated service to AMSAT! Congratulations to the new appointees!

Finally, AMSAT is pleased to welcome a new Special Legal Counsel to the fold. He is Kevin Peterson, W8GQ, who works with KBOCL at Burroughs Corporate HQ in Detroit.

Short Bursts

• The Ohio AMSAT Management meeting was held on December 1 in Chillicothe. Details and photos soon.
• AMSAT-DL President DJ4ZC will be taking holiday in EAB-land again this year. Karl indicated he will again bring AO-10 equipment and expects to have a better signal than his last trip to Tenerife. Watch for Herr Doktor Meinzer, DJ4ZC/EAB from 20 Dec. to 12 Jan.
• The North American Teleconference Net featuring packeteers Lyle Johnson, WA7GXD and Harold Price, MK6K, aired 2 Dec. to an estimated audience of 20 to 50 thousand hams around the world. The transmission was carried in real-time aboard AO-10 on SSC H2. Transmission of selected portions of the Annual Meeting from audio tapes by W6KAG preceded the TRN on 1 Dec. and 2 Dec.
• According to MARCE Project Manager Ed Sluka, W4QAU, the failure of the MARCE package on the recent Shuttle was attributed to human error by a special NASA study panel. The experiment was inadvertently not turned on. The Marshall group believes they will rely soon.
• News from G3IOR on the RS birds has them in eclipse through 7 Dec. when their normal schedule will resume. Until then RS-5 will be on Mondays and Fridays; RS-7 on Tuesdays and Saturdays; RS-8 on Thursdays and Sundays. RS-5 is not operational now. RS-9 could be launched next year but RS10 and 11 are still on the drawing boards with no further work expected for 1.5 years. There is reputed to be work on a Mode B bird but RS-9 will likely use a 10 to 15 meter transponder to take advantage of the low point in the sunspot cycle towards mid-decade.
• Leading the member recruitment drive is KA1M. Get your entries in soon. Contest closes up 31 Dec. 84!
• AMSAT welcomes a new Net Control Station aboard. Dave Cowdin, WD8HHU, of Colorado made his 15/20 meter net debut on 2 Dec. He'll join N4HY on the International Net Sundays.

Directors Election Results

W31WI, 1333; elected Director
WA2LQQ, 1022; elected Director
JA1ANG, 774; elected Director
KE3D, 711; First Alternate Director
VK5AGR, 473; Second Alternate Director
Short Bursts

- Shigetake Morimoto, JA1NET, Chairman and President of JAMSAT died at 0800 UTC, 21 Dec 84. He was 76. The venerable leader of JAMSAT and Chairman of JARL's JAS-1 satellite committee had been ill for several months. According to JA1ANG, he was very actively engaged in the satellite project until about one month ago when his health turned for the worse. Services were scheduled for 26 Dec in Nakano, Tokyo. AMSAT has expressed its sympathy on behalf of all its members.

- New Area Coordinators appointed recently include Butch Mason, W6KAG for Southern California and Gerd Schrick, WB8IFM, Eric Rosenberg, WAGYBT and Kenneth Tessner, N8AE all Assistant Area Coordinators for the Dayton Ohio District. In Northeastern Ohio, Dave Kifer, N8ETY has been appointed Area Coordinator. Congratulations to all the new appointees! So nice to have you all aboard.

- AMSAT's new mainstream publication is AMSAT SATELLITE JOURNAL, ASJ or simply Satellite Journal will be in the mail by mid-January. Meanwhile, ORBIT-19, a collector's item, is in the mail now and should be in your hands soon. Winner of the 'Name the Misspelled Astronomy Term Contest' is Andy MacAllister, WSAS.2ZB.

- Comet AMPTE was due over the Eastern Pacific (9 deg S, 84 deg W) Christmas morning. How many readers saw it? Reports and comments invited.

- One of the most active speakers in AMSAT's treasure trove of talented talkers is Ohio Area Coordinator Dick Burggraf, W8PGP. Dick recently gave two presentations in Ohio. One was to the Goodyear Atomic Amateur Radio Club (an AMSAT affiliate club) and the other was to the Scioto Valley ARC. Dick is a Goodyear retiree. Nice job, Richard!

- The contract between AMSAT and the European Space Agency, ESA, has been signed. That means we are now on our way towards a SECOND Phase III satellite, Phase IIIC. The P3C bird may have some exciting add-ons in addition to the anticipated Mode B and Mode L transponders. One of the possibilities is that of a high power version of Mode L that will reduce overall link requirements. Increasing the downlink power may reduce ground system requirements on both the uplink and downlink to a degree. Also looming large for P3C is a digital Mode L transponder and an S-Band beacon at 2.3 GHz. Construction now begins in Marburg, Washington and Boulder for the anticipated June 86 launch of the bird. Still to be finalized is the propulsion system to be employed. It could be an experimental plasma system, a hypergycol system as with AO-10 or a solid fuel rocket as was used with P3A. Full scale campaign begins in January 1st. Also aboard the huge Ariane 4 will be RACE's Arsene Amateur Radio satellite.

- AMSAT's Dayton Hamvention Committee headed up by WBGQW has issued a call for papers for the 1985 version of the Hamvention. Please provide an abstract of your paper or at least the subject and title to AMSAT HQ, P.O. 27, Washington, D.C. 20044 as soon as possible. No final cutoff date had been established at presstime.

- The Space Activist News was kind enough to announce AMSAT's AGM in their 31 Oct issue. Inquiries about the publication may be made to 2033 Parker St., Berkeley, CA, 94704.

New Sideband Technology On AO-10

Experiments using the newest techniques in analog voice processing, Amplitude Compressed SideBand, ACSB, will get under way in earnest in late December with AO-10 being one of the main test venues. ACSB is a technique which first compresses the speech at the source and then expands it at the receiver. Thus COMPress and exPANDer yields COMPAndering. Improvements in signal to noise ratio of 15 dB or more are claimed. The tests will aim to find what benefits can be derived using ACSB with AO-10. Early tests from ARRL HQ last month began the Project Companion Phase 1 tests. Project Companion is a joint project of AMSAT, ARRL and Project OSCAR which aims to bring this very important technology to the Amateur Radio community at the earliest opportunity. According to Paul Rinaldo, W4RI, a surprise bonus of the ACSB technique was the virtual elimination of the annoying effects of spin modulation on AO-10. Paul explained to ASR that the introduction of a 3.1 kHz pilot tone at the source provides an index to the amount of compression employed. The ACSB receiver compensates for the effects of spin modulation by changing the expansion function according to the strength of the received pilot tone. The pilot also affords a very tractable AFC function to negate Doppler shift effects for a while. All told, ACSB may bring OSCAR communication a lot, lot closer to the armchair-style copy many expect but which cannot now be afforded of AO-10 given the link budgets and user population evident. What is yet to be reckoned, according to
Engineering VP, W3GEY, is the effect on transponder peak power versus average power (a significant parameter) should many SSB stations use ACSB on AO-10.

The ACSB radios forming the central elements of the experimental apparatus for Project Companion are modified commercial radios manufactured by Sideband Technology, Inc., formerly of Rochester, N.Y. The company has since been acquired and relocated to North Carolina. ARRL has purchased about 60 surplus ACSB radios from STI for use on Project Companion. These radios can be modified to work in the amateur 2 meter band but are presently crystal controlled. ARRL will announce shortly the price of a kit of materials for would-be ACSB experimenters. The kit consists of a fully populated, operational ACSB audio board and RF package. A comprehensive documentation package accompanies the kit. The price will be in the $60 range and the kit is the experimenter's to keep.

If you wish to apply for one of these kits, simply write to WA2LQQ, P.O. Box 177, Warwick, N.Y. 10990 with the following. First, a short (a paragraph or two) proposal or explanation of what or how you will do with the ACSB radio. Next, you promise to file a report on the results of your experiments and to participate in Project Companion by putting the radio on the air and joining in with others doing likewise. Finally, you should enclose an SASE so we can contact you when the radios are ready for shipment. Overseas shipments will require special provisions.

**Project OSCAR Orbital Predictions To Be Printed**

Project OSCAR, Inc., is preparing a new set of orbital predictions for 1985. The predictions will provide the UTC times and longitude for all south to north equatorial crossings of the four Russian satellites carrying Mode A transponders (RSS, 6, 7 and 8). Additionally, the UTC time, sub-satellite latitude and longitude and argument of perigee will be provided for each apogee of AMSAT OSCAR 10 (AO-10). Used with an appropriate plotter, the document the user will be able to determine his access time to all the presently available Amateur Radio satellites carrying active transponders. A minimum donation of $10.00 is required for these comprehensive databooks for shipment to North America. Elsewhere the minimum is $12.00. To order you copy, send you check or money order (in U.S. Dollars only please) along with your name and address to: Project OSCAR, P.O. Box 1136, Los Altos, CA 94022. The books will be shipped in January. Show your support for this fine effort today. In the past Project OSCAR has donated thousands of dollars to AMSAT for important projects. Now let's get behind this worthy project ourselves!

**AO-10 RTTY Format Delineated**

On 3 Sep 84 a new beacon system was implemented on AO-10 which included for the first time an RTTY transmission. This signal coded key spacecraft operating conditions in a format convenient for many Amateurs not equipped with the PSK decoders used by the command stations and a fortunate few others. Now comes word on how to decode the RTTY telemetry being heard both on Mode B at 15 and 45 minutes past the hour and on Mode L at 0, 15, 30 and 45 minutes past the hour. There are 4 beacons on AMSAT OSCAR 10:

- **Mode B General Beacon:** 145.810 MHz
- **Mode B Engineering Beacon:** 145.987 MHz
- **Mode L General Beacon:** 436.020 MHz
- **Mode L Engineering Beacon:** 436.040 MHz

Currently the Mode B General Beacon and the Mode L Engineering Beacon are in use. Listen for the RTTY telemetry there. According to command station VE1SAT/VE6, the so-called "Z" block sent as RTTY is a version of the "Y" block telemetry sent via PSK. Thus many of the key operating parameters are now available for general consumption to anyone who has 45 baud baudot RTTY demodulation and display capability.

The exact baud rate is 50 rather than the 45 baud (60wpm) standard but most electronic and mechanical machines equipped to receive 45 baud will respond well to 50 baud. The AO-10 RTTY telemetry is sent in FSK with 170 Hz shift and is standard baudot (5-level) coded.

The following table exemplifies the format of the RTTY as one might see it printed or displayed on a RTTY machine or computer VDU. The telemetry channels will appear as six rows (lines) of 10 columns thus:

```
1 2 3 4 5 6 7 8 9 10
A
B
C
D
E
F
```

According to command station ZL1AOX, each of the 60 telemetry cells or channels is sent as a 1, 2 or 3 character numeric group such as "1", "16" or "165". The entire sequence begins with an identification such as:

```
HI HI THIS IS AMSAT OSCAR 10
```

This is followed by the UTC time in the standard HH:MM:SS format. Next is the AMSAT day number where day 1 equals 1 Jan 78. This is followed by three hexadecimal numbers denoting safety information, transponder status and command serial number. Next are 7 decimal numbers which indicate the IU multiplexer status. The block of 60 telemetry channels then follows 4 blank lines.
<table>
<thead>
<tr>
<th>Row/Col</th>
<th>Meaning</th>
<th>Equation</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Solar panel out and BCR input voltage</td>
<td>n=150</td>
<td>mV</td>
</tr>
<tr>
<td>A2</td>
<td>70cm xmt range average power output</td>
<td>(253-n)/2000</td>
<td>W</td>
</tr>
<tr>
<td>A3</td>
<td>70cm rcvr temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>A4</td>
<td>Nutation damper temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>A5</td>
<td>BCR output and main battery voltage</td>
<td>(n-10)/75</td>
<td>mV</td>
</tr>
<tr>
<td>A6</td>
<td>Special purpose</td>
<td>xxxxxxxxxx</td>
<td>-</td>
</tr>
<tr>
<td>A7</td>
<td>70cm xmt temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>A8</td>
<td>14 volt rail current to xponder</td>
<td>(n-15)+20.64</td>
<td>mA</td>
</tr>
<tr>
<td>A9</td>
<td>10 volt regulator voltage</td>
<td>(n-12)/50</td>
<td>mV</td>
</tr>
<tr>
<td>A10</td>
<td>He tank pressure at hi pres regulator</td>
<td>(n-34)+44.46</td>
<td>bar</td>
</tr>
<tr>
<td>B1</td>
<td>IHN temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>B2</td>
<td>14 volt rail current to magnetorquers and antenna relay</td>
<td>(n-15)/4.128</td>
<td>mA</td>
</tr>
<tr>
<td>B3</td>
<td>BCR #1 status</td>
<td>0=Off; N=10=On</td>
<td>-</td>
</tr>
<tr>
<td>B4</td>
<td>He tank pres at low pres regulator</td>
<td>(n-37)+0.8</td>
<td>bar</td>
</tr>
<tr>
<td>B5</td>
<td>BCR temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>B6</td>
<td>10 volt regulator current</td>
<td>(n-15)/4.128</td>
<td>mA</td>
</tr>
<tr>
<td>B7</td>
<td>BCR #2 status</td>
<td>0=Off; N=10=On</td>
<td>-</td>
</tr>
<tr>
<td>B8</td>
<td>Not used</td>
<td>xxxxxxxxxx</td>
<td>-</td>
</tr>
<tr>
<td>B9</td>
<td>SEU temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>B10</td>
<td>Battery charge current</td>
<td>(n-15)+10.32</td>
<td>mA</td>
</tr>
<tr>
<td>C1</td>
<td>Top photocell sensor</td>
<td>65 means sun normal to Z (spin) axis; 20-30 nominal</td>
<td>-</td>
</tr>
<tr>
<td>C2</td>
<td>Special purpose</td>
<td>xxxxxxxxxx</td>
<td>-</td>
</tr>
<tr>
<td>C3</td>
<td>Main battery case #1 temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>C4</td>
<td>Active BCR output current</td>
<td>(n-15)+20.64</td>
<td>mA</td>
</tr>
<tr>
<td>C5</td>
<td>Bottom photocell sensor</td>
<td>(same as C1)</td>
<td>-</td>
</tr>
<tr>
<td>C6</td>
<td>Kick motor strut temperature</td>
<td>(nonoperable)</td>
<td>-</td>
</tr>
<tr>
<td>C7</td>
<td>Main battery case #2 temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>C8</td>
<td>Active BCR input current on 28 volt line</td>
<td>(n-15)+10.32</td>
<td>mA</td>
</tr>
<tr>
<td>C9</td>
<td>Spin rate</td>
<td>if n&lt;139, r=139-n+0.8+20 rpm; if n&gt;139, r=508/(n-116)-2 rpm</td>
<td>-</td>
</tr>
<tr>
<td>C10</td>
<td>24cm rcvr AGC</td>
<td>if n&lt;100, AGC=0 dB; if n&gt;100, AGC=(n-100)/289 dB</td>
<td>-</td>
</tr>
<tr>
<td>D1</td>
<td>Auxiliary battery temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>D2</td>
<td>Solar panel #6 current</td>
<td>(n-15)+4.128</td>
<td>mA</td>
</tr>
<tr>
<td>D3</td>
<td>2m xmt range average power output</td>
<td>(200-n)/2000</td>
<td>W</td>
</tr>
<tr>
<td>D4</td>
<td>He tank temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>D5</td>
<td>Solar panel #4 temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>D6</td>
<td>Solar panel #5 current</td>
<td>(n-15)+4.128</td>
<td>mA</td>
</tr>
<tr>
<td>D7</td>
<td>70cm rcvr AGC</td>
<td>(n-8)-2/100</td>
<td>dB</td>
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<tr>
<td>D8</td>
<td>70cm xmt temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>D9</td>
<td>Solar panel #3 temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>D10</td>
<td>Solar panel #4 current</td>
<td>(n-15)+4.128</td>
<td>mA</td>
</tr>
<tr>
<td>E1</td>
<td>Special purpose</td>
<td>xxxxxxxxxx</td>
<td>-</td>
</tr>
<tr>
<td>E2</td>
<td>24cm rcvr temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>E3</td>
<td>Solar panel #5 temperature</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>E4</td>
<td>Solar panel #3 current</td>
<td>(n-15)+4.128</td>
<td>mA</td>
</tr>
<tr>
<td>E5</td>
<td>14 volt regulator voltage</td>
<td>(n-10)+61.5</td>
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</tr>
<tr>
<td>E6</td>
<td>Top surface temperature of arm #3</td>
<td>(n-127)/1.82</td>
<td>C</td>
</tr>
<tr>
<td>E7</td>
<td>Top surface temperature of arm #1</td>
<td>(n-127)/1.82</td>
<td>C</td>
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<tr>
<td>E8</td>
<td>Solar panel #2 current</td>
<td>(n-15)+4.128</td>
<td>mA</td>
</tr>
<tr>
<td>E9</td>
<td>Internal 9 volt bus from transponder</td>
<td>(n-10)+50</td>
<td>mV</td>
</tr>
<tr>
<td>E10</td>
<td>Wall temperature in arm #2</td>
<td>(n-127)/1.82</td>
<td>C</td>
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</tbody>
</table>

F1 Bottom surface temperature of arm #1 | (n-127)/1.82 | C |
F2 Solar panel #1 current | (n-15)+4.128 | mA |
F3 Special purpose | xxxxxxxxxx | - |
F4 Wall temperature in arm #1 | (n-127)/1.82 | C |
F5 N2O4 tank temperature | (n-127)/1.82 | C |
F6 UDMH tank temperature | (n-127)/1.82 | C |
F7 Auxiliary battery voltage | (n-10)+75 | mV |
F8 Central supt cylinder temp near arm #1 | (n-127)/1.82 | C |
F9 Earth sensor temperature | (n-127)/1.82 | C |
F10 Mode L xponder 9 volt regulated line | (n-10)+44 | mV |

**NOTES:**
B1: IHN = Integrated Housekeeping Unit; the computer
B3: BCR = Battery Charge Regulator
B4: He = Helium
B9: SEU = Sensor Electronics unit
C: Direct from solar panels
F5: N2O4 is nitrogen tetroxide; the propellant oxidizer
F6: UDMH is unsymmetrical dimethyl hydrazine; the propellant fuel

Compiled 10 Dec 84 by ZL1AOX, VE1SAT, K4Q, DB5ER, R.Gape, W82LQQ

**UoSAT Bulletin-104 (Edited) 14th December 1984**
UoSAT Spacecraft Control Centre, University of Surrey, England

**GENERAL NEWS**
**UoSAT-OSCART-11 Stabilisation**
Automatic attitude control manoeuvres, carried out by the on-board computer over last weekend, have successfully restored gravity-gradient stabilisation to the UO-11 spacecraft. The spacecraft was inadvertently destabilised a month previously during a routine despin manoeuvre causing UO-11 to go into a complex tumbling motion.

Several weeks of navigation data analysis, followed by four days of autonomous attitude manoeuvres by the OBC were necessary to de-tumble the spacecraft and recapture gravity lock. The autonomous manoeuvres could be seen by those monitoring the multiple orbit magnetometer data surveys - the attitude algorithm was initiated after the first orbit displayed. Gravity lock, at present, looks even better than before - we shall try to keep it that way! We are back in business!

NOAA-9
NOAA-9 was launched at 10:42 gmt on 12 December - no additional information available at present.

**UoSAT Bulletin-105 (Edited) 21st December 1984**
UoSAT Spacecraft Control Centre, University of Surrey, England

**GENERAL NEWS**
1984

Thanks for all those who sent Xmas cards, it is nice to know you think of us! 1984 has been a hectic but rewarding year for all at UoS - having overcome the teething problems following the launch of UoSAT-OSCART-11 in March, we have been most pleased with the spacecraft's performance. The gravity gradient stabilisation has operated extremely well (provided we do not 'kick' it too hard!) and a great deal of work is under way on the various experiments.
The DCE has been in use since May assisting spacecraft operations and is about to be activated as a communications experiment shortly in the new year - although initially in a limited experimental way only.

The Particle/Wave Experiment has carried out experiments in conjunction with the AMPTE spacecraft in November and more are scheduled for April 1985.

Test images have been received from the CCD camera on UO-11, but further work is required on the ground station facilities at UoS before this experiment can be fully evaluated. Considerable efforts are underway on the 9600 bps psk 435 MHz downlink with some success.

Although little has been seen from the Space Dust Experiment, a number of events were recorded in early December coinciding with a meteor shower. This data is still being analysed.

The OBC has been used continuously to provide autonomous attitude control; whole-orbit experiment and telemetry data surveys; automatic experiment and downlink switching and special experiment support.

The telemetry, telecommand and power systems continue to perform well. The programmable channel dwell facility on the telemetry has been used frequently for attitude control navigational support.

The UoSAT Team would like to thank the many experimenters world-wide for their support and regular reports on the spacecraft - they are much appreciated.

UoSAT-OSCAR-9 has had a good year too - supporting a regular experiment schedule and, of course, the Bulletin! The UO-9 schedule is likely to be modified in the New Year to reflect user interests.

The UoSAT Team do, however, suffer increasing manpower problems. Operating two spacecraft - as well as planning future missions - is very labour-intensive and there is much we cannot do, due to resource limitations, which we would like to be able to do. We are trying to improve this situation but it will take time. 1985 promises to be a busy year too - more experiments on UO-11 and preparation for PACSAT and other missions - we are looking forward to another exciting year!

NOAA-9

NOAA-9 was launched at 10:42 gmt on 12 December - no additional information available at present except that the launch appears to have been successful and signals from NOAA-9 have been received at UoS on 191284.

UoSAT-OSCAR-9 Schedule
This week's schedule will be modified as follows due to Xmas:
Friday 211284 - load Bulletin
Saturday 221284 - Bulletin/DIGITAL K/1200 bps telemetry until Wednesday 020184
(The 21 MHz Beacon will be in use during this time.)

UoSAT-OSCAR-11 Operations

<table>
<thead>
<tr>
<th>DAY</th>
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<th>CHANNELS</th>
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<tr>
<td>Saturday</td>
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<td>whole orbit data dump</td>
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<td>Sunday</td>
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<td>DCE tests</td>
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<td>Friday</td>
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<td>reset Watch Dog</td>
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(Thanks for reports & questionnaire returns from I2KBD, ZL1MO, J2WO, W.T.Smith, DL7OU)

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