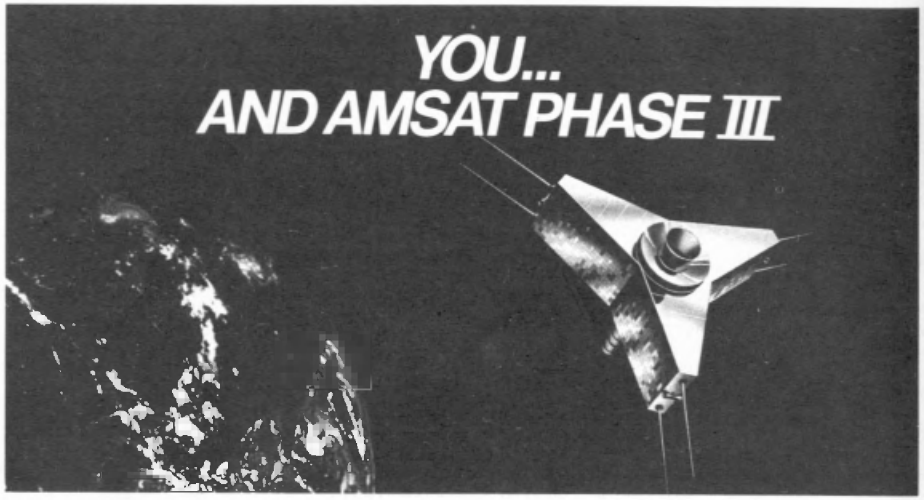

An exciting new era in amateur radio is about to begin... the era of AMSAT PHASE III OSCAR satellites.

The AMSAT PHASE III satellite program promises a continuing demonstration that amateur radio is at the forefront of modern technology. PHASE III satellites will routinely provide reliable communications over paths of up to 11,000 miles (17,600 km) for 17 hours each day. You can think of them as a resource equivalent to a new band.

The cost of these PHASE III satellites is a projected $250,000. Commercial satellites of similar performance would cost nearly $10,000,000.

Your help is needed to put these PHASE III OSCAR satellites in orbit.

Your valued, tax-deductible contribution can be as small as one of the 5000+ solar cells needed. A handsome certificate will acknowledge the numbered cells you sponsor for $10 each. Larger components of the satellites may also be sponsored with contribution acknowledgements ranging to a plaque carrying your name aboard the satellites. Call or write us for the opportunities available.

Your membership in AMSAT is important to the satellite program, and will give AMSAT a stronger voice in regulatory matters concerned with satellites. At $10 per year or $100 for life, you will be making a most significant contribution to the satellite program and the future of amateur radio. You will also receive the quarterly AMSAT newsletter.

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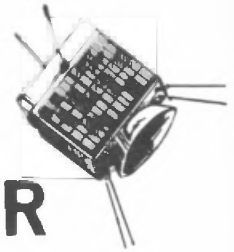

Publications Contest Winner 1977,1978

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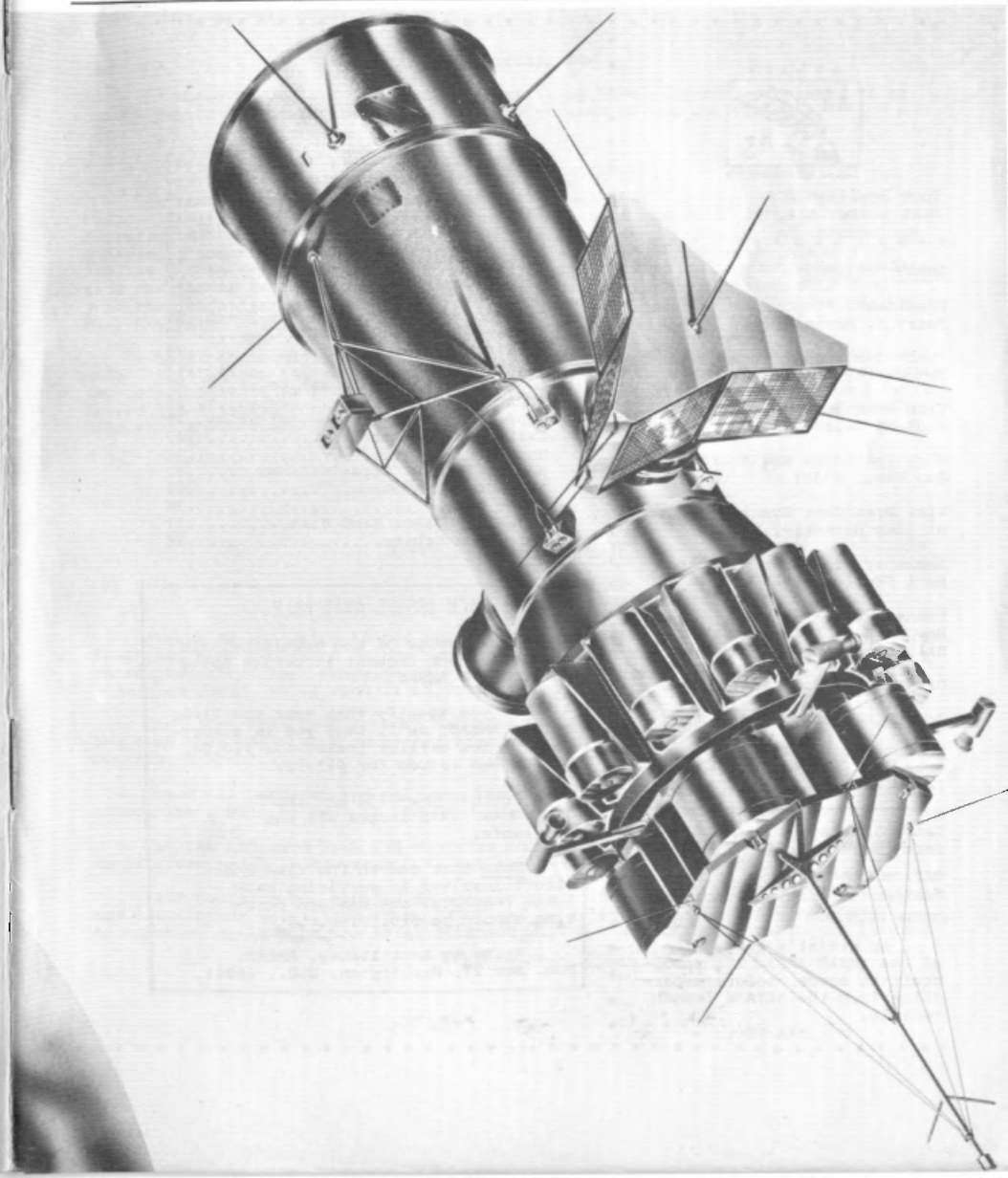

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Amateur Radio News Service

Copy Deadline for next issue is 1 May 1979

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COVER PICTURE

An artist's conception of the AMSAT Phase III spacecraft in space, before separation from the ARIANE launch vehicle.
ESA Photo

CONTENTS

BACK ISSUES AVAILABLE

Back issues of the Newsletter are available upon request in return for a donation to AMSAT.

If you specify what year you first joined AMSAT, we'll send you an assortment of ten earlier issues for $10.00, or fifteen issues for $15.00.

Certain pre-1974 and the September 1975 issues are not available.

Note that due to the time and effort involved in servicing back issue requests, the minimum donation should be $10.00.

Write to Back Issues, AMSAT, P.O. Box 27, Washington, D.C., 20044.

* *

EDITORIAL

By Joe Kasser, G3ZCZ

Somebody

"Why doesn't somebody....." is a common complaint these days. Well, who is somebody? There are only so many hours in the day and so many people doing the work. If somebody volunteered then more things could be done. AMSAT, like many organisations is managed mostly by volunteers. The volunteers are motivated in different ways, and many studies have been done on "motivation of personnel in organisations". If the goals of a volunteer and the goals of the organisation are in harmony, the volunteer will do a good job. Thus, if you can see a need for somebody to do something and it is something you wish to do -- why not do it? That's how the rest of us started.

Area Coordinators

To those of you who answered the note in my last editorial-- thanks. I am sorry that I do not have the time to reply to each of you individually.

The ARNS

The Amateur Radio News Service (ARNS) is organised for editors of amateur radio club publications. It is not a news service in the sense of UPI, Tass or Reuters, but is an organisation with aims that include the sharing of information concerning common problems between club editors. Such information includes the finding and encouragement of authors. If you belong to a radio club which publishes a newsletter or bulletin, you ought to consider recommending that your club join that organisation. (write to: Doris Dennstaedt, WA3HEN, 303 N. Hammonds Ferry Rd., Linthicum Heights, Md., 21090.)

One of the activities of the ARNS is an annual competition between club journals. This allows the editors to see how their journal compares to others in similar categories. I am proud to announce that the AMSAT Newsletter has placed first in its class in two consecutive years (1977 and 1978). With your help, we will make that three years in a row, ...four...?

COMPUTER PROJECT UPDATE

By Joe Kasser, G3ZCZ

Please do not write in for more information. The only information that exists is or has been published in the Newsletters. We do have an up-to-date group purchase plan sheet that contains prices and announcements. If you send in an sase, attention W3IWI, we'll send it to you.

The ARC-1 RTTY Card artwork has been completed. Prototypes should be made by the time that this issue is mailed out. The June Newsletter should carry further details (I hope).

Phase III hardware and software have been prototyped and are being tested. An announcement will be made in the June Newsletter as to their availability.

The new CPU card from SSM contains much of the circuitry needed for a dedicated front panel-less system. Fliers are available for the usual sase.

BYTE Magazine has carried an article about the communications uses of computers and amateur satellites (Nov. 1978) and an introduction to IPS (Jan. 1979). An expanded article on the AMSAT-GOLEM-80 will be carried sometime in the future.

FROM THE PRESIDENT'S DESK

By Perry Klein, W3PK

AMSAT's FIRST TEN YEARS

March 3 marked the tenth anniversary of AMSAT's formal organization; the incorporation papers that registered AMSAT as a non-profit, non-stock corporation in the District of Columbia were filed on March 3, 1969.

The idea to form AMSAT was suggested on January 9, 1969, at a meeting of the Communications Satellite Corporation Radio Club in an address by George Jacobs, W3ASK who suggested the need for a new group to carry on the work of the California-based Project OSCAR organization. The idea was discussed with representatives of the radio clubs of the Johns Hopkins Applied Physics Laboratory, IBM Federal Systems Division, Aeronautical Radio, Computer Sciences Corp., NASA Goddard Space Flight Center and Communications Satellite Corp., and it was immediately evident that there was much interest in creating the AMSAT organization. Many of those interested in helping were already involved professionally in satellite-related programs and had the technical know-how to design, build and test satellite systems.

By the end of 1969, membership in the new AMSAT organization stood at 250, a number small enough that the AMSAT Newsletter could be assembled and mailed by hand. Now, at the beginning of 1979, we have more than 4,300 members in 75 countries, including over 1,000 life members, and membership records will soon be maintained by AMSAT's AMS-80 microcomputer system. During the same period, annual expenses grew from $811 in 1969 to $98,086 in 1978. The cumulative total spent by AMSAT for amateur satellites and membership services over these ten years has been $345,841, yet over half that amount is expected to be expended during 1979 alone.

Several milestones were achieved in the first ten years of AMSAT's existence:

- Australis-OSCAR 5, built by students at Melbourne University in Australia was launched by NASA January 23, 1970 and operated for 52 days. AMSAT was responsible for testing and preparing the satellite for launch, and for arranging the launch by NASA and licensing by the U.S. Federal Communications Commission. This was the first OSCAR satellite to transmit on ten meters and to be actively controlled by amateur telecommand stations.

- AMSAT-OSCAR 6, first of AMSAT's long lifetime "Phase II" series spacecraft was launched by NASA on October 15, 1972 and operated until June 1977, a period of 4½ years, far exceeding its original one year lifetime expectation. AMSAT was responsible for spacecraft design, fabrication, testing, launch arrangements, licensing and operation. AMSAT-OSCAR 6 was used for several unique experiments, such as tests to determine the positions of emergency locator transmissions from simulated downed aircraft. It was also used in many schools as a resource for classroom demonstrations and experiments.

- AMSAT-OSCAR 7, second in AMSAT's Phase II series, was launched by NASA on November 15, 1974 and is still in operation, though showing signs of wear and tear, and difficulties in telemetry and telecommand. AMSAT-OSCAR 7 represented the result of a team effort by Project Australis, AMSAT-Canada, AMSAT-Deutschland and AMSAT U.S. members under AMSAT's management. OSCAR 7's capability, sophistication and anticipated lifetime are comparable to the first six OSCAR satellites combined.

- AMSAT-OSCAR 8, developed as a replacement for AMSAT-OSCAR 6, was launched by NASA on March 5, 1978. This spacecraft contains, in addition to a two-to-ten meter transponder identical to the ones flown in OSCAR's 6 and 7, a new two-meter-to-70 cm transponder developed by members of the Japan AMSAT Association. Construction costs of OSCAR 8 were reimbursed by ARRL, who has operations responsibility for this spacecraft.

- AMSAT-Phase III-A, first of a series of long-life satellites intended for high-altitude elliptical orbit, is now under development by AMSAT Deutschland and AMSAT for launch on the European Space Agency's new ARIANE launch vehicle early next year. AMSAT Phase III spacecraft offer the significant communications advantage over the previous low-orbiting OSCAR's of providing improved coverage for hours at a time over transcontinental distances. This is expected to provide a new communications resource for emergency communications applications and make possible experiments not feasible with satellites in lower orbits.

- Our AMSAT-OSCAR Spacecraft Laboratory was completed in October 1978 at the NASA Goddard Space Flight Center Visitor Center in Greenbelt, Maryland. Used as a center for Phase III spacecraft work, AMSAT computer operations and flight hardware storage, the facility was provided by NASA under a no-cost contract with AMSAT.

- AMSAT's Washington office, recently expanded, is located in a condominium complex in Southwest Washington near the Capitol building. Much of the membership records, supplies and files are maintained here.

- AMSAT's professional technical staff now include a full-time Phase III Project Engineer and a Phase III Project Technician in addition to teams of volunteers in the U.S., Germany and elsewhere. In addition, AMSAT has a professional Office Manager and General Manager, supported by some 130 volunteers listed in the "AMSAT Directory", including area coordinators, overseas coordinators, telecommand station operators and heads of AMSAT affiliate organizations.

- AMSAT affiliate organizations now include WIA Project Australis, AMSAT-Canada, AMSAT-Deutschland, AMSAT-France, AMSAT-Italiana, Japan AMSAT Association (JAMSAT), AMSAT-Mexico, AMSAT-Nederland and AMSAT-UK.

Projections of AMSAT's Future

It is, of course, hard to predict what the future will bring, but here are some of the President's predictions for the next ten years based on current trends and knowledge of projects now underway.

A) Membership ten years from now may achieve 20,000 including as many as 5,000 life members (assuming a 16½% geometric growth pattern, or a linear increase in membership of 1,600 per year).

B) AMSAT Phase III satellites will be in regular production, with launches averaging every two years. Orbits are likely to be fully geostationary, as well as drifting synchronous and high-altitude elliptical.

C) Long lifetime SYNCART (Synchronous Amateur Radio Transponder) packages will be developed for launch as part of commercial or government payloads, and several of these systems will be in orbit in the 1980's.

D) Lower orbiting Phase II satellites will be built by active amateur groups outside the United States, including the United Kingdom, perhaps Italy and Japan, in addition to further RS satellites constructed by amateurs in the Soviet Union.

E) As much as ten percent of the active amateur population will have some experience with AMSAT Phase III satellite use, and many of these radio amateurs will use the VHF and UHF satellite transponders exclusively in preference to operation on the HF bands.

F) AMSAT satellites will be used by IARU societies on a scheduled basis to relay official bulletins of their organizations and for code practice and special presentations. Traffic handling will be a regular part of satellite activity, and groups will be organized to handle emergency communications via satellite during disasters and other emergencies.

G) Digital communications techniques will begin to see wide use on AMSAT satellites as more amateurs set up personal computers and find new communications applications for them.

H) AMSAT satellites will be in regular use for classroom demonstrations and laboratory experiments, and will see wide use in stations in museums throughout the world.

I) AMSAT will become completely self-sufficient, not requiring support or funds from government or industrial organizations. Funding will be derived entirely from membership dues and satellite user services.

Although this outlook may be considered by some as highly optimistic, it would also have been difficult to predict ten years ago that by the year 1979 four OSCAR and two RS satellites would have been launched. Let's hope we can do as well in the future.

AMSAT PHASE III PROJECT REPORT

By Joe Kasser G3ZCZ

The European Space Agency (ESA) has formally notified AMSAT-Deutschland that the launch date stands at 5 March 1980 (when A-O-8 will be 2 years young). The spacecraft and all major ground test equipment must, however, be delivered to ESA Paris by 1 December 1979.

The weekend of 2-4 March 1979 saw the completion of another major milestone in the project development: a major ground station interface meeting was held at the AMSAT-OSCAR Spacecraft Laboratory. The hardware and software modules necessary for the ground stations were identified in detail and tasks assigned to the attendees. Amongst those taking part in the meeting were: W3GEY, W3IWI, WØPN, W6PAJ, G3ZCZ, DJ4ZC (by conference telephone), K1HTV, VE3SAT, WB1EYI, W9KDR, W3PK, W1HDX, W2FPY (by conference telephone), K1GP, K1JX, WA3MEX and Marie Marr.

The AMSAT Phase III ground stations are designed around S-100 Bus 8080-based microcomputers incorporating floppy disc systems using NorthStar hardware and comprise an integrated system of hardware and software. Programs will be written in IPS and NorthStar BASIC. Hardware has been prototyped for Telemetry, Tracking and Command (TT&C) applications. When the new revisions of the TT&C hardware are available for general use by AMSAT members, an announcement will be made in the AMSAT Newsletter. A special temporary authorization has been received from the FCC allowing on the air use of ASCII for spacecraft link simulations and ranging tests. The following stations were authorized to use ASCII by the FCC for the purposes of Phase III testing until February 1980: W3IWI, WA3MEZ, W3HCF, G3ZCZ/W3, WØPN, W6PAJ, WBØCOR, WØLER, VE3SAT/W6, W1HDX, WA3NDS and W3ZM. An additional station, K1GP is pending.

On 28 February 1979, W3IWI made the first FCC authorized ASCII transmission in the present series of tests by sending 110 baud data to G3ZCZ/W3. W3IWI transmitted Bell 103 compatible tones to G3ZCZ/W3 who copied them on a ST-5 RTTY Terminal Unit. Joe confirmed that the ST-5 would not print 300 baud data. W3IWI and W3HCF subsequently completed two-way ASCII transmissions to each other.

Two structures are being fabricated (two spacecraft are planned). Solar arrays are being fabricated both in Germany and hopefully in the U.S. also. 73 six amp-hour battery cells leftover from the RCA ITOS project have been received from NASA. They are in excellent condition even being within the current NASA date code. Battery charge regulators are being designed in Germany and Hungary.

The thermal design has been completed. We have a working computer model of the spacecraft that meets specifications. The spacecraft can withstand a three hour eclipse and half an orbit with the sun shining directly on the top or bottom of the spacecraft, these representing worst case thermal conditions. The design of the flight modules has been completed and a full size wooden model of the spacecraft is at the AMSAT-OSCAR Spacecraft Laboratory. It is hoped to use this to resolve conflicts in positioning of the various modules and as a model for fabricating the wiring harness.

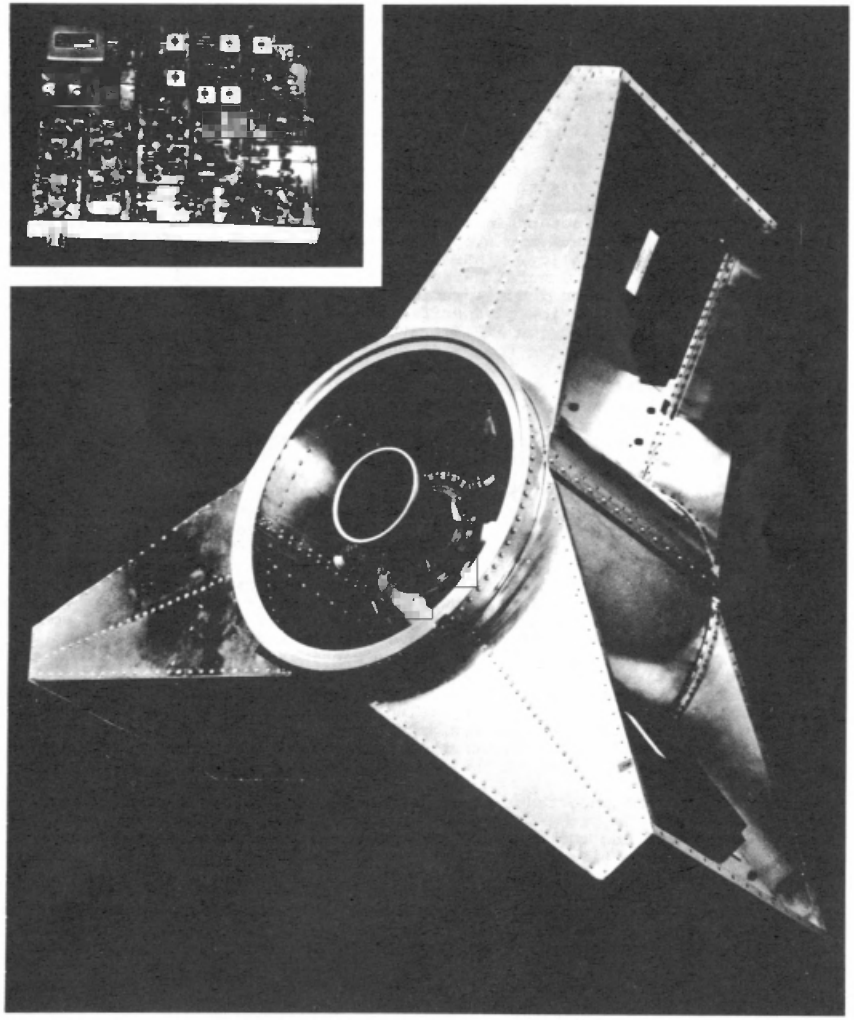
The first tests of the full 50 watt transponder are scheduled for March 1979. The transponder is being built in Germany using a 150 kHz crystal filter supplied by JAMSAT. The antenna designs are still not completed. There are problems in getting the two meter high gain antenna to perform as predicted by our computer model.

Worldwide tracking stations equipped with microcomputers and experienced with their use will be required at locations between 20°N and 20°S latitude during the first month following launch. We are in need of volunteers for help with this. If single stations are not suitably equipped perhaps teams could form to perform the orbital determination task. Large amounts of data will be required to accurately determine the orbit (we don't want to fire the motor when the satellite is pointing in the wrong direction). As such, RTTY would probably be the best method for relaying the data around the world. Stations equipped for RTTY are also needed. K1HTV is to coordinate these efforts. Please contact him if you are able to help out.

The characteristics of the communications link for users are such that circular polarised antennas will be necessary, and even then "spin modulation" effects may be noticeable. It is expected that the term "spin modulation" will enter the language of amateur radio. The path link requirements are otherwise expected to be similar to those of AMSAT-OSCAR 7 Mode B.

Thought has still to be given to the use of the spacecraft. The communications capabilities are unlike anything that has previously existed. Some section of the passband ought to be set aside for channelised SSB (Nets and Education) and digital use (RTTY and inter-computer communications). The current bandplan will be modified accordingly. Comments are solicited. Send them to K1HTV, in care of AMSAT.

In summary, AMSAT has developed hardware and software that can be used by any radio amateur to receive the high speed (400 baud) phase-shift keyed telemetry and information data from the Phase III spacecraft Engineering Beacon. Documentation is still under preparation and may be in German or in English. AMSAT will make this computerware available to radio amateurs and an announcement of their availability will be published in a future issue of the AMSAT Newsletter.



The AMSAT Phase-3 satellite showing the mounting of the modules and the centrally positioned kick motor

Upper left: prototype of a transponder

(AMSAT-DL photo)