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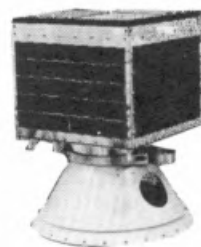
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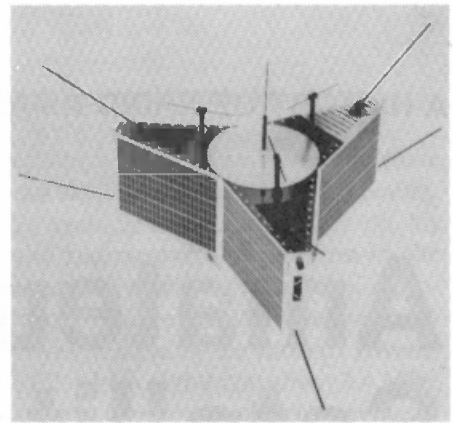
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OFF THE PAD

The Third Decade

By Joe Kasser, G3ZCZ*



Twenty years ago Radio Amateurs thrilled to the announcement of an Orbiting Satellite Carrying Amateur Radio. OSCAR 1 launched on December 12, 1961, with the Discoverer 36 spacecraft, was designed and built by a group of Radio Amateurs in the San Francisco Bay area banded together as Project OSCAR, Inc. OSCAR 1 contained a battery powered beacon transmitter and radiated the Morse greeting, HI, HI on a frequency of 145 MHz until its batteries were exhausted. It weighed about 10 pounds and cost about \$65.00 to build.

OSCAR 1 was the first of the Phase I series of spacecraft that demonstrated that Radio Amateurs could design and build working communications satellites. In the first decade Radio Amateurs put into operation the world's first multiple free-access communications satellite (OSCAR 3) and made the first direct satellite contacts between the USSR and the USA (via OSCAR 4).

The Radio Amateur Satellite Corporation (AMSAT) brought the Amateur Satellite Service into its second decade. Founded in 1969 in the Washington, DC area, AMSAT's first task was to put into orbit a satellite designed and built at Melbourne University in Australia. This spacecraft, the last of the Phase I series, known to history as AUSTRALIS-OSCAR 5, was the first Amateur built spacecraft capable of responding to ground commands. The AMSAT Phase II satellite program provided and continues to provide long life communications satellites in low-polar orbits. AMSAT-OSCAR's 6, 7 and 8 enabled many Radio Amateurs to expand their vhf/uhf horizons and affords a glimpse of the capability of an operational Radio Amateur Satellite Communications Network.

During the latter half of the second decade, planning and construction of a Phase III communications satellite was completed. The objectives of the Phase III program are to launch the operational era of the Amateur Satellite Service by providing global satellite coverage to at least 90 percent of the world's Radio Amateurs for many hours each day *using just one spacecraft*.

As we all know, the Phase III era was stillborn on May 23, 1980 when the Amateur Satellite Service suffered its first loss as the Ariane L02 rocket exploded seconds after leaving the pad. Phase III however still has a date with destiny as ESA has agreed to carry the Phase IIIB spacecraft aboard the Ariane L7 flight presently scheduled for February 24, 1982. This satellite, while being the first to show Radio Amateurs the capability of an operational worldwide communications satellite, is still far from the ideal of providing global coverage to everybody for 24 hours a day, and thus even though Phase IIIB is yet to fly, it is now time to start thinking about Phase IV.

Phase IV could provide global coverage to everybody 24 hours a day if the single satellite requirement is changed. If SYNCART packages are placed on three host space platforms in geosynchronous orbit, any Radio Amateur within line of sight of such a platform would be able to work anyone else who also is able to see the same platform. Each platform can see (and thus work) one third of the globe. Any lucky Radio Amateur able to see two such SYNCART's would be able to work two thirds of the globe directly. Consider for example three platforms located in geosynchronous orbits above longitudes 75°E (Indian Ocean), 200°E (Pacific Ocean) and 330°E (Atlantic Ocean) (See Fig. 1 on page 6 of *ORBIT* Number 1). With such a system, Europe and most of Africa can work both the Atlantic and Indian Ocean SYNCART's, Japan can work the Indian and Pacific Ocean ones while much of the USA can work both the Pacific and Atlantic Payloads. This scheme gives everybody communications capability over at least one third of the world, possibly more for 24 hours a day with 100 percent reliability. A quick glance at the world map shows that if these SYNCART packages are interlinked, full global coverage is provided to each and every Radio Amateur using at the most one interlink. Thus India could work California by means of the Indian-Pacific SYNCART link. That same station in India would talk to New York via the Indian-Atlantic SYNCART link. The interlink capability would be provided by a ground transponder that would be situated in a location that can see two platforms at the same time. The actual location of the ground segment of the communications link will of course depend on the locations of the SYNCART's (space segment) and that will depend on the host platform.

As the required bandwidth is not available below 435 MHz, Phase IV will probably carry a Mode M transponder initially. The uplink will be about 1269 MHz, the downlink at 436 MHz. Each SYNCART will contain the equivalent of three Phase III passbands as shown in Fig. 1, separated by, and associated with guard band areas. At the center of the space segment is a passband designated for in-zone working. This passband is used by any station within range of a SYNCART to work any other one within range of the same SYNCART. At the low frequency end of the central pass-

(Continued on page 12)