OSCAR 7: Ham on a shoestring

OSCAR I was just a little beeper. Launched in 1960, the first Orbiting Satellite Carrying Amateur Radio did nothing but circle the earth, sending out a continuing 144 megahertz pulse that could be picked up by the relatively low-cost equipment of "ham" radio operators. Built on a shoestring by a group of enthusiast-engineers at Lockheed in California, it was launched *gratis* by the Air Force when a bit of extra payload capacity was available on a booster being used to orbit another probe.

Since that time, six more OSCARS have been sent into orbit, the most recent of them just two weeks ago, on Nov. 15. OSCAR 7 has come a long way from its great-great-great-great grandfather's day. Though it weighs in at a mere 65 pounds, the newest member of the family tree is a full-fledged communications satellite, capable of handling about 35 conversations at a time while pulsing away with four beepers and providing 84 channels of telemetry so that its mentors can see how it's doing. It's even the hub of an educational program designed to aid students in the classroom in studying concepts ranging from the Doppler effect to orbital mechanics.

Yet it was still built on a shoestring —more, in fact, like an old sneaker lace—thanks to a remarkable combination of rabid enthusiasm and rampant generosity. Companies such as RCA and Amatek-Hunter Spring, some of whom are well-infiltrated by hams and sympathizers, donated thousands of dollars worth of equipment and parts. In a four-year effort by the Radio Amateur Satellite Corp., OSCAR 7 was built by hams from Australia, Canada, Germany and the United States, who contributed, says project manager Jan King, "about 10 man-years of labor." The result was a $60,000 tab for a satellite that would have cost, by normal NASA methods, about $2 million.

The final touch was that NASA launched it free, riding "space-available" on a rocket whose main passenger was the NOAA-4 weather satellite, accompanied also by the first Spanish satellite, an ionosphere probe called Intasat A. Government and commercial satellites, of course, are unlikely to find most of OSCAR's cost-cutting methods open to them, but King feels that some of the construction and testing techniques could be useful. Solid-state components, for example, are ordered from their manufacturers to meet certain reliability specifications. NASA procedures call for checking and rechecking them after delivery, whereas OSCAR's designers trusted their suppliers. The expensive requalifying is valid for expensive, long-life satellites, King says, but the reservicing potential of the upcoming space shuttle may justify the less costly approach.

OSCAR's educational program, developed jointly by the American Radio Relay League and Talcott Mountain Science Center in Avon, Conn., includes a free curriculum guide suggesting classroom experiments that can be done by monitoring the probe with inexpensive equipment. It is available to educators from the ARRL, 225 Main St., Newington, Conn. 06111, which also has access data on the satellite. Transmit through OSCAR on 145.95 megahertz; receive on 29.45 megahertz. Beep! □

In the medium is the message

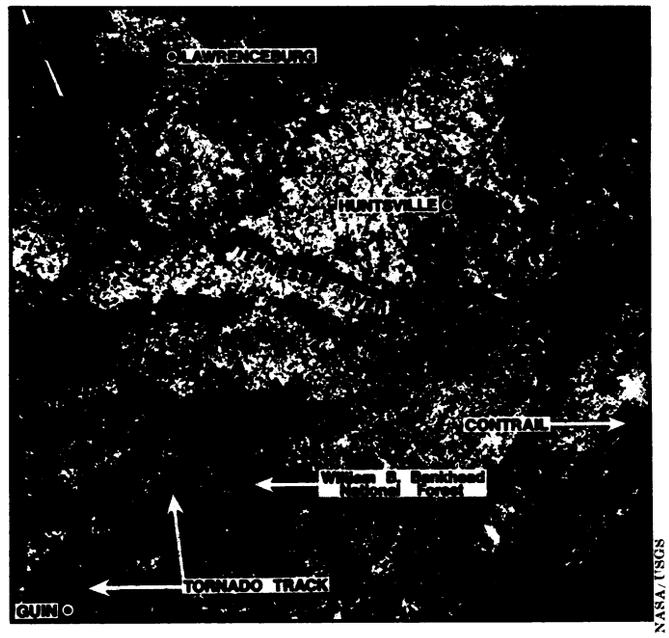
Hundreds of researchers are at work studying the biological effects of different wavelengths of light, from highly energetic gamma rays, through the visible spectrum to radio waves. Earlier this year, SCIENCE NEWS reported one group's findings on the effects of blacklight on mammalian cells (SN: 3/16/74, p. 177). Now that same group has updated its work, and the new findings have broad implications for both human health and biology research.

Biologists Richard J. Wang, James D. Stoien and Frederick Landa originally reported that blacklight (also called near-ultraviolet, 3,000-4,200 angstroms) can kill human, mouse and hamster cells in tissue culture. The lethal effects were due to a toxic photoproduct formed during irradiation and not to direct DNA destruction as in ultraviolet exposure. At the time, the team thought perhaps the photoproduct might have been formed in the culture medium itself, rather than within the cells. Now they have proven that that is in fact the case.

Wang and Stoien report in the October PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES that when a commonly used tissue-culture medium (Dulbecco's modified Eagle's medium) is irradiated with near-ultraviolet rays from a blacklight or visible fluorescent light source, toxic photoproducts are formed. These toxins will kill unexposed mammalian cells placed in the irradiated medium. Toxins are formed only when the vitamin riboflavin and the amino acids tryptophan or tyrosine are present in the medium. Riboflavin apparently absorbs light energy and transfers it to trypotophan or tyrosine, which are then involved in toxin formation. The structure and mode of lethal action of the toxins are as yet unknown, Wang says.

Research biologists may thus be getting anomalous results when cells grown in Dulbecco's or similar tissue culture media are exposed to standard fluorescent or blacklights in the laboratory, and "considerable caution should be exercised," the team states. The ingestion of large amounts of riboflavin or unnecessary exposure to near-ultraviolet should also be approached with caution, Wang says, until more can be learned about the toxigenic, mutagenic and carcinogenic effects of the light. □

Longest tornado track ever recorded



The tornado that destroyed much of Guin, Ala., on April 3 cut a 57-mile-long path of destruction through Alabama forestland wide enough to be recorded by a satellite orbiting 560 miles high. The tornado track was recorded by NASA's Earth Resources Technology Satellite (ERTS-1).