

Juno II, carrying a NASA Explorer satellite, went out of control immediately after leaving its Cape Canaveral pad on July 16. This dramatic picture was secured just as the destruct button was pressed by the range safety officer

Missiles and Spaceflight

PADDLE-WHEEL SATELLITE

An orbit ranging from an apogee of 26,400 miles to a perigee of 157 miles was achieved by Explorer 6, a NASA satellite launched by a Thor-Able rocket from Cape Canaveral on Friday last, August 7. Designed to study a number of scientific problems, the satellite employs four square vanes carrying 8,000 solar cells used to recharge the chemical batteries which power the radio transmitters. The initial orbital period was 12 hr 45 min and the estimated life-time of the satellite, which weighs 142 lb, is about one year.

The instrumentation of Explorer 6 is intended to obtain radiation information, to relay a crude picture of the earth's cloud cover, to study the earth's magnetic field and cosmic dust, and to evaluate the new system of using solar energy for the batteries. The equipment includes an electronic memory by means of which information is stored, and a control system which permits the satellite's radio transmitters to be switched on by means of a command signal sent from the ground. The first successful demonstration of this control was made shortly after the launch by the Space Technology Laboratories team at Jodrell Bank.

BRITAIN'S SATELLITES

The British space research programme will get under way with the launching of several satellites by means of Scout rockets in about two years' time. This was announced by Lord Hailsham in the House of Lords on July 29. These launchings will reportedly be from Virginia or California, and have been arranged following the visit to the U.S.A. of Prof. H. S. W. Massey and a team of scientists who have held discussions with the National Aeronautics and Space Administration.

The joint Anglo-American satellite programme will run for three or four years and the results are to be made internationally available. Ten scientific teams in the United Kingdom are to be formed to prepare equipment for particular experiments. Expenditure is expected to be between £100,000 and £200,000 per year.

The four-stage Scout solid-fuel rocket is now under development by NASA and is expected to be flight-tested at Wallops Island, Virginia, towards the end of this year. Known as "the poor man's rocket" because of its relatively low cost (about \$500,000), Scout is designed to launch a 150-lb satellite into a 300-mile orbit. Chance Vought is prime contractor.

Provision of £55,000 for "upper atmosphere and satellite instrumentation research" was included in revised estimates presented to Parliament on July 6. This was the first allocation for the British space research programme.

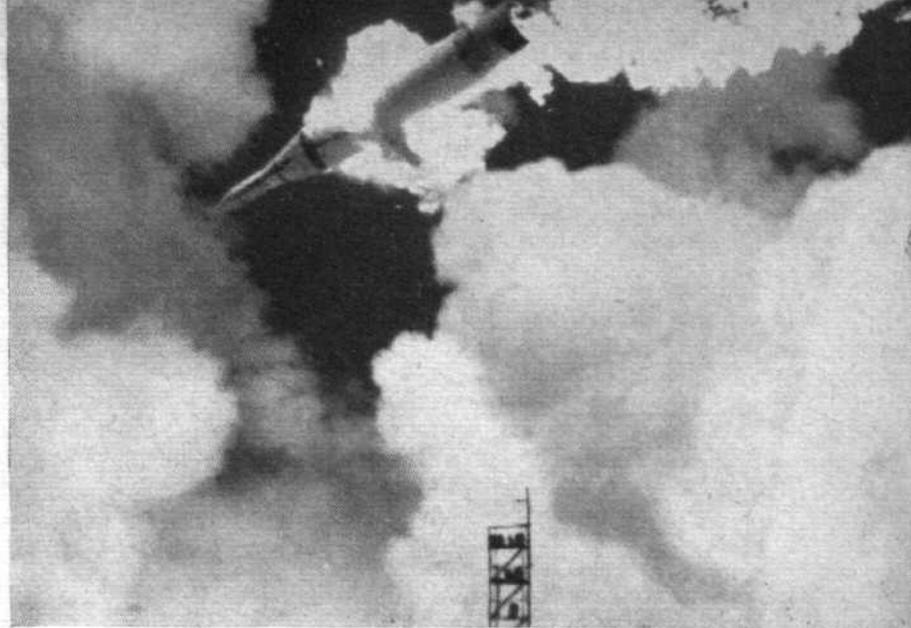
DOGS AND A RABBIT

Moscow Radio announced on July 6 that a single-stage rocket had been launched "to a great height" at 3.40 a.m. G.M.T. on July 2, carrying a 2,000 kg payload which included two dogs and a rabbit. As well as the animals, which were said to have been recovered in good condition, a number of scientific instruments were carried. These included equipment for studying the ultra-violet portion of the solar spectrum, structure of the ionosphere, micro-meteorites, and air currents at various heights, and instruments for measuring air density, pressure, temperature, and composition of the atmosphere.

Two dogs, one of them a veteran of the July 2 flight, were carried to an unspecified height in a further single-stage rocket launch on July 10. Information obtained included measurements of the infra-red radiation of the Earth and its atmosphere; photographs of clouds "over a vast area"; a simultaneous analysis of the ion and neutron composition of the atmosphere; and measurement of electrostatic fields. The payload was 2,200 kg and the dogs and instruments were parachuted safely back.

GODDARD SPACE CENTER

The new space projects centre which the National Aeronautics and Space Administration is building at Greenbelt, Maryland, will be named the Goddard Space Flight Center to commemorate the American rocket pioneer Robert A. Goddard. Under the overall guidance of the NASA director of spaceflight development, the centre will perform basic research and will be respon-



sible for the development of satellites, space probes and vehicles, and of tracking, communications and data reduction systems. It will eventually be also a command control centre for NASA spaceflight operations.

The first two major buildings at the centre should be complete in mid-1960 and will house a staff of about 450. Until completion of the centre the remainder of the staff will be housed at the U.S. Naval Research Laboratory in Washington and at the Langley Research Center, Langley Field, Virginia. The director of the Goddard Center will be Harry J. Goett.

An Australian National Committee on space research was formed during June, with Professor L. G. H. Huxley of Adelaide University as chairman. Another member of the Committee is R. W. Boswell, controller of the Weapons Research Establishment at Woomera.

The maximum height of 500 miles was achieved by the third Black Knight rocket test vehicle, launched at Woomera on June 11. Instruments and equipment are said to have worked satisfactorily and the rocket landed 75 miles down range. Black Knight No. 4 flew a successful mission, to an unstated height, on June 29.

Launched from Cape Canaveral on June 22, Vanguard 3, whose 20in satellite was designed to measure the heat of the Sun and of the Earth, did not achieve orbit. The launching vehicle was the same as used in previous Vanguard firings, except that the payload was to be separated from the third stage not automatically, but on ground command at the end of the first orbit.

On July 7 the U.S. Navy permitted publication of a photograph depicting a test firing of the "advanced Terrier" ship-to-air missile. In production by Convair at Pomona, Cal, it retains the original tandem boost motor but has an entirely new aerodynamic configuration. The original Terrier employed fixed tail-fins and a cruciform of moving wings; the latter have now been moved to the tail of the missile, while the wings take the form of four axial strakes along the body.

Originally a U.S. Navy weapon, Bullpup has now been formally adopted by the U.S.A.F. under the designation GAM-83A. Production is proceeding at Martin's Orlando Division on a \$6m contract.

Early in June the first Boeing IM-99B Bomarc was fired from Cape Canaveral. Not previously known is the fact that the solid boost motor has a fixed chamber, the jet being deviated by an annular vane. This rocket provides propulsion during the vertical climb until the RJ47-7 ramjets light up at about 8,500ft at M 0.6.

For the first time the nose-cone of an Atlas ICBM was recovered after an "all the way" 5,500 n.m. mission on July 21. This success followed six consecutive failures which led to the suspension of Atlas firings on June 6. Initial operational capability is now expected next month.

On June 23 the first Corporal tactical ballistic missile to be fired in the U.K. was launched by an Army crew (Royal Artillery, R.E.M.E. and R.A.O.C.) from the Outer Hebrides range at Benbecula, South Uist. Corporals have been used as training weapons by No. 47 Guided Missile Regiment since 1956, and this unit and No. 27 both fired rounds at Benbecula during the past two months.

In order to facilitate international production by Belgium, the Netherlands, France, Germany and Italy of the U.S. Army Hawk missile, a new NATO agency, Hawk Production Organization, has been created. It has been unofficially suggested that 22 battalions will be apportioned between the five nations, and that initial deliveries of equipment will begin in June 1961.

Replying to a question by Lord Fraser of Lonsdale in the House of Lords on June 11, the Lord President of the Council, Lord Hailsham, said that communication with possible inhabitants of other worlds was not one of the objects of the British space-research programme. The Government had not sought advice as to whether sentient creatures lived in other worlds, and it would resent any suggestion that the Martians had anything to fear. "Our space programme," he declared, "does not involve any unprovoked aggression against any third world or second world."