

This early test model used in the US Army Nike Zeus programme gives a clue to the somewhat jagged configuration adopted for this hypersonic weapon. A round-up on its progress is given below

Missiles and Spaceflight



ZEUS REVEALED

When the overall Nike anti-aircraft missile system was planned it was hoped that, owing to its relatively early concept and comparison-type radar guidance, the overall performance of the system could be progressively improved by the introduction of successive types of missile. Already Nike Ajax has given way to Nike Hercules, and the latter is undoubtedly the fastest and highest-flying anti-aircraft missile in service today. So high is the flight performance of Hercules that it has long been appreciated that it could form the basis of a vehicle capable of destroying incoming nosecones from strategic ballistic missiles.

For at least four years the main Nike team of Western Electric, Douglas Aircraft and Bell Telephone Laboratories have been concentrating upon a new missile named Nike Zeus which, while fitting into the existing Nike ground environment, would have acceleration, speed and range far surpassing that of any existing surface-to-air missile. The problems involved in producing an anti-ICBM system are very great. Even assuming that the incoming nosecone can be detected and isolated from decoys and other spurious returns, its destruction must be accomplished at a range of some 200 miles, at a height such that the realization of the full megaton yield of the warhead (plus that of the defending missile) can do no harm or produce fall-out. Moreover the defending missile must fly at a speed of at least 12,000 m.p.h. through relatively dense parts of the atmosphere, and must be able to manoeuvre at these speeds. The types of structure which will eventually prove suitable for this very arduous task have yet to be completely resolved.

In order to hasten the development of the Zeus system, the Army Ballistic Missile Agency at Huntsville, Douglas Aircraft and the Langley Laboratory of the National Aeronautics and Space Administration, and several other research agencies, have many hundreds of engineers at work upon the basic problems of the airframe, aerodynamics and control, propulsion and guidance systems. Aspects of the Zeus programme dealing with tangible hardware have progressed at a rapid pace; already both booster and sustainer motors have been fired, and the complete airframe appears to have reached a commendable degree of development. The very powerful ground radar needed for the operational system is still some years away, but such giant firms as RCA and Sperry are heavily committed to the task. The sustainer and booster are respectively being developed by the Grand Central Rocket Co and Thiokol, and it is worth noting that the booster, with its thrust of 450,000lb, is the most powerful solid charge of which details are available.

An accompanying photograph is the first to be cleared for publication by the US Department of Defense showing the test vehicle with a configuration similar to that envisaged for the eventual Zeus. Although based essentially upon Hercules, the new missile has a revised control system incorporating delta-shaped control surfaces carried on the tips of the very acute

delta wings. The test vehicle illustrated is only marginally larger than Hercules, but the operational missile will undoubtedly weigh in the region of 10,000lb, while the booster may weigh 20,000lb.

Initial test firings are being based at White Sands, New Mexico, where a series of experimental Zeus vehicles is being fired to determine the future of the programme. The first was fired in August and broke up shortly after leaving the launcher (the latter, incidentally, fires the missile at a fixed, shallow angle). The next was fired on October 14, and although a malfunction occurred during the coasting period (between booster burnout and ignition of the sustainer) the desired data were obtained in the final analysis. Another round was successfully fired on December 16. Early this year a number of test vehicles will be fired from a new emplacement on Kwajalein Atoll in the Pacific, to intercept warheads from ICBMs fired from Vandenberg and IRBMs fired from Johnston Island. The IRBMs will be Jupiters (see news item opposite).

VANGUARD 3 SILENT

Tracking and telemetry transmitters in the US Vanguard 3 satellite ceased to function on December 11 after a working period of 85 days. Nominal lifetime of the silver-zinc batteries carried was 90 days. Third and last of the Vanguard series, the satellite was instrumented to measure the Earth's magnetic field, X-rays from the Sun, and environmental conditions in space. The scientific payload weighed 50lb and the attached third-stage casing weighed an additional 50lb.

During its transmitting lifetime Vanguard 3 travelled approximately 30,874,000 miles in 938 orbits around the Earth. The Minitrack station at Santiago, Chile, was the last to interrogate the satellite—at 2.01 p.m. GMT on December 11—and the last tracking report came from Woomera at 10.39 p.m. on the same day. Vanguard 3 is now expected to remain in orbit up to 40 years.

MIDGET CAMERA

Rejoicing in the name of WRECISS (Weapons Research Establishment camera interception single-shot) the tiny camera illustrated at the foot of this page has been designed and developed by the WRE at Woomera and is currently manufactured by the Fairey Aviation Co of Australasia Pty Ltd, at Salisbury, South Australia. Basic data are given at the end of this news item. In most surface-to-air missile installations the cameras have been mounted in the nose telemetry bay. Although the firing lever must be replaced after each mission, it is estimated that some 30 per cent of the WRECISS can be re-used without repairs and a substantial further proportion can be repaired relatively cheaply.

WRECISS data: film is Ilford 5R101 in the form of 0.93in discs punched from 35 mm strip; weight 8oz; diameter 1.5in; length 1.25in; field of view 186 deg; exposure time 0.3 millisecc; effective relative aperture, approximately f/8; electrical supply, more than 45V and 40 microjoules of energy; miss-distance accurate within 5 per cent; missile/target attitude, in conjunction with wing-tip cameras, accurate within 1 deg.

NEWS OF JUPITER

Last month the Chrysler Corp announced that they had received a contract from the US Army to supply a modified version of the Jupiter IRBM for use as target missiles during the evaluation of Nike Zeus (see above). The targets will have substantially the same external configuration as the SM-78 Jupiter of the US Air Force and Army, but will contain instrumentation capable of

In the text above is described the WRECISS camera, now being manufactured by Fairey Aviation's Australasian subsidiary. The frame taken by it depicts a Meteor U.15 over the range at Woomera

