

MISSILES 1958...

tem. At launching, about 1½ miles from the target, the missile is pointed slightly downwards, presumably to prevent the blast from the high-thrust Aerojet-General solid sustainer from damaging the aircraft or entering the intakes. An upward curving trajectory should then bring the Genie into the immediate neighbourhood of its quarry, detonation being effected by a proximity fuse by Panda Electronic Specialty Co.

A large number of Genies are now in service, the first issue to a squadron having been made in January 1958. The ground-handling and positioning trolley is by Fruehauf. It is clear that the present MB-1 is a relatively crude weapon, although an effective one. In February it was announced that a guided version, with greater thrust and longer range, was in advanced development. This version will also be produced by Douglas.

MB-1 Genie: overall length, about 8ft; diameter over warhead, about 15in; firing weight, probably about 1,000 lb; optimum range, approximately 1½ miles.

M.051

French Air Force.

Type: Radar guided air-to-air missile.

IN its essentials this missile is a version of the M.510, but guided by radar beam riding or semi-active homing. Its maximum speed is slightly lower, at Mach 1.5, and a small series has been completed.

R.510 (M.510)

French Air Force.

Type: Optical-homing air-to-air missile. Drawing: p. 896.

UNIQUE in that it employs a photocell seeker sensitive to electro-magnetic radiation within the spectrum of visible light, this relatively large missile is produced by the Soc. Matra and is in pre-production and limited service. It is carried by the Vautour and a development, the M.511, would have gone into service with the Trident. Full details were given in our 1957 review; propulsion is effected by a two-stage solid motor and the flight of the weapon is controlled by delta foreplanes and a ventral rudder in line with the delta wings on the rear part of the fuselage.

R.510: length, 10ft 5.9in; body diameter, 11in; wing span, 39.4in; firing weight, 353 lb; burn-out speed, Mach 1.7; maximum range, 8,750 yd in good visibility.

ROBOT 321A

Royal Swedish Air Force.

Type: Test vehicle. Drawing: p. 896.

THIS ground-launched vehicle is intended to be the initial stage in the development of an air-to-air missile, presumably to be carried by the J-32 Draken. The first 321A was launched on December 20, 1948, the instrument head being recovered by parachute. The basic missile has a cylindrical 7in-diameter body with a pointed ogival nose and a cruciform of delta wings. An internal sustainer is fitted, and boost propulsion is provided by a tandem motor with additional stabilizing fins. The size is noteworthy.

Robot 321A: overall length, 13ft (17ft 6in with booster); wing span, 36in (booster 39in); firing weight, 300 lb (630 lb with booster); flight speed, supersonic.

SIDEWINDER

United States Navy, Marine Corps and Air Force (Air Defense Command, Tactical Air Command and Far East Air Force), air forces of Australia, Western Germany, Norway and Japan and Royal Canadian Navy; the missile is



Perhaps the most lethal air-to-air missile in the western world is the nuclear-tipped MB-1 Genie. For more than a year this has been in squadron service with the U.S. Air Force; this one is carried by an F-89J and is illustrated with its stabilizing fins in the extended position

designated AAM-N-7 (Navy) and GAR-8 (Air Force).

Type: Lightweight IR-homing air-to-air missile for firing from virtually any aircraft. Drawing: p. 896.

MORE wide usage than any other air-to-air guided missile in the Western world is the reward for the extreme simplicity, low cost and reliability of this pencil-slim weapon. Moreover, it has recently shown its effectiveness in actual operations, when—according to combat reports—14 Chinese Mig-17s were destroyed in a single October day by Sidewinders fired from F-86s of the Chinese Nationalist air force.

Prime contractors are Philco and G.E., original design having been done at NOTS, China Lake (see 1957 review issue for history). The missile is assembled from sections of light-alloy tube, comprising (front to rear): infra-red seeker head; guidance system, miniaturized servos, control ring and canard fins; distributed warheads, wrapped in optimum fragments; slender, 75in-long solid sustainer; and rear, fixed fins and motor nozzle. Airframes are produced by Hunter Douglas and Norris-Thermador, who have also made over a million Mighty Mouse spin-stabilized air-to-air rockets. In February it was reported that 13,000 Sidewinders had been ordered from the two primes, and that nearly all had been delivered. Follow-on orders were placed the following month, amounting to \$15.5m for Philco and \$9.5m for G.E.; these sums would buy a total of about 3,000 rounds.

Sidewinder: length, 9ft 5in; body diameter, 4.5in; fin span, approximately 19in; firing weight, 155 lb; burn-out speed, Mach 2.5; range, between 3,000 and 6,000 yd depending on visibility.

SPARROW

United States Navy and Marine Corps.

Type: Guided air-to-air missile for ship-board use.

THIS large and effective species of missile has been developed in three major versions, which, in view of the great dissimilarity, should be considered separately.

Sparrow I. A full history of this weapon was contained in our 1957 review. Developed for the Navy Bureau of Aeronautics by the Sperry Gyroscope Co., Sparrow I (AAM-N-2) was manufactured in quantity by the Sperry-Farragut Division of Sperry-Rand at the Naval Industrial Reserve Aircraft Plant at Bristol, Tennessee, between 1951 and 1957. Sparrow I is a beam-rider, with fixed tail fins and moving wings, all eight surfaces being of pointed delta form. It is in service with Atlantic and Pacific fleets, and can be fired by Chance

Vought F7U-3M Cutlasses, McDonnell F3H-2M Demons and possibly other types of aircraft.

Sparrow II. This version was evolved by Douglas Aircraft in 1955 for the XF5D Sky-lancer; when the aircraft was terminated the missile programme was also cancelled. In 1956 the missile was selected as the standard air-to-air weapon of the Royal Canadian Air Force, and a consortium was formed to build it in Canada. This programme was cancelled three months ago. Sparrow II is a radar-guided weapon, with Bendix-Pacific guidance, and it has an airframe quite different from that of Sparrow I.

Sparrow III. In this missile a revised version of the airframe of Sparrow II has been matched with a completely new guidance system. Raytheon is the prime contractor, manufacturing the weapon at the same N.I.R.A. plant in Bristol formerly used by Sperry on Sparrow I. Compared with the earlier weapon, the III is slightly larger, and its aerodynamic surfaces are of considerably greater area; the wings are square-tipped and at least one of the fixed fins appears to fold in order to allow the missile to be carried partly submerged in a fighter fuselage. Raytheon also produce the semi-active radar homing guidance, the receiver for which is housed beneath an ogival nose radome about 22in long fabricated from heat-resistant ceramic material.

Propulsion is provided by an Aerojet-General sustainer with a single cast solid charge (not integral with the body). Future versions may be fitted with the Guardian pre-packaged liquid motor produced by the Reaction Motors division of Thiokol. Body and wings are mainly precision castings in aluminium alloy. The high-explosive warhead is larger than that of other American air-to-air weapons.

Flight testing is being conducted chiefly from the Naval Air Missile Test Center at Pt. Mugu, Cal. Raytheon have a Douglas F4D Skyray and a McDonnell F3H Demon on bailment from the Navy for this purpose. Operationally the carrier will be the Chance Vought F8U-3, which carries three rounds (one just off the centre-line, necessitating an offset nose undercarriage), and the McDonnell F4H, which mounts four (in pairs beneath the front and rear fuselage sections). The Sparrow IIIs are housed half submerged in both types of aircraft.

Sparrow I: overall length, 12ft; body diameter, 8in; firing weight, about 300 lb; burn-out speed, about Mach 2.5; range, up to 5 miles.

Sparrow III: overall length, approximately 12ft 6in; wing span, approximately 40in; body diameter, 9in; firing weight, approximately 370 lb; burn-out speed, probably close to Mach 3; effective range, at least 5 miles.