



Air-to-Air



Excellent results are being achieved by the Société Matra with the R.530; it is to be standard armament on the Mirage 3C, an example of which is carrying it in this photograph

EAGLE

LARGEST and by far the longest-ranged of all air-to-air weapons, the 2,000lb Eagle was cancelled early this year. Prime contractor to the US Navy was Bendix Systems Division.

FALCON

Family of homing missiles embodying progressive improvements

US AIR FORCE (Guided Air Rocket 1, 2, 3, 4 and 11), ROYAL SWEDISH AIR FORCE (Robot 327 and 328)

GENESIS of the Falcon was described in our 1957 review. Production for the US Air Force Air Defense Command was begun by Hughes Aircraft at a specially built plant in Tucson, Arizona, in 1954. The first versions were GAR-1 and GAR-2, respectively with semi-active radar and infra-red homing guidance. After delivering some 4,000 GAR-1s, Hughes switched to the GAR-1D, with larger control surfaces carried well behind the wing, and delivered nearly 12,000 between 1956 and 1959. Production of IR-homing missiles began in 1956, and from 1957 the GAR-2A allowed for operation over a wider band of ambient temperatures, total -2 and -2A production amounting to 9,500. These missiles are still found in units equipped with the F-101B and F-102A, and some may be supplied to the RCAF for use on the former aircraft.

First of the Super Falcons was the GAR-3, introduced in 1958 for issue to F-106 squadrons. Completely redesigned, it has much improved radar guidance, a pointed radome of new material, a more powerful warhead, new wings and a longer-burning motor. After delivering 300, Hughes moved on to the GAR-3A, with better guidance discrimination and a completely new motor. Deliveries probably now exceed 2,000. In parallel, Hughes are making the IR-homing GAR-4A,

with a seeker cell of greater sensitivity. Shortly after our 1960 review was written the Royal Swedish Air Board obtained a production licence, and Saab assisted by many other firms are starting production of the GAR-3A and -4A, under the designations Rb327 and Rb328. These will form the main armament of the Saab J35F version of the Draken, in conjunction with an improved Saab S7 collision-course fire-control and a more powerful Swedish radar.

Known as the Nuclear Falcon, the GAR-11 has been in production about 18 months. An offshoot from earlier members of the family, it can be fitted to the F-102 and other aircraft without modification to the launcher or fire-control, and has radar guidance for attacks made some 20° to 30° from dead ahead. Its development was a triumph of kiloton-warhead design.

FIRESTREAK

IR-homing missile

ROYAL AIR FORCE, ROYAL NAVY

ORIGINALLY known by the code name Blue Jay, this weapon has been developed by de Havilland (originally the Propeller Co, now de Havilland Aircraft, Manor Road, Hatfield) since 1951. As described in *Flight* for February 26, 1960, the missile is guided by an infra-red seeker cell behind the glass nose, which locks-on to the target before release from the launch aircraft. Signals of telescope dish position are processed by potted electronics in the forebody and used to control pneumatic actuators ahead of the wings coupled by rods to the rear control surfaces. Proximity-fuze windows in the forebody trigger the warhead surrounding the motor tube. Firestreaks are the primary weapons of squadrons equipped with the Lightning (two missiles per aircraft), Sea Vixen and Javelin (four).

GENIE

Unguided nuclear rocket

US AIR FORCE

AS intimated in our 1960 review, this fin-stabilized missile is likely to be carried by later types of Lightning of RAF Fighter Command, as well as the F-101Bs of the RCAF. It is widely used by F-101B, F-102 and F-106 squadrons of Air Defense Command, and is said to have a warhead with a lethal radius of more than 1,000ft.

MATRA R.511

Semi-active radar homing missile

FRENCH AIR FORCE

DESCRIBED in *Flight* for August 19, 1960, this twist-and-steer missile was originally developed with an *autodirecteur* containing a light-sensitive optical seeker cell. This was abandoned in favour of radar, but overall performance limitations have restricted the R.511's employment to training and indoctrination, almost entirely with Vautour squadrons.

MATRA R.530

Radar or IR homing missile

FRENCH AIR FORCE

EARLIER Matra and Nord air-to-air missiles have been interim designs, developed to fill the gap until this definitive weapon is ready. Abandoning twist-and-steer in favour of cruciform surfaces, Matra have produced a finely engineered missile of high performance. Behind the hemispherical nose lies the stabilized IR telescope or semi-active radar dish aerial, both versions being described as "of equal importance." Next comes the continuous-rod warhead, with four axial proximity-fuze aeriels, followed by the autopilot, electric batteries, upper and lower cable

TABLE 5: AIR-TO-AIR MISSILES

	Launch wt (lb)	Length (in)	Body diam (in)	Span (in)	Range (n.m.)	Altitude peak (ft)	Mach number	Warhead
GAR-1D Falcon	121	78	6.4	20	4.5	50,000	2+	20lb?
GAR-2A Falcon...	120.5	79.5	6.4	20	4.5+	50,000	2+	20lb?
GAR-3A Falcon...	150	86	6.6	24	6+	70,000	3	40lb?
GAR-4A Falcon...	145	81	6.6	24	6+	75,000	3	40lb?
GAR-11 Nuclear Falcon	203	84	11	20	4?	—	2	N (2kt?)
Firestreak	300	125	8.67	29.4	4+	—	2+	50lb?
MB-1 Genie	820	114.9	17.4	—	2.5	50,000+	3	N (2kt?)
Matra R.511	397	122	10.24	39.4	4.1	59,000	1.8	55lb
Matra R.530	430	133	10.24	43.3	—	98,500	2+	60lb?
Nord AA.20 (5103)	295	102.4	9.84	31.5	2.5	50,000	1.7	51lb
Nord AA.25 (5104)	298	102.4	9.84	31.5	3	—	1.7	51lb
Red Top	—	—	—	—	7	—	3+	68lb
Sidewinder 1A	155	113	4.8	20	2+*	50,000+	2.5	10lb
Sispre C-7	143	77	6.3	25	6.2	—	1.9	55lb
Sparrow 3	380	144	8.5	39	5+	50,000+	2.3+	60lb

* Reduced to about 3,500ft at sea level.