



Surface-to-air missiles 1, Redeye; 2, Blowpipe; 3, Seacat; 4, Rapier; 5, Roland; 6, Crotale; 7, Chapparral; 8, Indigo; 9, Sea Dart; 10, Tartar; 11, Standard; 12, Hawk; 13, Micon; 14, Gainful; 15, Seaslug; 16, Goa; 17, Thunderbird; 18, Standard; 19, Advanced Terrier; 20, Sprint; 21, Bloodhound; 22, Masurca; 23, Ganef. More surface-to-air missiles on page 795 "Flight" copyright drawings

4 - Surface-to-air Missiles

FRANCE

Crotale Thomson Houston-Hotchkiss Brandt, which is responsible for ground equipment for the TH.D.5000 Crotale weapon system, claim that reaction time from detection of target to launch of first missile is six seconds. This is made possible by digital data processing, resulting in complete automation of the weapon system. Crotale is designed to deal with aircraft flying at up to Mach 1.2, at altitudes down to 50 metres, in all weathers, and can be mounted on tracked vehicles, semi-mobile launchers or ship-board launchers.

In the basic version for the French services, four missiles, in containers, are carried by the Crotale launch vehicle, together with a monopulse fire-control radar capable of guiding two weapons simultaneously. Guidance is by radio command, a transponder on each missile enabling it to be tracked by the radar. Acquisition of the missile after launch is facilitated by an infra-red unit which picks up the exhaust heat emission; an optical tracking device is also provided. Three launch vehicles are served by a single vehicle-mounted pulse-Doppler surveillance radar, which is believed to have a range of 11 miles and to be almost impervious to clutter.

Prime contractor for the Crotale missile is Matra. Few details are available except that the 33lb explosive charge is detonated by a proximity fuse, but Crotale is thought to have a launch weight of about 165lb and range of over 5 miles in a 16-second flight time.

Masurca Mk 2 This semi-active homing missile forms the primary anti-aircraft defence system on the new frigates *Suffren* and *Duquesne*, each of which carries a twin launcher. It is similar in appearance to the slightly smaller American Advanced Terrier and carries a proximity-fused warhead.

Roland In its initial form, Roland is being developed jointly by Nord and Bolkow as a fair-weather weapon which can be tube-launched from light armoured vehicles against low-flying aircraft and helicopters flying at speeds up to Mach 1.3. Target detection in azimuth is by means of pulse-Doppler surveillance radar with a range of 9.3 miles, carried by the launch vehicle. In-flight guidance is by the TCA optical aiming/infra-red tracking system developed for the Harpon missile (page 798). The complete weapon system can be carried by modified versions of the French AMX-13 and German Spz tanks, including a total of ten missiles in each case.

The efficiency of the surveillance radar, even against helicopters hovering behind trees, was demonstrated last June at Bretigny. On the following day, a production-configuration Roland intercepted a CT.20 jet target drone at Landes. Under development in the all-weather Roland II, which involves only the addition of a second radar to the present launch vehicles.

ITALY

Indigo Following highly-successful firing trials in Sardinia, this short-range land-based missile is now available for evaluation by potential customers.

GREAT BRITAIN

Bloodhound The RAAF's squadron of Mk 1 Bloodhounds is expected to be phased out soon, but the Mk 2, with CW radar guidance, up-rated Thor ramjets, longer range and greater lethality, continues to be deployed by RAF Strike Command in the UK, and by the FEAF. This version also forms an important element of the Swedish and