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FIRE POWER

The development of electronic and radar tech-nology has led to a rapid advance in the strike capabilities of military aircraft. In this Flight
survey the attack systems of the West's most

FRANCE

Dassault Mirage F.l The Mirage F.l's Thomson-CSF Cyrano IV monopulse radar has a range twice as great as that of the equipment fitted to Mirage Ills. The basic Cyrano IV-0 designed for air-to-air operation searches through a maximum ±60° in azimuth and ±30° in elevation, or through smaller angles when the approximate direction of the target is known. Range indications of 7, 15, 35 and 60 n.m. are provided. Tracking of a target selected manually by use of a marker is then automatic, and the pilot transfers his attention from the radar display to the Thomson-CSF multi-colour electromechanical HUD as the attack phase is entered.

The radar has three pulse durations and can look down by 4° below the horizontal at 4,000ft before being swamped by ground clutter. This increases to 32° at 25,000ft. See Flight for October 16, page 566, for further information. Operation of the weapons is manual or automatic; in the former case the fire-control computer provides the pilot with firing clearance and in the latter it issues automatic firing commands to the weapons. The computer also ensures that the target continues to be illuminated after the break-off if semi-active-homing missiles such as Matra Super 530s are being used.
The Cyrano IV-1 has airborne moving-target indication and the IV-2 is a multi-mode development capable of per-forming air-to-ground functions: ground mapping, low-altitude navigation and air-to-ground ranging (when coupled with an attack computer). Contour mapping accuracy is claimed to be + 200ft out to 10 n.m. and air-to-ground ranging accuracy is said to be typically + 150ft. The Cyrano

The accuracy of airborne-radar detection depends basically on antenna diameter. The Panavia MRCA has a Texas Instruments radar, the diameter of which has dictated a very wide fuselage. Prototype P.04 (heading) is the first MRCA with complete avionics; the laser is mounted under the fuselage, just aft of the Doppler radar aerial (the dark square behind the radar dome)

mod srn aircraft, listed by country of manufacture,
are detailed. In the succeeding article we examine the basic principles of the most advanced airborne radars.

IV-3 combines the functions of the basic -1 and -2 variants. The Cyrano IV series 100 multi-mode radar being developed for the Mirage F.1E is completely digital, which increases acquisition performance, reliability and maintain-ability. The F.1E, if it goes ahead, will use a Thomson-CSF VE 150 head-up display, which is larger than the Super Etendard's VE 120 from which it is developed. The French Air Force's Mirage F.lCs have a simple fixed reticle for air-to-ground gunnery, but specialised attack versions are being offered with an inertial navattack system and laser range-finding. The former comprises a Litton LW-33 inertial system coupled with a Marconi-Elliott Hudwac. Trials with the Milan test-bed have demonstrated the ability of this combination to achieve circular error probabilities better than 5mil in bombing runs, including attacks at grazing angles of less than 10°.

The laser range-finder is a CGE Marcoussis Laboratories/ Compagnie Industrielle des Lasers (Cilas) TAV 34 with a claimed accuracy of ± 5m between 320m and 10km. A laser designation system comprising the RPL 44 airborne receiver and IPY 43 portable ground-based illuminator is also on offer.

Dassault Super Etendard A Thomson-CSF/Electronique Marcel Dassault Agave solid-state X-band monopulse radar with a claimed air-to-air detection range of 22 n.m. is the primary sensor. Other roles are air-to-sea search and target designation, either to a gunsight or to the active homing head of an anti-ship missile; ground mapping; automatic air-to-air and air-to-sea tracking; and air-to-air, air-to-ground and air-to-sea ranging. The inverted Cassegrain antenna— a choice of dimensions is available—scans through ±70°, and the radar is provided with two pulse durations, three pulse-repetition frequencies and beam sharpening.
The Thomson-CSF VE 120 head-up display has a 5in lens and a 20° field of view. It is used in association with a Singer-Kearfott UNI-40/UAT-40 (SK-2602) inertial-naviga-tion and weapon-aiming system built under licence by Sagem. The SK-2602 will operate with a new Thomson-CSF/ EMD digital microprocessor which is claimed to perform four times as many operations in the same volume as the present unit.