

MISSILES 1969 . . .

Swiss air defences, having proved its capability to intercept fast jet targets at heights well below 1,000ft.

Blowpipe During the past year Government support has been given to this man-portable supersonic weapon system which promises to meet a British Army and RN requirement. The complete Blowpipe weapon system, including one missile, weighs less than 40lb. It consists of the missile in its transport canister/launch tube, and an aiming unit attached to the canister and housing all the ground equipment.

Blowpipe can be converted from transport configuration to operational readiness in 20 seconds. The operator then supports the launch tube on his shoulder, sights the target through an integral monocular sight and controls the missile in flight by thumbstick. Guidance is by Short's well-proven command link technique and the missile is fitted with an infra-red actuated proximity fuse. It is about 4ft 6in long and has a unique sliding-ring tail-fin assembly which is positioned in the large-diameter forward section of the launch tube and locks in place at the rear of the missile only when Blowpipe leaves its launcher.

Rapier This highly mobile weapon system probably offers the best available defence against aircraft and helicopters flying at heights from ground level to 10,000/11,000ft, yet can be operated by one man. A second man normally stands by to act as relief operator and to help reload the launcher. The whole system is highly mobile, needing only a vehicle of the size of a Land-Rover to carry spare missiles, the optical sighting unit and petrol generator and to tow the trailer on which the four-round launcher and automatic target detection and acquisition radar are mounted. By inference, Rapier can be airlifted by small transport aircraft and helicopters.

Immediately a target is detected (at about three miles range) it is interrogated automatically and the operator is alerted if no "friendly" signal is returned by an IFF transponder on the aircraft. The missile launcher and tracker align themselves automatically on the general bearing and elevation of the target. By this time, the operator will be able to pick up the target in his optical sight and will switch to manual tracking. A red light, flashed by the system computer, tells him when to launch a missile, at a range of about 1.8 miles. He then guides the Rapier by keeping the target centred in his sight, with the aid of tracking flares carried by the missile. The computer steers the missile along the line of sight by command link to ensure a direct hit on the target. The 3lb warhead has no proximity fuse.

Firing trials against live targets began on April 27, 1967 and have proved highly successful. Rapier is in large-scale production for the British Army, RAF and Kingdom of Libya, with further orders likely soon. An all-weather version, with target-tracking radar replacing the visual system, is under development.

Seacat Twelve navies have now chosen this very effective close-range weapon as standard anti-aircraft armament for their ships. Seacat's success stems from its proven accuracy, simplicity, low cost and ability to operate in conjunction with gunnery fire-control systems, making it equally suitable for new ships and those being modernised. It is com-

patible with a variety of fire-control systems, for both visual and "dark" firing. The standard launcher carries four missiles. Under joint development by Shorts and Marconi is an automatic TV monitoring system that will allow RN Seacats to be fired and guided from below decks.

Sea Dart Although it can be carried by ships smaller than those equipped with Seaslug, this ramjet-powered missile offers considerably improved all-round performance. It is described as an area-defence weapon, capable of intercepting aircraft at both very high and extremely low altitudes, as well as many kinds of air- and surface-launched missiles. The overall weapon system can deal simultaneously with multiple targets, has faster reaction time than Seaslug and has a surface-to-surface capability. It will be carried on a twin launcher by the Type 82 destroyer, HMS *Bristol*, laid down on November 15 1967, and is specified for the Type 42 ships now in the design stage. Test firings began in 1965. The first production order was announced on November 3, 1967.

Seaslug The last four of the Royal Navy's eight "County" class destroyers are each fitted with a twin launcher for the Mk 2 version of this beam-riding weapon. The others will have their Mk 1 Seaslugs replaced retrospectively by the end of the 1960s.

Sea Wolf Very little may be said yet about this next-generation Seacat-type missile. It was first mentioned, under the designation PX 430, in the government's 1967 Defence Estimates. A design contract was awarded to BAC's Guided Weapons Division in June 1967 and Marconi are responsible for the associated radars and control system. Experience with the smaller Rapier should speed the development on Sea Wolf, which is intended for use against aircraft, air-to-surface missiles like Kennel and Martel and surface-to-surface missiles such as Styx. It will be a fast-reaction all-weather weapon, suitable also for use in a surface-to-surface role.

Thunderbird The Mk 2 version of this solid-propellant semi-active homing weapon continues in production following receipt of a large order from the Kingdom of Libya last April. Dual-purpose radar, together with a comprehensive telecommunications system, will provide early warning and tactical control for Libyan Air Force fighter aircraft and the mix of Thunderbird and Rapier missiles. Thunderbird Mk 2, which uses CW guidance, equips both missile-armed anti-aircraft regiments of the British Army; surplus Mk 1 missiles were sold to Saudi Arabia in 1966.

Tigercat As ordered for the RAF Regiment and Imperial Iranian Air Force, this weapon system is mounted on two trailers towed by Land-Rovers. One trailer carries the three-round launcher; the other carries the aimer with his optical sight and control gear. The Tigercat missile is identical with Seacat. Highly successful firing trials by the RAF Regiment began on November 16, 1967.

SWITZERLAND

Micon Latest in the series of SAMs developed by Contraves-Oerlikon, Micon is a mobile all-weather medium-range weapon designed to

TABLE 4: SURFACE-TO-AIR MISSILES

Designation (see notes)	User	Prime Contractor	Dimensions				Launch wt (lb)
			Length	Length boosted	Span	Max diam	
Masurca Mk 2	French Navy	Ruelle Naval Arsenal	17ft 4.5in	28ft 2.5in	4ft 11in	16in	4,080
Roland	France, Germany	Nord-Aviation/Bölkow GmbH	7ft 10.5in	n.a.	1ft 8in	6.3in	139
Indigo	—	Contraves Italiana	10ft 6in	n.a.	2ft 7in	7.5in	214
Micon	—	Contraves/Oerlikon	17ft 8.5in	n.a.	6ft 6.75in	16.5in	1,764
Bloodhound Mk 2	RAF, Sweden, Switzerland	British Aircraft Corp Ltd	25ft 2in	27ft 9in	9ft 3.5in	21.3in	n.r.
Rapier	British Army, Libya	British Aircraft Corp Ltd	8ft 6in	n.a.	1ft 0.5in	4.8in	150
Blowpipe	—	Short Brothers & Holland Ltd	4ft 6in	n.a.	10.5in	3in	n.r.
Seacat	RN, RAN, RNZN, Sweden, Neth, Brazil, Chile, Germany, Malaysia, India, Iran, Argentina	Short Brothers & Harland Ltd	4ft 10.3in	n.a.	2ft 1.6in	7.52in	n.r.
Sea Dart	RN	Hawker Siddeley Dynamics Ltd	n.r.	14ft 3.5in	3ft	16.5in	n.r.
Seaslug Mk 1	RN	Hawker Siddeley Dynamics Ltd	19ft 8.1in	19ft 8.1in	4ft 8.6in	16.1in	n.r.
Thunderbird Mk 2	British Army, Libya	British Aircraft Corp Ltd	20ft 10.6in	20ft 10.6in	5ft 4in	21in	n.r.
CIM-10B Super Bomarc	USAF, RCAF	The Boeing Co, Aerospace Group	45ft 1in	n.a.	18ft 2in	34.6in	16,030
MIM-23A Hawk	USA, USMC, NATO, Israel, Sweden, Saudi Arabia	Raytheon Co (NATO, SETEL)	16ft 6in	n.a.	4ft	14in	1,295
MIM-3A Nike Ajax	NATO, SEATO, Japan	Western Electric Co (Douglas Airframe)	21ft	34ft 10in	4ft 5in	12in	2,300
MIM-14A Nike Hercules	USA, ANG, NATO, SEATO, Japan	Western Electric Co (Douglas Airframe)	26ft 10in	41ft	7ft 6in	31.5in	10,000
FIM-43A Redeye	USA, USMC, Sweden, Australia	General Dynamics/Pomona	4ft	n.a.	n.a.	2.75in	29
Spartan	US Army	McDonnell Douglas Corp	—	55ft	n.r.	n.r.	n.r.
Sprint	US Army	Martin Orlando	n.r.	27ft	n.a.	54in	n.r.
RIM-66A Standard Missile	USN	General Dynamics/Pomona	14ft+	n.a.	n.r.	n.r.	1,300
RIM-67A Standard Missile	USN	General Dynamics/Pomona	n.r.	26ft+	n.r.	n.r.	3,000
RIM-8 Talos	USN	Bendix Corp, Mishawaka	21ft	31ft 3in	9ft 6in	30in	7,000
RIM-24A Tartar	USN, RAN, France, Italy, Japan	General Dynamics/Pomona	15ft	n.a.	1ft 8in	13.4in	1,200+
RIM-2D Terrier	USN, RNethN, Italy	General Dynamics/Pomona	14ft 10in	27ft	1ft 8in	16in	3,000
Guideline ("Mk 2")	USSR, Warsaw Pact countries, Cuba, Egypt, Indonesia, Iraq, N. Vietnam	—	27ft	35ft	5ft 7in	26in	5,000

Notes ANG, Air National Guard; CIM, interceptor missile launched from shelter; MIM, mobile interceptor missile; n.a., not applicable; n.r., not releasable; RIM, land or sea launched; USA, US Army; USMC, US Marine Corps. Data given in italics are estimates.