

control surfaces, comprising upper and lower nose rudders, a fixed foreplane with elevators, a rear-mounted wing fitted with ailerons, and upper and lower rear fins which fold sideways to facilitate ground handling and stowage on the carrier aircraft. Propulsion is provided by a Bell rocket motor with three superimposed aluminium-alloy chambers operating on fuming nitric acid and JP-4 fuel. A variety of warheads, some with a very high yield, can be accommodated within the fuselage. Varying types of guidance have been employed during the launching, cruise and terminal portions of the flight. The production GAM-63A has inertial guidance by Bell Aircraft Avionics Division; previously radio-command had been dominant, system-contractors including Federal Telecommunications Laboratory and R.C.A.

About 40 GAM-63s were launched from B-36s and B-47s during the research and development flight-test programme from Holloman A.F.B. in Mexico, which was completed in 1957. By this time Rascal was in production, and the first inventory missile was accepted at Eglin A.F.B. on October 30, 1957. The complete weapon system was assigned to operational status the following month. Production at Bell's Niagara Frontier Division is now almost complete. Several Rascals launched from DB-47s have achieved hits within a circle of 1,500ft radius. Chief item of ground equipment is the combined transporter/lifter vehicle, which is produced by the Lull Manufacturing Co.; other support items are manufactured by Bell and American Machine and Foundry Co.

**GAM-63A Rascal:** overall length, 31ft 11.5in; span of wings, 16ft 8.5in; span of foreplanes, 11ft 5.4in; body diameter, 48in; launching weight, about 13,500 lb; full-load ceiling, 85,000ft; maximum speed (possibly also the cruising speed), about Mach 1.5 or 1,000 m.p.h.; range, about 75 miles.

## RAVEN

*United States Navy (and, presumably, Marine Corps).*

*Type: Relatively simple missile for use by carrier-based aircraft.*

FROM its name it would be logical to place this missile in the Corvus family (*q.v.*), although it is also described as being a more sophisticated successor to Bullpup (*q.v.*). A new aircraft is stated to be designed around this weapon, although this seems to be a *volte face* state of affairs.

## ROBOT 304

*Royal Swedish Air Force (Attack Wings F-6, 7, 14 and 17).*

*Type: Subsonic vehicle for launching from high-speed strike aircraft. Drawing: p. 887.*

LITTLE additional information has become available on Robot 304 since its existence was disclosed one year ago. The requirement was established in the autumn of 1949; project work began in March 1950 and the first test round was launched on February 11, 1955. The Robotbyran state that "a considerable number" of test firings have taken place since.

All-weather guidance is fitted (implying a system more sophisticated than simple radio-command according to visual tracking), and the flight of the weapon is controlled through the cruciform of fins mounted on the fore-body. Lift is provided by a delta wing, which has large fixed fins at its tips. The 304 is clearly large enough to carry a nuclear warhead and the weapon has been officially described as the best available to the R.S.A.F. In service its principal carrier will be the Saab A-32A Lansan, which can carry one of these missiles beneath each wing.

**Robot 304:** overall length (including projecting sustainer nozzle), 14ft 9in; wing span (including tracking-flare nacelles), 6ft 8in; span of control cruciform, 37in; body diameter, 19.4in; launching weight, probably about 1,200 lb; flight speed, high-subsonic; effective range, several miles.

## WAGTAIL

*United States Air Force.*

*Type: Air-to-surface missile for supersonic launching.*

SECURITY withholds publication of any official details of this remarkable weapon system, which is being developed under the management of the Minneapolis-Honeywell Aeronautical Division. Early last year this company received a contract for \$500,000 from the Air Force Armament Center covering design, mock-ups, tunnel tests and evaluation at Eglin A.F.B. This study contract is in hand at the Minneapolis-Honeywell missile control centre in Los Angeles. The basic vehicle will have a simple gyro-reference guidance system and a warhead developed by the Honeywell Ordnance Division. The Wagtail has been successfully sled-tested.

An unofficial report has stated that Wagtail will have forward-firing rockets to reduce its speed to a very low value before the ignition of the solid sustainer. By this means the weapon would be capable of being released at ground level at Mach 2, and would thereafter slow up and follow the contours of the terrain while the carrier aircraft made its escape at undiminished speed.

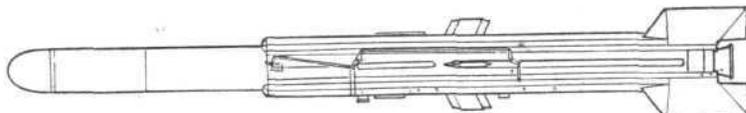
## WHITE LANCE

*United States Air Force (Tactical Air Command).*

*Type: Relatively simple guided missile for tactical use.*

LIKEWISE a product of Martin's Orlando plant, White Lance is said to be a rather more advanced version of Bullpup, tailored to meet the needs of the Air Force. It is probably somewhat larger than the Navy's weapon, since a choice of high-explosive or nuclear warheads is mentioned.

## ANTI-SUBMARINE



*Rat (A.S.W. weapon)*

## ASROC

*United States Navy.*

*Type: A.S.W. missile for launching from surface craft.*

PRIME contractor for this weapon system is the Minneapolis-Honeywell Regulator Co., Ordnance Division. Asroc is reported to signify Anti-Submarine ROCKET, and the vehicle part of the system is certainly rocket-propelled. According to *Missiles and Rockets*, it is designed for launching from underwater, but this has not yet been confirmed. Most of Asroc's flight takes place in the atmosphere.

## RAT

*United States Navy.*

*Type: Rocket-propelled torpedo system.*

LOOKED at in retrospect, it appears that Rat will prove to have ushered in a completely new family of weapon systems combining the techniques of the classic torpedo with those of airborne vehicles. Conceived at the Naval Ordnance Test Station at China Lake, Cal., Rat is in production at the Allegany Ballistics Laboratory, Cumberland, Md. It consists of a standard homing torpedo attached to a jettisonable airframe incorporating stabilizing surfaces and a solid-propellant rocket motor.

Altogether, the Rat system consists of search and detection equipment, a fire-control system, a launcher and a missile. In the majority of U.S. Navy destroyers, Rat can be launched by modifying the existing 5in gun mounts, and the search and fire-control systems already installed require only minor modification. In current installations Rat is normally launched at between 30 and 40 deg elevation. After burn-out, the rocket drops away and the missile continues on the programmed trajectory. It then deploys a parachute which stabilizes its flight and restricts the speed of entry to the water so that the nose-cap and guidance system are undamaged. On entry to the water the torpedo releases its parachute and nose-cap, and thereafter behaves as a standard homing torpedo.

**Rat:** overall length, 13ft 6in; body diameter, approximately 15in; firing weight, 480 lb; effective range, 5 miles.

## SUBROC

*United States Navy.*

*Type: Underwater/air/underwater or air/underwater missile.*

SINCE early this year the U.S. Navy has been intensively examining the possibilities of this difficult weapon system, which is intended for

the destruction of submarines. Carrying a nuclear warhead, it can be launched through a torpedo tube of a submarine or surface vessel; it flies between 25 and 50 miles through the air and then re-enters the water and homes on to its target.

In April the director of the long-range objectives group of the Office of the Chief of Naval Operations stated that the key to the Subroc system was to increase the range of sonar equipment. It is known that such a system can, in fact, be programmed with some assurance of success. Following an intense competition involving fourteen major companies, the Bureau of Ordnance awarded a \$65m development contract to Goodyear Aircraft Corporation, Akron, Ohio, late in June. Goodyear are prime contractors for the weapon system, including production and tooling methods, and they are working in close collaboration with the Naval Ordnance Laboratory at Silver Spring, Md. Chief sub-contractors are Librascope: division of G.P.L. and Kearfoot.

It is hoped to perfect a sonar system, carried by the Subroc-armed submarine, capable of detecting enemy submarines at the maximum range of the missile. The Subroc weapon system would include the detection equipment and a target-course computer. The vehicular part will almost certainly be rocket-propelled, both underwater and in the air, and the final dive will be a ballistic trajectory.