

Equipment



Spadeadam's Equipment



On the ground, an order of battle (or ORBAT) of real, simulated and emulated threat radars are arrayed across RAF Spadeadam's 9600 acres in order to provide a hostile air environment in which aircrews can hone their tactics, manoeuvres and electronic-countermeasures in preparation for combat operations. However, there are some restrictions as the Station encompasses a number of Special Sites of Scientific Interest and is also surrounded by farmland. For example, the use of chaff (formerly called Window) is limited but aircrews can practise their full chaff tactics over the North Sea against threat radars that RAF Spadeadam deploys to the north east coast of England. The current radar threats at Spadeadam comprise the surface-to-air missile systems SA-2, 3, 6, 8, 10 and 11, as well as the gun-related radars GUNDISH and SKYGUARD.

Emerging from lessons identified on operations in Afghanistan and Iraq, there has been an increased front line demand for training in 'time sensitive targeting', or TST, which involves the identification, acquisition and attack of mobile targets. RAF Spadeadam can offer just such training as the threat systems described above are complemented by a host of real, model, and inflatable visual targets, including real SCUD and STYX transport-erector-launch vehicles and missiles. These targets are developed, refurbished and deployed by Serco, RAF Spadeadam's contract element. In addition to this invaluable TST training RAF Spadeadam will, in the near term, offer the only overland, urban Close Air Support training facility in the UK. This is a local initiative based upon the requirements of front line squadrons.

At this juncture there has been no mention of the infra-red threat to UK and allied aircrews, which are prevalent in Afghanistan and Iraq. Surface-to-air guided missiles SA-7, SA-14 and SA-16 are simulated at RAF Spadeadam by 'Smoky SAMs' which fly with the distinctive corkscrew flightpath.

A variety of actual **actual** and **emulated** threat systems and targets are available for the training of aircrews.

SA6



SA6

The SA6 "Gainful" low altitude surface to air missile (SAM), was first designed at Tushino in 1956 but was not seen in public until 1967 and entered full service in 1970.

Straight Flush is the NATO designation given to the radar and command guidance system used with the Gainful missile system. The system performs the following functions:

Limited search capabilities.

Low altitude detection and acquisition.

Target tracking and illumination.

Missile radar command guidance.

Secondary radar missile tracking.

The arrangement of the system can be seen in the pictures included on this page. The upper tracking radar antenna assembly is able to rotate independently of the lower assembly. The two antennas and associated apparatus can be rotated relative to the carrying vehicle on a turntable, on which the whole assembly is mounted.



Straight Flush has a similar chassis to that of the Gainful but with radar equipment mounted on top. The radar has an estimated range of 55 to 75 Km depending on target size. Some modified vehicles have TV cameras fitted to enable the system to remain in action even if the radar is being jammed or forced to shut down because of the threat of anti-radiation missiles.

Further information on the equipment maintained at RAF Spadeadam can be found in the links below.

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ZSU



ZSU

The ZSU-23-4 began development in the 1950's. The design was to include an amphibious tank with a new turret with four 23mm water cooled cannons. The 23-4 was accepted for service in 1962 and was regularly seen in Moscow parades from 1965 onwards. It had a relatively long life as production ceased in 1983.



ZSU is the Soviet designation for the system, (Zenitnaia Samokhodnaia Ustinovka), however it is more commonly known in NATO as the Shilka. The "23" refers to the calibre of the weapon, and the "4" refers to the number of cannons on the system.

The range of the Gun Dish radar system can be between 18-20 km depending on type of target and atmospheric conditions. There are optical sights fitted to the ZSU to help the operators remain in action even in event of the radar being jammed, or if the radar system is forced to be shut down due to the threat of anti-radiation missiles.

The four 23mm cannons are gas operated and fire approximately 1000 rounds per barrel per minute. Each ZSU carries around 2000 rounds, however, supply trucks can carry around 3000 rounds. The Shilkas cannon can engage using only one of the four cannons if required and will normally fire in bursts of 5, 10 or 50 rounds per barrel. The barrels are water-cooled and have flash hiders to eliminate detection at night.

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SA8



SA8

The SA8 "Gecko" low to medium level Surface to Air Missile, (SAM), system was designed around 1959. The concept of the design was to produce a missile system that encompassed all of the acquire, tracking, engaging and guidance of the weapon to the target. The SA8 entered service in 1974 and was first seen in public in 1975.

SA8 is a six-wheeled design, based on a number of earlier all terrain vehicles. The missile system is centred on the vehicle for stability during amphibious operations. The surveillance aerial is hinged and is capable of collapsing 90 degrees for transportation.



Landroll consists of a surveillance radar and a target tracking radar. The target acquisition radar at the rear of the radar has a range of 45 km with a 360 degree coverage. Once a target is within 28 km the target tracking radar comes into effect. The target tracking radar operator tracks the target then will activate the auto track system.

A TV camera is fitted to enable the system to remain in action even if the vehicles radars are being jammed or forced to shut down due to the threat of anti-radiation missiles. Once a target is engaged the missile tracking radar is activated and the missile is launched.

Further information on the equipment maintained at RAF Spadeadam can be found in the links below.

[SA6](#)

T43



T43

The American built T43 Emitter is an emulator of which there are two variants. These reliable, highly mobile equipments provide the aircrew with the best possible training outside of using the real thing. RAF Spadeadam currently has two AN/MPS T43 emulators, one Version 1 emulator and one Version 4 emulator.

The T43 version 1 provides signals that emulate the SA-6,(Straight Flush and Gainful), but doesn't have the acquisition radar capability that the real radar has. The system is very reliable and is very quick and easy to deploy.

The T43 version 4 provides signals that emulate the SA-8,(Landroll and Gecko), but again doesn't have the search capability that the real threat system has. Again this system is easy to deploy and has a very good reliability record.



The Station has previously been awarded the Smallwood Electronic Warfare Trophy for innovations to enhance the RAF's electronic warfare effectiveness. The award came after several successful deployments of the T43 and its crew to an east coast emitter site.

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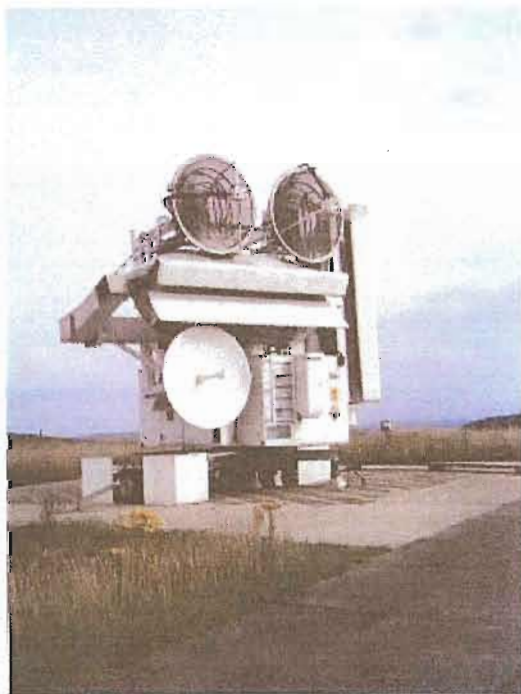
T1



T1

The T1 is an EMULATOR consisting of two threat radars producing SA-2 "FAN SONG" and SA-3 "LOW BLOW" signals. This system is virtually identical to the real systems, both physically and electronically. As an emulator this system tracks primarily via radar with optics as a back-up, identical to the real systems. This system is therefore susceptible to electronic jamming, chaff and manoeuvre jamming.

The Soviet SA-2 "GUIDELINE", (NATO name "FAN SONG"), is a medium to high level SAM system. It gained notoriety in 1960 when it shot down American pilot Gary Powers over the Soviet Union. Nowadays countries such as Iraq use variations of the system and it was used by Iraq during the Gulf War. Different variations of the missile have varying speeds and ranges; the maximum range of the SA-2d/e versions is nearly 50 km with a maximum speed of Mach 3.5.



The smaller SA-3 "GOA", (NATO name Low Blow), is a low to medium SAM system and is more modern than the SA-2. Like the SA-2 many different countries use variations of the SA-3, it was used by Iraq in the 1991 Gulf War. The maximum effective range of the missile is nearly 22 km with a maximum speed of Mach 3.5.



Both kits are controlled by a single cabin and only one threat can be used at a time; however, the second radar can be slaved to the one being operated to give the full range of threat signals. The T1 is a fixed system and is currently located at the ops site, Berry Hill.

Further information on the equipment maintained at RAF Spadeadam can be found in the links below.

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Skyguard



Skyguard

The Skyguard radar was used by the Argentine military during the 1982 Falklands War for laying Anti Aircraft Artillery on to incoming British aircraft. The Skyguard system comprises a towed trailer with the pulse-doppler radar mounted on top. The trailer houses a crew of two operators and a small generator. An optical TV tracking device is also used for aiming the guns.

At RAF Spadeadam the Skyguard radars are not just used for complementing the hostile environment; they are often deployed around the UK for low flying monitoring purposes.

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