



### ANCESTORS OF THE UAV

In Issues 8 and 36 of *Pathfinder*, we looked at current developments in Uninhabited Air Vehicles (UAVs) and their combat equivalents, UCAVs. It is interesting to note that when UCAV development began in America during the 1970s, the concept of using unpowered aircraft for military applications had already been around for some 30 years. These earlier examples served not as surveillance or attack aircraft but in the simpler role of target drone, requiring less sophisticated technology.

The first attempts at using robot warfare in the air occurred during World War II. The Germans Luftwaffe conceived the *Mistel* program, which involved mating a fighter with an explosive-filled Ju.88 bomber. The two aircraft took off together with the manned fighter mounted above the unmanned bomber, and flew until the pilot released the bomber after aiming it in the general direction of the target. *Mistel* saw limited use from mid-1944, mainly against Russia, although a few examples are believed to have detonated in rural England. It does not appear that the pilot had any control over the bomber during its descent, so the concept of having a remotely controlled, manoeuvrable as well as unmanned vehicle in the sky did not apply.

More relevant to the UAV story are two similar World War II American programs. Under the first of these, known as *Project Aphrodite*, the US Eighth Air Force in England filled several Flying Fortress bombers with ten tonnes of the powerful explosive Torpex and targeted German V-weapon launch sites on the French coast. Instead of mating an aircraft onto the bomber, the 'mother' ship (a Liberator bomber or another Fortress) was flown separately at a safe distance, and controlled the 'baby' using a radio link-up to its autopilot. The two crewmen of the 'baby' parachuted out once radio control had been established shortly after take-off. Nineteen Aphrodite missions were flown during the second half of 1944, with little success due to control problems and cloud.

The US Navy had an identical program (*Project Anvil*) involving Liberator drones, only these were fitted with TV cameras to facilitate control by the 'mother' ship in acquiring the target once the 'baby' was free of cloud. On 12 August 1944 Lt Joe Kennedy Jr (older brother of the future US president) was killed while piloting a baby ship that accidentally blew up shortly after take-off, before the crew had bailed out; the explosion was surely one of the largest ever witnessed in the skies over England.



*Mistel*

1952 saw the maiden flight of an Australian UAV: the Government Aircraft Factory's radio-controlled Jindivik, a jet-powered target drone designed for use in guided missile programs. It followed trials of a piloted version, the Pika, two years earlier. Unlike earlier US cases where existing conventional aircraft were converted as target drones, the Jindivik was purpose-designed. It has been hailed as Australian aviation's greatest success story and was in service in Australia (with the RAAF and Weapons Research Establishment at Woomera, SA, and with the RAN at Jervis Bay), Britain, Sweden and also with the US Navy.

Jindivik is an Aboriginal word meaning, appropriately, 'hunted one'. The drone was designed to a 1948 British specification for a high-speed pilotless target aircraft, Britain being the primary overseas

customer. One hundred Mk I and Mk II Jindiviks were delivered, followed by more than four hundred of the Mk III and Mk IV and other variants before production ceased in 1986. Like most aircraft, the Jindivik was improved over the years with more powerful engines, and updated electronics and control systems, which enabled it to simulate aircraft and cruise missiles. Because it was an expensive asset, in its later years the Jindivik itself was not the actual target, but either launched or towed behind it an auxiliary target or flare. Camera pods could be carried for post-mission evaluation of missile intercepts.



### *Jindivik*

The aircraft was controlled by a crew on the ground, which over the years evolved into a five-member team including azimuth, pitch and master controllers, together with a navigator. Its Armstrong-Siddeley turbojet engine propelled it at around 540 knots at heights of up to 54,000 feet. Flight duration was about 100 minutes. The take-off run was on a tricycle trolley that was left behind, and landings were made on a retractable skid. Some Jindiviks reportedly made over 300 landings. Although originally conceived for high altitude flight, with a radio altimeter fitted the Jindivik could also be flown at very low altitudes.

Over the decades, many missile systems were developed with the aid of the Jindivik. It has also seen other roles, notably surveillance. Jindivik was phased out of Australian use in 1998, to be replaced by the

Kalkara, but production was temporarily reinstated in 1994 and again in 1997 to meet British orders for more examples. The type was last known to have flown in RAF service in north Wales on 26 October 2004, giving it a 50-year longevity.

Apart from the Jindivik, some unusual pilotless drones appeared at Woomera. The U.10 was a radio-controlled version of the Canberra bomber, of which 17 RAF examples were sent to the Weapons Research Establishment in the late 1950s. These served as targets for Bloodhound and Thunderbird surface-to-air missiles. In addition, more than a dozen RAAF Meteor jet fighters were converted to U.21A drones, and used as target drones during the 1960s.

There are other, lesser-known Australian UAV connections. For example, the former RAAF Phantom jet fighters (see *Pathfinder* Issue 23) were converted to QF-4G radio-controlled target drones by the USAF. These aircraft were not only radio controlled but, to an extent, self-controlled using GPS navigation. Most have ended their days over the deserts of the USA during the last decade.

- *Idea of unpiloted combat aircraft not new and was conceived during World War II*
- *Origins of UAV as a controllable robot aircraft first trialed in US Projects Aphrodite and Anvil*
- *Target-drone Jindivik is the Australian ancestor of the UAV*

*The lesson from the last war that stands out clearly above all the others is that if you want to go anywhere in modern war, in the air, on the sea, on the land, you must have command of the air.*

- Fleet Admiral William F. Halsey to Congress after World War II



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