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Can a pile of scrap unmask a new high technology? The A4/V-2 No V89 *Bäckebo-torpeden*

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ABSTRACT

Three months before the first V-2 rocket attack on London a test vehicle crashed in southern Sweden on June 13, 1944. At this time the Allied only had limited knowledge about the rocket (A4/V-2) from agent reports and information from the Polish resistance investigating some remains from a crashed test vehicle in Poland. London was confronted with a new weapon supposedly able to carry an explosive warhead of several tons some 250 km.

The A4/V-2 rocket test vehicle number V89 broke apart shortly before impacting ground. In a short time 2 t of metal parts and electrical equipment was collected and transported to Stockholm for investigations. A first Swedish report was ready by July 21, 1944 and the rocket parts were then transported to England for further investigations. By August 18, 1944 the Royal Aircraft Establishment (RAE) had its preliminary report ready. But how close to reality can a complex vehicle be reconstructed and the performance calculated from a pile of scrap by investigators dealing with a technology not seen before?

In the early 1940s the state of art of liquid propellant rocket technology outside Germany was limited and the size of a liquid rocket engine for the likely performance hardly imaginable. The Swedish and British reports, at that time classified as top secret, have since been released and permit a very detailed analysis of the task to reconstruct the rocket vehicle, the engine itself and its performance. An assessment of the occurrence at Peenemünde and how the rocket became astray and fell in southern Sweden, together with the analyses by Swedish and British military investigators give a unique insight into the true nature of the V89. It shows the real capabilities of early aeronautical accident investigation methods in combination with solid engineering knowledge to unmask a new high technology.

1. Introduction

Information on an emerging German development of a flying bomb and/or a rocket system, including the construction of a new test site at Peenemünde, came to the attention of the British authorities in late 1939 through *The Oslo Report*. Other elements in the report dealt with e.g. German radar and radio navigation developments. The beginning of the Second World War set priorities such that the checking on background and confidence of such information were to be concentrated on the electronic systems development in Germany, and to find countermeasures for the Battle of Britain air war to start in 1940. The information on rocket systems was merely put aside [1,2].

The first air reconnaissance photos of Peenemünde were taken in May 1942, but at this time no flying bombs or rockets were found on the photos. In December 1942 and February 1943 the first agent reports on the

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development of a large rocket with a warhead of some 5–10 t for a range from 110 up to 210 km were received by the British military intelligence. Early June 1943 a detailed report on activities at Peenemünde and a layout of the test site came in from an agent, and the report also describes a rocket vehicle. Photos of Peenemünde from June 12 and 23, 1943 then finally permitted the identification of a rocket (A4/V-2) and allowed the first very crude size estimates. On August 17 and 18, 1943 Peenemünde was bombed by the allied forces [1–3].

On August 22, 1943 a flying bomb test vehicle (a V-1 marked V83) crashed on Bornholm in German occupied Denmark. Photos taken and a sketch of the crashed V-1 done by a Danish naval officer were brought to England for further analyses. Soon after was also the flying bomb (FZG76/V-1) discovered on launch rails at Peenemünde and Zempin on Usedom. In November 1943 two further V-1's (test vehicles, no warhead) crashed in neutral Sweden and could be analysed in detail and all technical details and performance data were revealed and also forwarded to England. A first British report was put together by Reginald Victor Jones at M.I.6, the Secret Intelligence Service, on December 12, 1943 six months before the first operational V-1's were deployed towards London in June 12, 1944. And by then one more V-1's had crashed in Sweden. The Jones-report of December 1943 was fairly exact except for the propulsion system, which was thought to be a rocket propulsion one using decomposed hydrogen peroxide similar to the known Hs 293 missile and not the actual pulse jet engine [1].

The details on the A4/V-2 should however remain unknown for another half a year until May–June 1944 and caused considerable discussions and speculations within the British government and military intelligence. Only when access to real hardware occurred could the true nature of the A4/V-2 rocket be revealed.

2. British investigations of a German rocket until spring 1944

After the British had managed to counteract the German radar and air radio navigation systems and finding an increasing construction activity of supposed launch sites for a rocket or flying bomb in France and Belgium did the counterintelligence concentrate on exposing the true nature of the A4/V-2 system. From late 1942 on reports on a rocket kept coming into the Scientific Section of M.I.6 from agents, interrogation of prisoners-of-war (POW), foreign labourers in Germany and British air recognisance missions. The work of the Scientific Section of M.I.6, headed by R.V. Jones, concentrated on collecting information and facts from aboard and to verify this information by further reports into an overall picture of a threat to Britain and the weapon presumably under development (Project Big Ben). Most reports were describing a rocket of some 10–20 m in length, 1–1.5 m in diameter and with a warhead from 1–5 t [1].

In April 1943 the Chiefs of Staff called for an independent expert to analyse the German development of long-range rockets and flying bombs and Duncan Sandys (later Sir Duncan Sandys) was appointed Scientific and Intelligence Adviser. He mainly relied on scientific and technical experts from outside the military establishment and the basic method used initially was to define a rocket system that could fulfil the performance of transporting a 1–5 t warhead some 250 km. The propulsion technology in Britain during the pre-war and early years of the war was concentrating on solid propellants (cordite) and very limited experiments were carried out on liquid propellant systems. Thus the experts attached to Sandys' group were mainly experts on solid propellant systems and provided the group the concerted opinion that the rocket must be a 2-stage rocket with a launch weight of some 30–40 t (some estimates were even as high as up to 100 t total weight). Such a rocket seemed somewhat unrealistic. The Sandys' group categorically refused the idea of a liquid rocket propulsion system as "not mature" for such a vehicle although experts pointed out that liquid propulsion was far more advanced in the US than in Britain. Some comments went as far as to claim that the observed "objects" on air recognisance photos were too small to be rockets. Due to the low speed at launch it was assumed that a rail or tower would be needed for initial guidance at lunch as other methods were regarded as unfeasible. Thus the evaluation of air recognisance photos was partly mislead and concentrated on finding launch rails or towers and rockets in a horizontal position. Based on the knowledge of the V-1 guidance system it was assumed that the A4/V-2 rocket also use a Siemens manufactured radio navigation system [2,3].

On May 20, 1944 at Sarnaki on the river Bug in east Poland the Polish Underground Army manage to capture and hide a crashed but not exploded A4/V-2 launched from Blizna (Heidelager) and thus for the first time the allied became indirect access to actual A4/V-2 hardware. Reports from Poland in June 1944 confirmed a length of about 12 m and a diameter of 1.8 m. A liquid recovered was identified as concentrated hydrogen peroxide, which would verify that the propulsion system used this as a liquid fuel. Radio equipment recovered pointed to a radio navigation guidance system [1].

3. June 13, 1944 in Sweden

On June 13, 1944 the intelligence work on revealing the details of the A4/V-2 rocket took an unexpected turn. At 15:15 (MET) on that day an explosion took place at some 1500–2000 m above ground in southern Sweden near Bäckebo (Gräsdals gård) and a rain of metal debris and major metal structures came down over an area of some 1 by 4 km (Figs. 1 and 2). Police and military personal called to the site of the impact could at once determine that it was not an airplane crash nor a V-1 flying bomb, but a rocket of unknown origin [1,14,17].

4. Peenemünde June 13, 1944

An A4 test vehicle was prepared for launch at Heersprüfanstalt Peenemünde (HAP) on June 13, 1944. This particular vehicle (V89) was taken out of the regular row of test vehicles for modification of the guidance system. In addition to the two gyros radio guidance equipment was also installed in the equipment bay