NUMBER

2

UNUSUAL

ROCKET

STORIES

Number Two 2024(1)

INTRODUCTION

Welcome to the second edition of "Unusual Rocket Stories". These are my versions of international events involving rockets which I think should be told and preserved. The more obscure and perverse, the better!

John Pitfield – Editor

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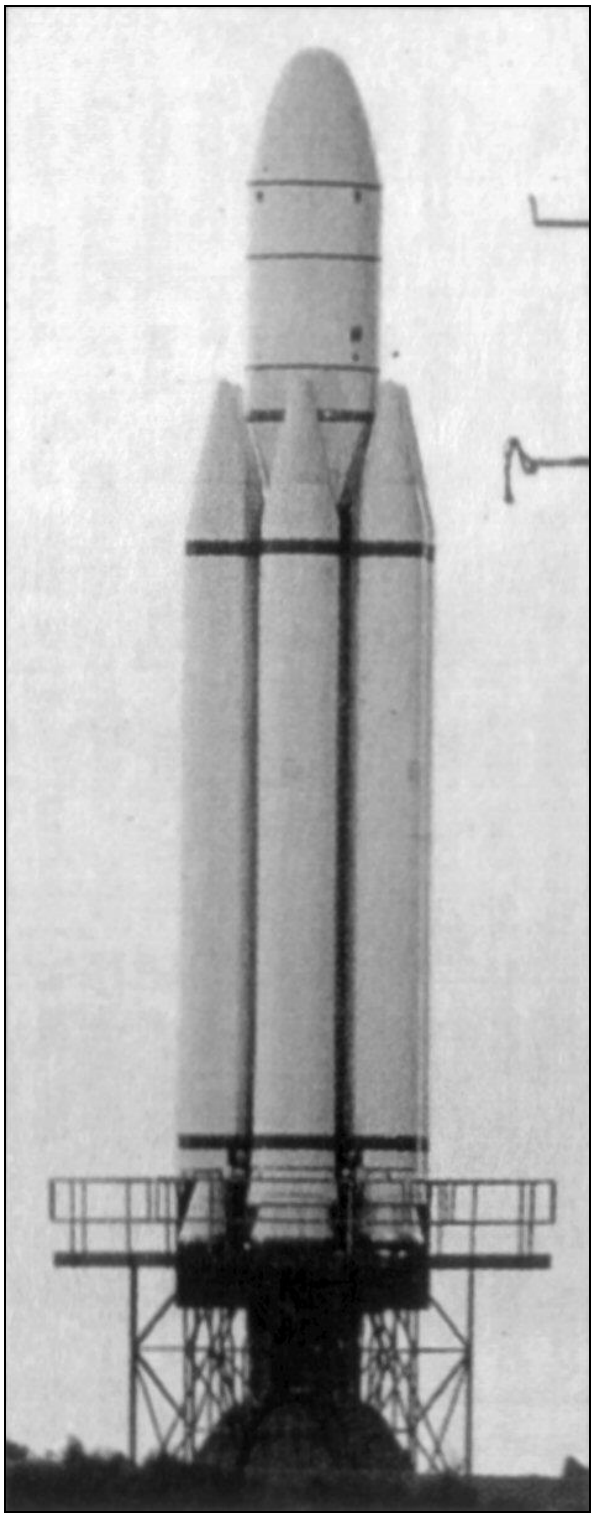
CONESTOGA-1620 (USA – 1985)

Led by ex-astronaut Donald "Deke" Slayton (1 March 1924-13 June 1993), Space Services Inc., planned a number of satellite launchers based on the clustering and staging of Thiokol solid motors; this being explained to the author in a telephone call, from Deke, on 26 Sept 1986. In September 1986 SSI gained permission by NASA to launch from Wallops Island, and at the same time gained a licence from the DoT to launch miniaturised cremated tombs into space for Celestis (who were to pay $14.5m per launch). In 1988 General Electric recoverable capsules were being proposed as payloads by UK-based NIS Space. The 1989-designed CONESTOGA-IA (CASTOR-4B/Half-CASTOR-4B/STAR-37FM) never flew, neither did CONESTOGA-II (2x STAR-42B/STAR-42B/STAR-48B), but the CONESTOGA-III eventually became the CONESTOGA-1620 when renamed in 1992. The GTO-capable CONESTOGA-IV-1 (5x CASTOR-4B/CASTOR-4B/CASTOR-4B/Half-CASTOR-4B/STAR-37FM/STAR-27) also never left the drawing board. These proposals were driven by the need to tempt NASA, DARPA and the SDIO to consider SSI as a launch provider. In January 1991 SSI was taken over by EER Systems then success followed. The next month they secured a NASA contract of $85m for three CONESTOGA-III rockets to orbit COMET microgravity spacecraft, the first due on 9 September 1992. In October 1992 the SDIO were seriously considering using this rocket to orbit their MSTI-5 satellite. In February 1993 a $0.5m contract was received to place advertising on the first rocket to publicise the movie *Last Action Hero*. The first launch was then planned for May 1993, but this was not met with a claim that an extra $14m was needed. In July 1994 this sum was released by NASA after Congressional intervention. The new planned launch was set for 29 March 1995, but this date was missed as well, but by this time the COMET payload had been changed to the METEOR craft with only some of the COMET equipment, and a new date of October 1995 was set. This was finally achieved and it was actually launched on 23 October 1995. Lift off was perfect, but about half a minute later the CONESTOGA-1620 veered off course, during which three of the strap-ons broke away. The RSO sent the destruct signal at 45 sec when altitude was 25,000 feet (7.6 km) and the remains fell at about 12 miles (19 km) off Wallops Island. CONESTOGA-1620 was 15.82m (52 ft) long and weighed about 90 tonnes. First stage was four of the six strap-ons (2x CASTOR-4A/100 t plus 2x CASTOR-4B/88 t), while second stage was the other two strap-ons (2x CASTOR-4A/100 t). Third stage was the core (CASTOR-4B/50 t), and the fourth stage was a Thiokol STAR-48V with 7.1 t thrust during 87 sec. It would have been capable of placing 816 kg into 480 km LEO.



CONESTOGA-1620

SMOKELESS ROCKETS (UK – 1989)

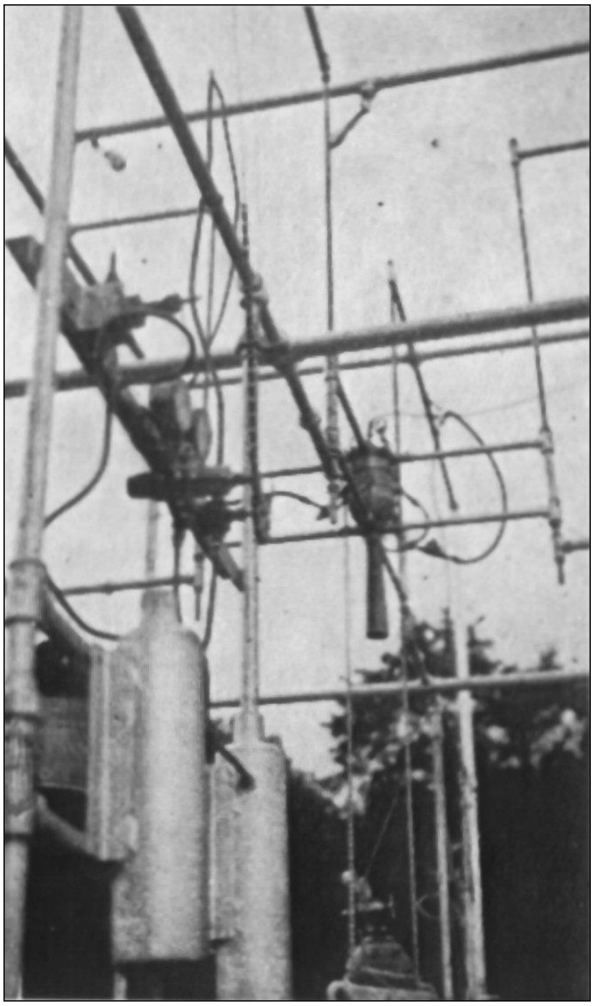
Way back in the 1980s the Holy-Grail of the rocket industry was a smokeless composite propellant. It had been thought that the only solution was a double-base mix with the attendant high pressures, heavy cases and appalling mass-ratios. So the race was on, and a rocket firm in the South of England accepted the

challenge. After a lot of preliminary studies a series of rockets began a launch series in 1989 and sure enough, there was no smoke from the motors in both static test and flight test up to 11,000 feet. Larger motors followed for extensive flight test up to 22,000 feet altitude and other more complex flight paths. By the mid-1990s large test rockets were being blasted off from their coastal range showing the successful conclusion of a development programme that had cost over £1m. Then suddenly nobody wanted to know. It had not been developed by a firm of the in-crowd so its existence was denied and the firm were told to go to hell. Those companies then went bust; but not the firm that had done all that work.

Smokeless rocket launch

CLEVELAND ROCKET SOCIETY (USA – 1933)

The Cleveland Rocket Society was the second such organisation to be formed after the American Rocket Society. German emigré Ernst Loebell had fled Germany in 1933 and settled in Cleveland Ohio. He had been one of the VfR's youngest engineers. Loebell found a patron in Edward L. Hanna, so that his rocket engineering could continue. They were based at 410 Hanna Building, in Cleveland. Membership grew quickly to several dozen and they even produced their own publication - "Space". The Society set up a test area 12 miles (19km) to the east of the city on the Rau Estate. This was equipped with a 12 foot (3.66m) test stand and a roofed-over control trench, but the site was only used infrequently. Two liquid engines were developed, one used a chrome-nickel-steel, water-cooled chamber, the other a light-alloy regenerative design. In 1935 a liquid propelled mail rocket made an erratic flight and the mail was not posted. Operations ceased in 1937 when Ernst Loebell returned to Germany. He was never heard of again.



CRS liquid rocket engine

CREDIBLE-SPORT (USA – 1980)

This remarkable plan to rescue the 53 US hostages held in Teheran, Iran, between 1979 and 1981 was revealed in 1997. Two highly strengthened C-130 Hercules transport aircraft were fitted with boost and also deceleration rockets, so that it could land and take off from a space the size of a football field adjacent to the building in which the hostages were held. The acceleration rockets consisted of four Mk56 STANDARD motors, two each side, while the braking rockets were eight motors as used by the ASROC. For the rescue mission the retros would be used first, but for the only test flight, on 29 October 1980, at Eglin AFB, Florida, the take off was boosted and the retros used for landing. The take-off run was less than 50 yards and went well. After circling, the aircraft came back to land on the runway. Four of the ASROC motors were fired and the C-130 stopped dead, then fell on to

the runway where the starboard wing broke away. No one was hurt but the CREDIBLE-SPORT plan was stopped. The hostages were finally released through negotiation on 20 January 1981.

CREDIBLE-SPORT

R-GERATE (Germany – 1940)

The German Air Force had been interested in rocket-assisted takeoff units since the 1930s, when they began funding experiments. Various safety issues and availability problems were eventually solved by the development of a dedicated system by the Hellmuth Walter company. He developed a "power-egg" able to be fitted to aircraft needing a shorter take-off run, or simply to assist very heavy planes to get off the ground at all.

The R-GERATE was put into production in 1940 and was an egg-shaped device 1.42m (4'8") long and having a maximum diameter of 0.66m (2'2"). The inside was dominated by an almost spherical propellant tank at the front for T-stoff, containing 120 kg of the liquid. The central portion of the remainder of the "egg" housed a Walter HWK-109-500 engine, with a thrust of 500 kgf for 30 seconds. Around the engine were mounted compressed air cylinders and other cylinders holding the Z-stoff catalysing liquids, reduction valves and control linkages. About 20 kg of Z-stoff was carried. Externally, attachment points were fitted so that the power unit could be attached to the aircraft. On the front was a canvas bag containing a 7.5m (24'6") parachute so that after completion, the egg could be recovered after jettison, usually at the edge of the airfield for collection and re-use. The total weight of the unit was about 284 kg, and empty weight 144 kg.

Development testing was carried out on Junkers Ju-88 and Heinkel He-111 aircraft in 1940. By February 1941 it was used in pairs, fours and even eights under the wings of the Messerschmitt Me-321 "Gigant" glider during development flights, in conjunction with tow-

aircraft for the huge glider.

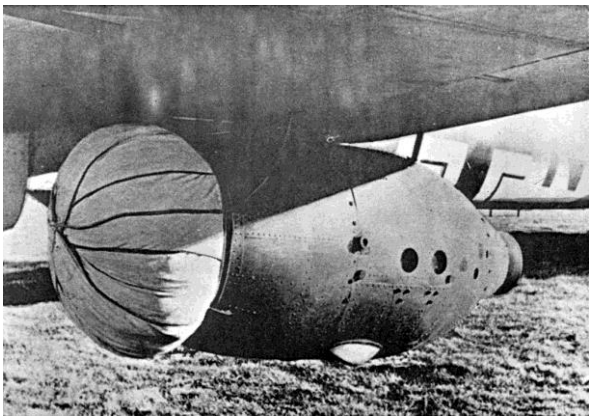
This version of the R-GERATE was used all through the Second World War, including paired use on the Arado Ar-234 two-jet aircraft to reduce its take-off run, when under test in 1944, before jet engine improvements removed the need for rocket boost.

A second version of the R-GERATE was also developed, using the HWK-109-501, specifically for use on heavier jet-bomber projects such as the Junkers Ju-287 where four were usually used, one under each jet engine. This version had a slightly larger fuel capacity and higher thrust, but was essentially the same size. The third version developed used the Walter HWK-109-502 engine in its "cold-burn" form in a "power-egg" 1.60m (5'3") long and 0.9m (2'11.5") in diameter. It weighed 475 kg, with 250 kg of this being T-stoff and Z-stoff, with thrust averaging 1042 kg over a 30 second period, falling from an initial peak of 1,500 kg. Again the front of the device housed a recovery parachute. It was used on early flight trials of the Junkers Ju-289 in 1944/45.

The units were manufactured by Heinkel and six thousand were built. The special company responsible for operations was called the Flughafenbertriebskompanie für Starthilfgerate.

From April 1944, a highly modified version of the HWK-109-502 R-GERATE was adopted as the propulsion system for the ENZIAN-1 surface to air missile project, and retained the 0.9m (35.5") diameter.

Some sources state that these power-eggs were fuelled with both T-stoff and C-stoff as the Messerschmitt Me-163B aircraft, but the decision had been made from the start that only "cold" propulsion would be employed as aircraft boosters for reasons of safety.

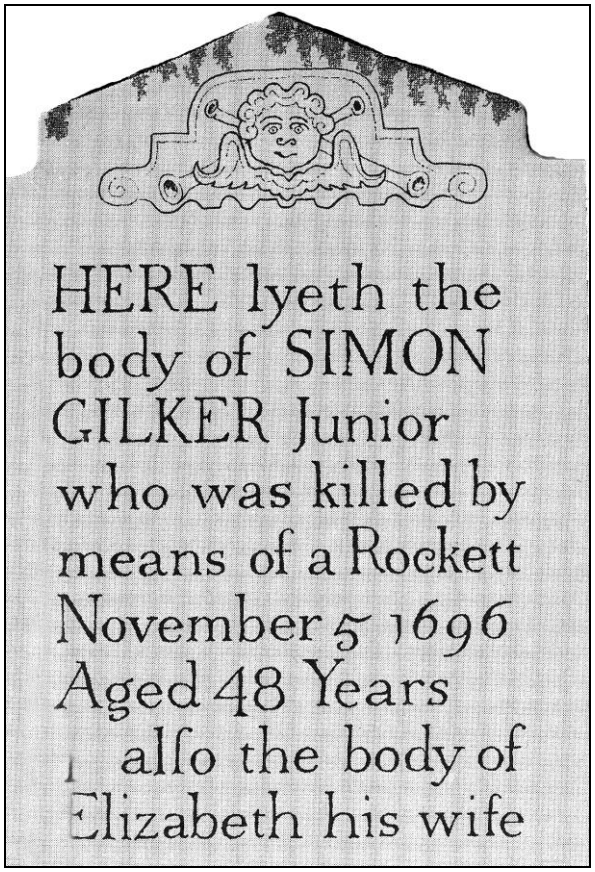


R-GERATE

ROCKET DEATH (UK – 1696)

This gravestone in the churchyard at Milton Regis in Kent records an incident that happened on "bonfire night" 1696 just 91 years after the "gunpowder plot".

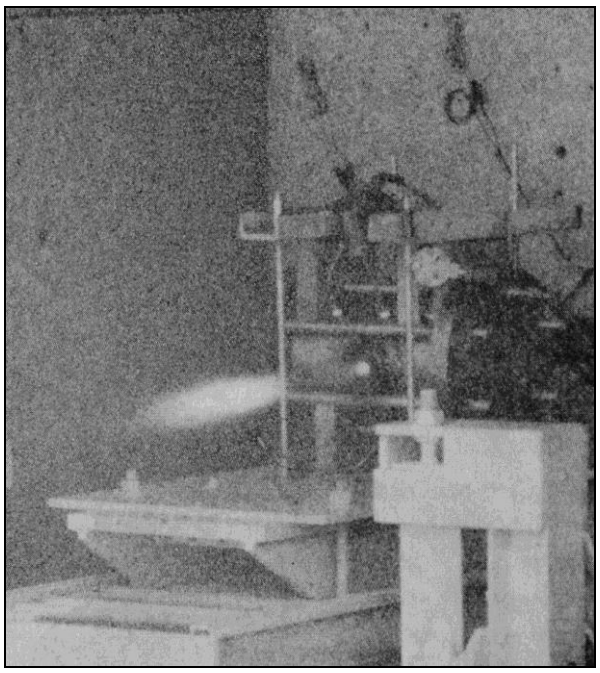
The vicar, in the early 1980s, the Rev. W. Drury, said that Simon Gilker was a churchwarden at the time and suspects that he may have 'borrowed' the rocket from the Naval Yards at Sheerness. But this is a pure guess, especially since it is not known of any RN rockets as early as this.



ROCKET DEATH

"SOLID-STAGING" (USA – 1982)

This strangely-sounding solid propellant motor technique was being actively explored in 1982, according to the AWST dated 12th April in that year. McDonnell Douglas received a USAF contract and the work was sub-contracted to Aerojet who carried out the actual work. The most strange aspect of this technology was that a motor case was fed with the products from two gas generators, one burning fuel and binder, the other oxidizer and binder. When the two gases entered the motor they ignited and produced what was claimed to be the then-high SI of 275 seconds. Eventually the expansion-ratio was to be 37, but was less in these initial test firings. There were high hopes for the technology being used in missile top-stages particularly MX-follow on SICBM and other naval ballistic missiles. Nothing more seems to have been reported in the "press" which could mean one of two things. Success. Or ignominy. Perhaps we will never know.


Aerojet test firing of "solid-staging" motor in 1982

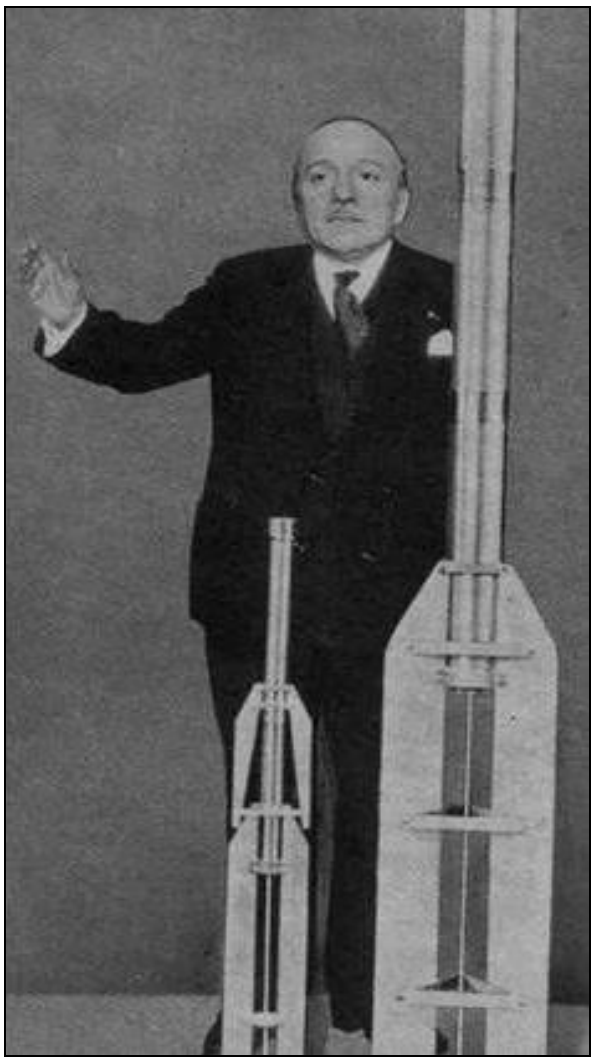
DAMBLANC SERIES (FRANCE – 1935-1939)

The solid propellant rocket series studied by Louis Damblanc prior to the war at the Central Pyrotechnics School of Bourges were based on "compressed black powder with internal nozzle". This French pioneer carried out an impressive series of multistage rocket launches:

- 2-stage 35.5 mm, 55 mm and 72 mm diameter rockets, with 1st stage cases made of steel or aluminium and 2nd stage made of magnesium. The 35.5 mm one was able to send a 500 g illuminating flare to an altitude of 2,150 m. With a 10 kg payload, the 72 mm one could reach an altitude of 500 m. An improved 35.5mm version with both stages made of magnesium was tested in October 1939.

- 3-stage 88 mm and 133 mm diameter rockets. The 1st stage was made of magnesium alloy and the 2nd obtained by cutting off shell-bodies.

Between 1935 and 1939, Damblanc launched 360 rockets, the 133 mm diameter being the most powerful ones built in France at that time. His main invention was that of automatically separable multistage rockets for which a French patent was granted to Damblanc in June 1936. The corresponding US patent of April 1938 covered the Navy's 2-stage Terrier missile. This patent - as well as another dealing with test stands - was sequestrated by the US government during the war but as a result of the Blum-Byrnes agreement, Damblanc obtained in 1965 indemnity for the use of his patents during that period.


Louis Damblanc with a couple of his rockets.

AMUCK (UK – 1943)

Ship-launched anti-submarine weapon project, consisting of a Mark-II depth charge of 180-lb (82 kg) surrounded by twelve 2" cordite rockets, and projected along a ramp about 100 feet long, which it left at about 200 mph. Total weight including the launch trolley was about 250 kg. The track was inclined about 5 degrees, while total thrust from the twelve rockets was 4,000 kg for 1 second. Directional control during trials at Brean Down in Somerset was disappointing.


AMUCK launcher at Brean Down

TRANSONIC-ROCKET (UK – 1947)

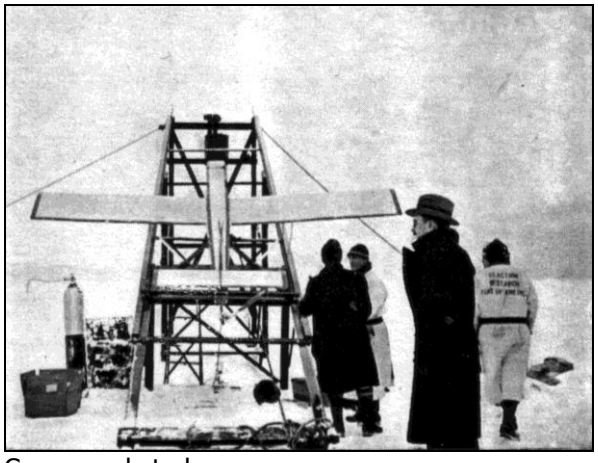
Transonic Rocket. Scale model of the Miles M.52 supersonic aircraft, but powered by a liquid propellant rocket instead of the planned eventual jet engine. The scaled down programme by Vickers was reportedly due to Barnes Wallis' reluctance to risk men after the high attrition rate on the Bouncing Bomb raids in 1943. Powered by two BETA-2 liquid engines using hydrogen peroxide and methanol + hydrazine hydrate and water, based on German engines, the 425 kg craft was launched at an altitude of 35,000 - 37,000 feet by Mosquito aircraft and velocities attained were 682 to 887 mph (1097-1427kph). First launched on 8 Oct 1947 off the Scilly Isles, the vehicle was 11 feet (3.35m) long and had a span of 8'1" (2.46m). It had an all-moving tail plane to maintain control through the Mach 1 transition and the burn time was 52 seconds.


The release of a Vickers TR (Transonic Rocket) over the Scilly Isles in 1947. The drop plane was a Mosquito flying at 35,000-37,000 feet. In the background can be seen the distinctive shape of the south part of Sampson Island near the middle of the group of islands. This also gives the precise heading of this trial - due West.

CARVER ROCKET PLANES (USA – 1936)

To demonstrate the potential of rocket-planes, Nathan Carver organised the demonstration of two liquid propellant rocket propelled gliders with the financial backing of E.W. Kessler. Willy Ley (previously of the German VfR) built the rocket engines, able to produce 29.5 to 18 kg thrust during up to 35 seconds, declining during the pressure feed. The aircraft were designed and built by students of the Guggenheim School of Aeronautics, NY, under Prof Dr Alexander Klemin. The gliders had a length of 11 feet (3.35m) and a span of 14'6" (4.42m) and a weight of 38.5 kg with all-

aluminium construction. They were completed at the end of January 1936 after work started in September 1935. The plan was to fly the planes from the Greenwood lake, when frozen over, to Hewitt, NJ carrying rocket-mail in asbestos bags housed in the front of the machines. Total mail carried was 4,323 envelopes and 1,823 postcards franked for collectors, in packs of 9 kg for each aircraft. The planned flights were to take place on 9th February 1936, but due to adverse weather, only static tests took place. Snow covered the aircraft completely in less than an hour. The flights were re-scheduled for 23 February 1936 and operations began with a static test of one aircraft that was strapped to a toboggan. It was then mounted on the 23° angled launch structure which contained a bungee catapult. The engine ignited, the bungee released and the craft took off. "Gloria", as the craft was named, soared on up to about 1000 feet instead of arcing over the lake. It stopped still briefly then stalled and fell to the lake surface, luckily the right way up with the engine still firing. It then slid along until the engine stopped. The second plane was launched horizontally on the ice instead of using the catapult. The engine fired and in 15 seconds it covered 50 yards, then rose briefly, but settled again for 30 yards. It then took off to reach a height of 75 feet where the wings collapsed upwards. The craft then fell after a flight of 17.8 seconds and was recovered at a ground distance of 700-800 yards. The rocket engines had performed well, but the aircraft both had structural problems.



Carver rocket plane on ramp

ROCKET LANCASTER MODEL (UK - 1990)

In the South of England, RS's rocket-aircraft project EAGLE began in 1977. It represented just 1% of firings and combined rocket power with aerodynamics. The project began with EAGLE-A until EAGLE-Z then continued with EAGLE-AA etc. The craft called EAGLE-AE had a 30cm fuselage and a span of about 350mm and was one of the many ducted-rockets being tried by the late 1980s. Many flights took place and it was discovered that only those launched at a certain angle had any hope of success. This was to combine thrust to weight ratio, climbing potential and the avoidance of stalling. The craft had a cylindrical fuselage with a centrally-forward motor, rear stabilising surfaces and a main wing with outrigger-dihedral to increase stability. After a few alterations the EAGLE-AE looked very much like a 1/100 scale model of the WW2 Lancaster bomber used by the RAF from 1943 onward. Model-motor-powered it was launched at an angle of 30-degrees and soared upwards and adopted a large circular flight profile, peaking at a height of about 400 feet. On the descent, and gradually slowing it levelled out at a height of about 100 feet where it attained its ideal flight speed and continued in level flight, just swaying and swerving a little for a distance of another 400 feet or so. After this it gently descended and made a soft landing, preferably in long grass, where it could be recovered and prepped for its next flight. The company sold 800 kits to modellers in a classic sales-curve which gave the firm adequate warning for the end of production after about 18 months. This was so carefully observed that there were only about a dozen left in stock when the orders stopped, in the mid 1990s. It was always a perfect way to punctuate or end a display of rocket model flying.

Lancaster set up for launch

HOW FIREWORKS WORK