

**Aviation: the human factor**  
with Ashley Morgan

Ashley, the archivist for the FAST Historic Film Archive, used film clips to tell the story of aviation medical work, primarily at RAE. It was a fascinating tale of great innovation and incredible bravery, at a time when concepts of health and safety were clearly very different from today.

She began by explaining how she was responsible for the FAST Museum coming to possess their film archive. It was while she was making the documentary *Farnborough Above and Beyond* for Meridian Television that she discovered a treasure trove of film from RAE, whose Central Unit for Scientific Photography had filmed all their experimental work. FAST did not know how to exploit the archive but Ashley, with her background in film production, recognised its potential and offered to become its archivist. A series of DVDs have been produced that have been used as source material for many documentaries, raising over £100,000 for FAST.

Turning to the subject of her presentation, Ashley told us that the Institute of Aviation Medicine was based, until 1994, at RAE, becoming a world leader in the 1960s and '70s for its research into such things as protective clothing, ditching on land or sea, and issues related to high altitude. Much of this work was carried out in collaboration with the Navy. With little funding available, a 'Heath Robinson' approach was adopted, making use of whatever was to hand to build testing rigs. Test subjects included dummies, green-horns, medics and pilots from the Test Pilot School, also based at RAE.

One area of testing focussed on g-force, for which a rocket sledge was created from disused railway line from Borden, to explore the effects of impact. Another piece of jury-rigged equipment we saw in action was an early human centrifuge, a later version of which still survives and can be toured by arrangement. For high altitude testing a decompression chamber had to be built to examine the effects of hypoxia (lack of oxygen).



*A new use for unwanted railway line*

Protective clothing was another important area of research at RAE. Partial pressure suits were developed that provided an independent oxygen supply, while suits were developed to guard against heat, cold, toxins, etc. Also, truly hair-raising testing was carried out on 'Mae West' life jackets to confirm that they were self-righting with unconscious subjects.



*Human Centrifuge Farnborough*

Testing for survival at sea took place at Hawley Lake and in the donut tank at RAE; hydrodynamics and aerodynamics are essentially the same.

One horrific clip showed the ditching of a plane trying to land on HMS Victorious in Portsmouth Harbour, in 1958, when a film crew happened to be on board the ship. Sadly, the pilot was unable to escape and lost his life, the whole tragic episode captured on film. This led to underwater seat ejection trials in 1962, which highlighted the importance of procedures

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and familiarity with equipment in aircraft safety. A deceleration track was built at Farnborough for more work on impact, and underwater escape practice carried out.

A wind tunnel was used to establish the maximum speed for escape from both cockpit and fuselage, and an ejection seat rig constructed for trials. Live ejection trials also took place in the air.

Vestibular (ear) research was also conducted at Farnborough, which found that changing the position of the head dramatically improved balance. This led to a desensitisation programme for motion sickness, using a turntable—another piece of ‘Heath Robinson’ equipment.

Other issues tackled at RAE were ergonomics, i.e. equipment design to improve productivity, vibration trials, examination of eye movements, and a bizarre mechanism for agent retrieval in WWII.



The film clips Ashley showed us, some of which were actually quite funny, demonstrated the incredible bravery and commitment of the test subjects at RAE, some of whom put themselves through to truly terrifying experiences. It also demonstrated how incredibly innovative the scientists were in creating the rigs and test equipment they needed for trials using whatever was available. Nothing like this could ever happen today, and we owe a great debt to those who put their lives at risk to make aviation safe for pilots and passengers alike.