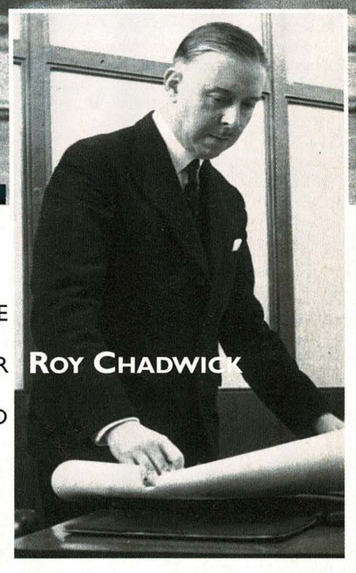
# FATEFUL



## HARRY HOLMES DESCRIBES THE DAY THAT AVRO DESIGNER ROY CHADWICK DIED

**Roy Chadwick, Avro's chief designer, studies a drawing in his office at Avro's Chadderton headquarters. He was awarded, the CBE for his part in the Dams raid. Many thought that he should have received a Knighthood at the end of the war, but it was not to be.**

SATURDAY AUGUST 23, 1947, dawned into a pleasant summer's day, but the events of the late morning would turn it into the blackest day in the history of A V Roe & Company Ltd. The reason was the tragic crash at Woodford, near Manchester, of the Avro Tudor II prototype airliner, G-AGSU, with the loss of an outstanding crew and the company's technical director Roy Chadwick.

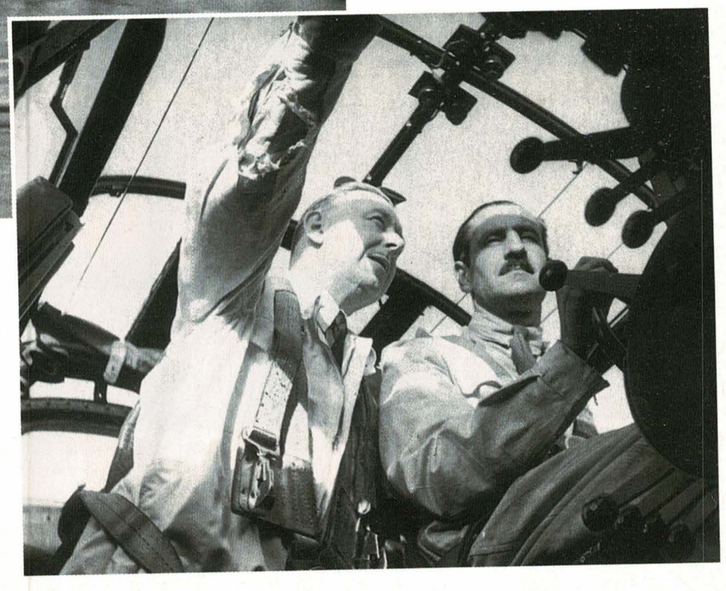
Chadwick was considered by many to be one of the world's greatest aircraft designers with a string of famous types to his name. He had joined the Avro company in 1911 at the age of 18 in the position of PA to Alliott Verdon Roe himself and after assisting 'AV' with the design of the Avro 504 Chadwick became chief draughtsman. He always thought that the pinnacle of his success came with the Lancaster, but after World War Two he laid down the foundations for the mighty Vulcan.

On that fateful Saturday Chadwick had decided to join a test flight of the prototype Tudor II airliner. He had designed the Tudor specifically for the North Atlantic route to the Air Ministry Specification 29/43, but the Ministry of Supply had directed that the aircraft would have to utilise as many parts of the Avro Lincoln as possible. This severely restricted the designer and he voiced his resentment over the limitations placed upon his design. However, the Tudor featured a number of innovations, including a fully pressurised fuselage and was the first airliner built in Britain with such comfort for its passengers.



# DAY

**The Tudor II prototype makes a low pass over Woodford's main runway before landing after its first flight on March 10, 1946.**



**Chadwick liked to fly on as many test flights as possible and here he is with Bill Thorn in a Lancaster. They were to die together in the crash of the Tudor II prototype.**

### TOSS OF A COIN

The prototype had been due to fly on the previous evening, but a snag had developed and the flight was postponed until the Saturday morning. The Woodford night shift worked on the aircraft and discovered that the problem required the disconnection of the ailerons. The fault was rectified and the Tudor was cleared for flight.

Chief test pilot Bill Thorn and his deputy Jimmy Orrell had been sharing the flight test programme of the Tudor, which included the original Mk.I version and the stretched fuselage Mk.II. The two pilots had tossed a coin on who would fly the aeroplane and the task fell to Thorn, with Orrell happily going off to play golf. As the delay had put the flight back to the Saturday morning, Bill Thorn had difficulty in gathering a crew together, as others were already scheduled to fly different aircraft or were off for the weekend. The co-pilot was David Wilson, a former RAF Squadron Leader, who had completed three tours of operations while flying Lancasters in Bomber Command and had been awarded a number of decorations when serving with 49 Squadron. The flight engineer was Eddie Talbot who lived locally and was called out to join the flight, while the radio operator was John Webster who had been scheduled to fly on the aircraft the evening before.

The change of schedule to the weekend made it possible for Roy Chadwick to go along and with him, as his deputy, Stuart Davies who would be monitoring some of the flight information. Upon hearing of the flight, Avro supremo Sir Roy Dobson decided to go along for the ride. However, when the passengers were boarding the aircraft one of the flight shed's managers ran out to tell Sir Roy that an urgent telephone call awaited him. Sir Roy informed Bill Thorn to proceed without him.

### FLAWED TAKE-OFF

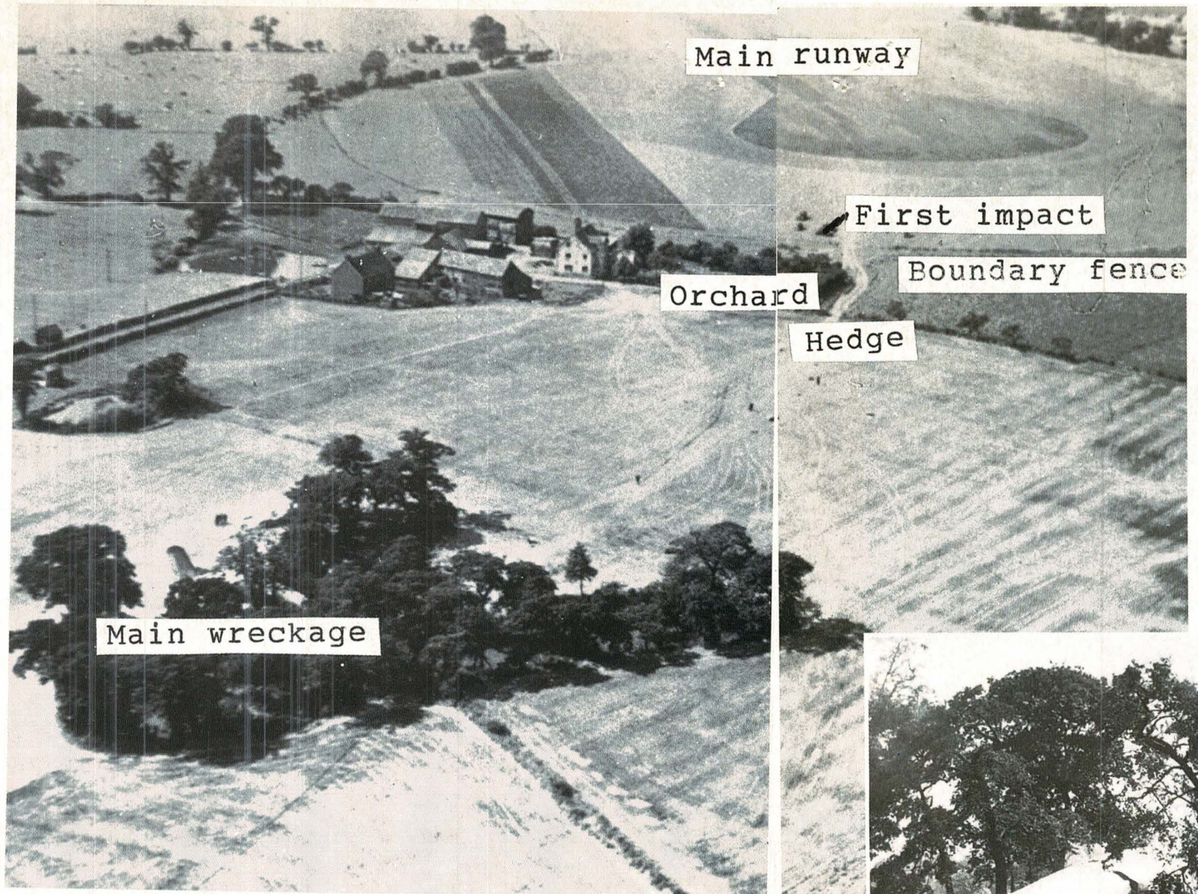
The Tudor taxied to the Wilmslow end of Woodford's main runway for take-off in the direction of Poynton and at 1058 hours the control tower gave the clearance to roll. The throttles were opened and the giant airliner began to roar down the runway. Take-off was normal, with the aircraft getting airborne after approximately 800 yards (730m), but after reaching about 50ft (15m) above the runway the starboard wing started to go down. It continued to go down until the wingtip hit the ground just 15 yards (14m) before the boundary fence. (The main runway has since been extended in both directions.) At this time the bank was considerable with the wingtip ripping through the fence which pulled the aeroplane off to the right, the Tudor then continued for 40 yards (36m) before the leading edge of the starboard wing struck a 15ft (4.5m) high hedge which surrounded the orchard at Shirfold Farm.

The impact caused the wingtip to detach itself from the outer wing and this was quickly followed by the starboard aileron. At the next ►

point of impact, which was a small hedge bordering a mangold field, large pieces of the wing broke away. Continuing for a further 170 yards (155m), the nose of the aircraft ploughed into the ground causing the tail to rear up as it slithered along the ground towards some oak trees which surrounded two small ponds. When the aircraft crashed into the trees the machine swung around in an anti-clockwise direction, finally coming to rest with the forward part of the fuselage in one of the ponds.

The aircraft had travelled nearly 300 yards (274m) from the first point of impact with the starboard wingtip and 435 yards (398m) since leaving the end of the runway. During the latter part of the flight it had turned approximately 90° to starboard from the line of flight. There was no outbreak of fire and when the aeroplane came to rest Stuart Davies scrambled out through a hole in the starboard side of the fuselage. Eddie Talbot was trapped in the wreckage and had to be cut free by rescuers who had witnessed the accident and were quickly on the scene. Talbot spent nearly two years in hospital, but the others were not so lucky as John Webster died almost immediately. Roy Chadwick's body was found lying on the bank – he had been thrown out, fractured his skull and died instantly.

The saddest part of the whole disaster was the discovery that the pilots, Bill Thorn and David Wilson, had not been killed by the crash but had died by drowning. They were found still strapped in their seats as the cockpit section was underwater in the pond, but it was some time after the accident before their bodies were found owing to the condition of the wreckage and the murky water. The post-mortem showed



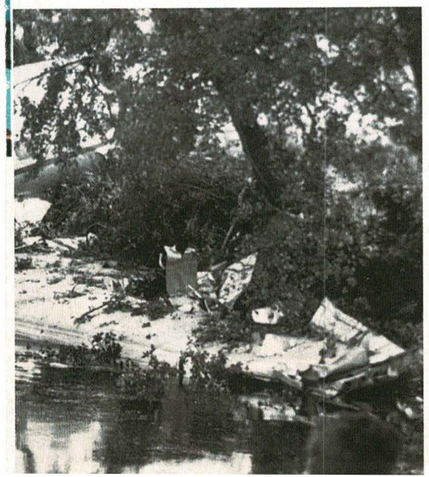

An aerial view of the crash site, with the Tudor's tail just visible in the trees. The rescue vehicle tracks from the airfield almost follow the same path as the crashing aircraft.

The shattered tail section of G-AGSU.

With the pond now drained, the tangled wreckage of the cockpit area is laid out. The faired direction-finding loop is clearly visible on what remains of the cabin roof.


G-AGSU after the redesign of the tail surfaces. These modifications increased the aircraft's weight and reduced the performance.

The crumpled fuselage of the Tudor rests in the partially drained pond providing a good illustration of the split in the forward fuselage.
All photographs via Author



that both were uninjured, but stunned by the crash and had drowned. Stuart Davies owed his life to the fact that Chadwick had asked him to sit halfway down the fuselage to monitor flight recording instruments.

## INVESTIGATION

In the days following, the wreckage was removed from the crash site and was hosed down before being laid out on a hangar floor for inspection. Before removal it was noticed that the starboard outer flap was in the retracted position and from the small amount of damage on the flap it was thought that it may have been in that position before impact. An early investigation showed a failure of the flap operating mechanism either in the crash or before take-off, and as the remainder of the flaps were all damaged it seemed a possible explanation for the accident. All of the defective parts were sent to the Royal Aircraft Establishment (RAE) at Farnborough for further examination.

In the meantime, the examination of the wreckage continued in minute detail. The control columns were retrieved from the mud at the bottom of the pond and were assembled on a mock-up of the cockpit floor to simulate their positions in the aircraft. The cover plates were removed from the control columns and although the chains had jumped off their sprockets, nothing abnormal was noticed in the method of assembly and there was no evidence of a mechanical failure. As members of the design office made a detailed study of the Tudor's drawings, it became apparent that it was possible to reverse the aileron controls, although according to the design requirements this should be mechanically impossible.

The draughtsmen visited the hangar to survey the wreckage and with the aid of the drawings carried out a check to establish the possibility of reversed controls. As a result of this examination it was discovered that the aileron chains were, in fact, incorrectly assembled, causing them to work in reverse. As the chains were inside the control column it was not visually apparent that anything was amiss.

At that time a report was received from the RAE indicating that the flap operating mechanism was not the cause of the accident, but was a result of impact forces.

Investigation of the inspection methods used for the assembly of the controls revealed no direct solution for the errors that had occurred. The fitter who had disconnected the aileron mechanism and reassembled it later did not have any drawings to work from and relied entirely on his memory. Upon completion "it looked the same" as it did when he dismantled it. Inspectors who cleared the work confirmed that both carried out a sense check and that the ailerons were functioning, but it was obviously not confirmed that they were working correctly.

During the pre-flight 'free and easy' check of the controls Bill Thorn, because of the length of the forward fuselage, could not see the ailerons and shouted back to flight engineer Eddie Talbot to check for movement. Talbot confirmed their operation, but he too could not know which way Thorn was moving the control column.

## LESSONS

It was confirmed by the Accident Investigation Branch of the Ministry of Civil Aviation that the crash was a result of the pilot not being able to maintain lateral control immediately after take-off due to the incorrect assembly of the aileron controls. The lesson learned was that in the future it should be totally impossible to connect aircraft controls incorrectly.

Besides the errors already noted, another contributing factor was the fact that Bill Thorn had been asked to clear the area without delay due to military traffic at nearby Ringway (now Manchester Airport) and if he had been allowed to climb straight ahead to a reasonable altitude there is no doubt that this very experienced pilot would have been able to sort out the problem. A similar incident had happened to him some years earlier when he was serving in the experimental flight section at the RAE and he was able to land safely.

Stuart Davies carried on with Chadwick's work on the delta-wing bomber which emerged as the Avro 698 Vulcan. Eddie Talbot returned to the company after two years in hospital.

The loss of Roy Chadwick cast a great shadow of the Avro design team and this, combined with the deaths of the other crew members, meant that a wealth of aviation experience had been lost forever. A massive blow had been dealt to Britain's aircraft industry.

FP