

From Roy Iredale, BAC Warton, Works Inspection Department

I first became involved in the TSR.2 in the spring of 1963 at English Electric, Strand Road, Preston on XR219's rear fuselage. Following it down to Vickers Aviation at Weybridge in July 1963, I was then a junior foreman (mechanical) inspector. The fuselages were married up, wings, fin and tailerons fitted all systems – electrical, hydraulic, air, fuel tested and functioned to an interim standard – to ensure no major problems – then reduced to the fuselage – and delivered by road to A&AEE Boscombe Down.

In November 1963 – by then English Electric and Vickers Aircraft had become BAC - and I became a foreman.

The final assembly of the aircraft the function and clearance of all systems, took until April/May 64, this included over 100 hours engine running (which must have assisted Bristol with the Concorde Olympus engine development at the time).

Part of the build up to first flight was a series of taxi trials, the final one at 100kts. 'Bee' started the taxi, selected reheat, at 100kts, cancelled reheat, selected 'brake chute' and closed the throttles. The brake chute candled and the MECU (engine control computer) shut down the engines. The aircraft brakes stopped 219 on the main runway, but with no power there was no cooling fans for the brakes and they seized on and caught fire. They were only small fires and they were soon extinguished, but this meant there was an extended period waiting for wheels and brake units to cool enough to handle. Unfortunately A&AEE's 'B' Squadron had a Vulcan in the circuit – short on fuel – and waiting to land. The Vulcan pilot and ATC agreed he could land on the 'short' cross runway. Unfortunately he overshot the runway into a field of wheat, caught fire and was 'Category 5' (reduced to scrap). Fortunately, all the aircrew escaped unscathed. But we weren't very popular with 'B' Squadron.

The design authority for the TSR.2 project was shared between Warton and Weybridge. The Inspection Authority was Weybridge. Myself and another Inspection Supervisor – Mr George Hammond (of BAC Weybridge) – were designated as the inspectors to clear XR219 for its first five flights at Boscombe Down. This was a demanding task, bringing the aircraft up to its first flight. All systems functions, in accordance with specified procedures had to be overseen and certified by us. The build standard of the aircraft and its equipment had to be certified against the design standard. The declaration document stating that the aircraft was cleared for flight was jointly signed by us and submitted to the Senior Inspector MOD Aeronautical Quality Directorate for his approval and signature.

With this, and the pilot's signature – Bee – the aircraft finally flew. Then are troubles *really* began.

I was promoted to Senior Foreman Inspector and signed a 10 year contract to stay at Boscombe Down to repeat the same task on the next 9 aircraft (making 10 development aircraft, 5 to remain at Boscombe and five to go to Warton). BAC moved my family down to Amesbury.

It took several months to get XR219 flying again. In the meantime, the final assembly of XR220 proceeded satisfactorily, once the damage - caused by the fuselage falling off the trailer, when the lorry backing it into the hangar at Boscombe (on delivery from Weybridge) jack-knifed - was repaired (*see Photo Album section*).

XR220's falling of the trailer upon delivery from Weybridge (In September 1964) was on the same day that Kennedy was assassinated in Texas. The name of the transport company delivering 220 was Texas. So there was a whole series of jokes doing the rounds for sometime after that event. (Editor's note – President Kennedy was assassinated In November 1963, but in September 1864 the Warren Commission report was published and thus the shooting was again headline news.) The rear fuselage of 220 was

designated to examine and monitor all critical structural stresses in all flight conditions. And all the internal structure was comprehensively strain gauged and the wiring exited the though the left-hand taileron which was hollow titanium. As the fuselage hit the ground the cables were severed/cropped off right by the end of the spigot. So 220's development flying envelope would have to be amended and a later rear fuselage programmed to be strain gauged. Fortunately, there was no serious damage to 220's main structure. But in the end, none of it mattered.

The engine running on XR220 was completed in a reduced time and the first flight was scheduled for Spring 1965. XR221 was scheduled to arrive about the same time, so the programme was getting on track.

#### XR219 early flying

XR219's first flight was flown "clean" in that the undercarriage was not retracted and the airbrakes (4 off) were not fully closed. It was decided that the undercarriage would be retracted on the second flight and the airbrakes would be fully closed, providing we received from Faireys Aviation a set of modified jacks.

Post-flight No.1, XR219 was laid up for a 2/3 month programme for the following:

- 1) Rectification of pilot's defects
- 2) Removal of engines and jet pipes for return to Bristol Siddeley at Filton.
- 3) Embody 4,000 Modifications and Alterations. (These Alts/Mods were mostly minor, but required a lot of strip downs/reassembly, and in many cases systems testing, which accounted to thousands of man hours.) The main reason for this programme was to get the aircraft to a better standard whilst waiting for Issue 2 engine and jet pipes.

So eventually this programme was completed, more or less on time.

For the second flight. I was a member of the flight control team in the radio van by the runway, communicating with the aircrew. The senior flight test engineer was Derek Hargreaves from Warton. A Canberra was the 'chase' aircraft with 219. 'Bee' counted down and selected u/c 'up' he reported '3 reds' then 'nose out', still port and starboard reds. After about 3 minutes the Canberra reported both port and starboard bogies were just 'swinging' about. 'Bee' was advised to select 'down', which he did and confirmed '3 greens' so the aircraft was safe to land.

Post-flight 2. The undercarriage was a Weybridge design. They had determined that the main bogies required hydraulic jacks to rotate them and lock them down, but not to rotate them into the 'u/c up' position. The 'up' position rotation would be accomplished by a 'damper?' which was compressed when the u/c was selected and locked in the 'down' position. However, there were lots said about the situation, but in the end another bogie hydraulic rotational jack was designed into the system, to be embodied during the following weeks. As you can imagine, this was no simple mod to embody. All the main u/c pipework had to be modified to install extra pipes, etc.

Between each flight of course a series of undercarriage retraction tests were carried out with the aircraft on jacks in the hangar, but before (about) flight 7 it was decided that a pilot would do these tests, to show him all was well. I sat in the cockpit and did a series of 20 successful retractions. Jimmy Dell then took my seat, selected 'up' and yes, you guessed it, the starboard leg mal-functioned and the light stayed red. But we eventually got four flights at Boscombe where the undercarriage worked correctly - it was flight ten before the u/c retracted satisfactorily and XR219 was despatched to Warton on flight 14.

Once 219 left Boscombe, my next task was to get the first flight cleared - from the production side, of XR220. XR221 was expected later in 1965.

XR220 nearly makes it to the air!!

XR220 was completed up to – and cleared to – flight standard. Every day we took her out for pre-flight engine runs and checks, hoping that we would get the clearance to fly her. XR220 was never formally cleared for flight, but it only required the MoD Form 1090 to be cleared by BAC (Inspection) and AQD. Both myself and the senior AQD Inspector were standing by to clear the 'paper work' – subject to the final engine runs being completed satisfactorily, but because of the local heavy fog, Boscombe Down would not allow any flying or ground movement of aircraft. So we couldn't take 220 to the 'Pear Drop' –which was the designated running pan for the TSR.2.

By the time the weather cleared, the plug had just about been pulled. Jimmy Dell's return to Boscombe was suspended. And that was that.

And then the final news came that the whole project/contract was cancelled.

I stayed behind for a few months, mainly to certify documentation for components etc, deemed to be MOD property. Also to clear Canberra aircraft from an RAF M.U. nearby, to a one-flight standard, to return to BAC Samlesbury, for overseas sale. The engine running on XR220 in support of the Concorde programme, which took place over a few weeks in summer 1965, was done under the authority of A+AEE A Squadron, so I was not involved.

In the meantime I had to get my family back to the Fylde ready for my eventual return to Warton.

A maintainability study of the aircraft was commenced, but obviously never really got started. But there were many concerns, eg the outside skinning of the whole plane was a material called 20/20, an American alternative to duralium, the processed aluminium usually used for aircraft manufacture at that time. 20/20 was very brittle and being a

bit heavy handed with a pair of steps would necessitate a skin insert repair. Also the hydraulic oil was DP47, a clear oil, unlike OM15 which is dark pink, and thus it was difficult to detect any leaks of the DP47. Then the engine and jet pipe replacement was at least a full days' job, with another full day for setting up and running etc etc.

The aircraft, that is the design, the material it was skinned with, hydraulic systems and avionic systems would have made the development ground engineers', inspectors', fitters' and electricians' job to most modification and flying programmes a nightmare. But no doubt with 10 development a/c to sort out problems, we could have eased the situation for the customer. Who knows?

As you can imagine, all personnel involved with XR219, up to, including its life at Weybridge, A&AEE Boscombe Down and Warton, although I can't speak for Warton, found the job challenging in all aspects. Very long hours were worked by most. I personally worked 70-80 hours per week, through holiday, including two Christmases, and the more the pressure, the more the stress. But I wouldn't have missed it for the world. Many of my inspection team who were to stay with me for 10 years at Boscombe, and those who returned to Warton with XR219, are sadly no longer with us.

In 1972 I set up the Quality Assurance department in Saudi Arabia with BAe and the Royal Saudi Air Force. I returned, again, to Warton in 1988.

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