Flying the RAF's VC10 sim

Developers on the flight deck

VC10 pilot Flt Lt Andy 'Tonks' Townshend answered a few forum queries from some well known UK FS developers. Before long he was wondering how David Maltby and David Booker would get on in the RAF's simulator of an aircraft they have modelled. As it turned out, they got far more experience of the RAF's VC10 tanker than they expected. Over to you, Andy...

Flt Lt Andy Townshend in his regular office

There are numerous aircraft that can justifiably be described as classics and every one of us has our own idea of types that fit the bill. For me the Vickers VC10 is one aircraft that definitely deserves the 'classic' accolade. I am very lucky to have a close relationship with this particular classic as my day (and often night) job is as a Royal Air Force VC10 pilot and captain. I am currently on 10 Squadron, based at RAF Brize Norton – the home of the VC10 fleet – although as I write this article the only aircraft in sight is the VC10 K4 parked on the ramp here at Mt. Pleasant airfield in the Falklands.

Although I have never really had a huge interest in Microsoft's Flight Simulator, I have always been fascinated by aircraft of the 1960s. Thus it was that about 18 months ago I chanced across a very good VC10 website (www.vc10.net) and answered a question in the forum about VC10 performance. It turned out that the question was posted by a well known FS freeware modeller, Dave Booker. Dave was actually seeking information in order to help another renowned name in modelling, Dave Maltby, in the testing of an upgrade to his freeware VC10 model.

Just another day at RAF Brize Norton

I have to confess that at the time I had precious little idea of what was available on the Internet where flight simulation was concerned, and as a busy QFI (Qualified Flying Instructor) in the RAF, I had little time for more flying at home. Having recently done two tours on the VC10s at RAF Brize Norton, though, I did feel suitably qualified to answer Dave's question – and the next one. And the next! I honestly had no idea that there were people out there who did this kind of work for free, having only previously seen the expensive software that was

VC10s in the RAF

The RAF has a fleet of 19 VC10s flown by 10 and 101 Squadron with a mixed fleet of C1Ks, K3s and K4s. The Cs were the original RAF VC10s and have been in service since the mid 1960s. Originally built as passenger/freight aircraft, they have since had wing-mounted refuelling pods fitted to increase the flexibility of their role.

In the late 1970s the RAF was looking for a tanker to replace the Victor tankers that were approaching the end of their service lives. With great foresight the RAF had purchased all the retired ex-airline VC10s it could and the decision was taken to start converting some of them into three-point tankers (two wing hoses and a centre-line hose). Although the C1Ks are in 10 Sqn markings and the K3/4s have 101 Sqn badges, the two squadrons now share the aircraft and mixed squadron crews routinely fly them. The two squadrons carry out a variety of tasks including passenger and trooping flights, aeromedical sorties and mid-air refuelling.

on sale in the shops. As 'free' is my favourite word, I was more than happy to help.

Over the months I answered dozens of questions from the two Daves (we'll call them DB and DM from now on!), and the VC10 was finally released to an appreciative public. Up to this point I had only ever seen screenshots of the aircraft, which looked stunning, but had never had a chance to get to grips with the actual FS model. Since the start of our correspondence I had been posted back to RAF Brize Norton and, coincidentally, nearer to the pub that DB runs, so I was able to pop over for a pint and a flight in the recently finished VC10 model. It goes without saying that I was very impressed, and it was during this introduction to simulated aviation that I hatched the idea of a comparison between the VC10 simulator used by the RAF and the version created by the two Daves.

Isn't that the sort of surprise we all wish for? You're happily looking forward to flying an RAF simulator and within the hour you're sitting in the real thing watching all this!

As always, these projects always take a little time to sort out, but at the end of July this year the two Daves arrived at Brize Norton to see how we do things in the RAF's full-motion VC10 simulator. The idea of the visit was for both Daves to try their hand at flying one of the two VC10 simulators operated by the RAF in order to compare it with their FS model. A few weeks prior to their arrival I had e-mailed them both a couple of procedures to learn and practise on their own model, which they would then be able to fly in the 'real' thing. Their challenge was to fly a departure from Brize climbing to 2,500 feet, cleaning the aircraft up and returning for a Locator to ILS on runway 26. From that approach they would roll into the visual circuit before landing with full reverse thrust.

The day started with a major surprise as I had managed to arrange a flight on a real VC10 to watch the mid-air refuelling of several Tornado F3s over the North Sea and observe another VC10 that was refuelling Tornado GR4s.

Before they had a chance to perform their practised manoeuvres on the sim back on the ground, I demonstrated an emergency procedure with a full VC10 crew. The completely safe environment of the sim is the ideal place to learn emergency drills and procedures; although you know you're in a simulator it is still very easy to get totally engrossed in the scenario and end up exhausted after a tough session. We accelerated down the runway at Brize in a C1K at maximum take-off weight and an outside air temperature of 25°C (a more limiting situation); as we passed through V_1 (decision speed) one of the engines failed.

Committed to getting airborne, we applied full power and got off the ground at V_R, only to then lose a second engine with a fire. This is where things start to get interesting. All large aircraft are designed to cope with the loss of one of their engines on take-off, but losing a second is considerably more serious – and thankfully very rare. The most important thing in this situation is to reduce the drag and weight of the aircraft

Those lucky pilots in the RAF have two VC10 sims – a C1K and a K3

Emergencies mean getting a lot done very quickly – exceptional teamwork from the RAF crew in the simulator

and get away from the ground before dealing with the engines. On the VC10 we have a Double Engine Failure Drill which is called for by the captain.

Various actions are performed straight away and the engineer starts an immediate fuel dump. The captain orders only the flaps to be retracted, leaving the slats out; it's only when the flaps are up that the aircraft is in a position to climb away from the ground and there is time to shut down the engines. Flying the aircraft is always the most important thing and the crew has to work well together to carry out all the procedures in a correct and timely manner. If two engines have been lost on the same side (the most likely situation) a hydraulic system will have been lost, causing plenty of other problems such as slow flap/slat movement and the need to manually free-fall part of the undercarriage.

In this case the captain would get the aircraft away from the ground and stabilised and then hand it to the co-pilot to fly with the navigator, while he and the engineer sort out the aircraft. The captain will then take control of the flying and land the aircraft. Teamwork is the essential factor in these situations and the two Daves were amazed at how much was done in such a short period of time. They also felt considerably more comfortable about real-world flying after seeing how emergencies are handled. As they pointed out, very few people carry out any sort of emergency in flight simulation. For us, however, this is the main

The RAF VC10 simulator

There are two six-axis, day/night visual VC10 simulators at RAF Brize Norton; one represents a C1K and the other a K3. Although all crews fly the different variants there are subtle differences between them, hence the two simulators.

The current C1K sim was built in 1985/6 to replace the first C1 sim that was built in the 1960s. The K3 sim was built in 1988/9 after the introduction of the K2s and K3s on 101 Sqn in 1984. Over the years they have been updated in line with the aircraft and have had to undergo some major upgrades in order to keep pace with both modifications to the actual aircraft as well as developments in simulator technology.

A few years ago the C1s were converted to tankers with the addition of two wing-mounted refuelling pods and then converted to kilograms from pounds. Other modifications have included updates to the visuals and the addition of modern navigation equipment and altimeters.

Every new VC10 crew member spends many hours in the sim, learning everything from basic checklists and procedures to dealing with complicated emergency drills and air refuelling scenarios.

David Maltby on flying the RAF sim

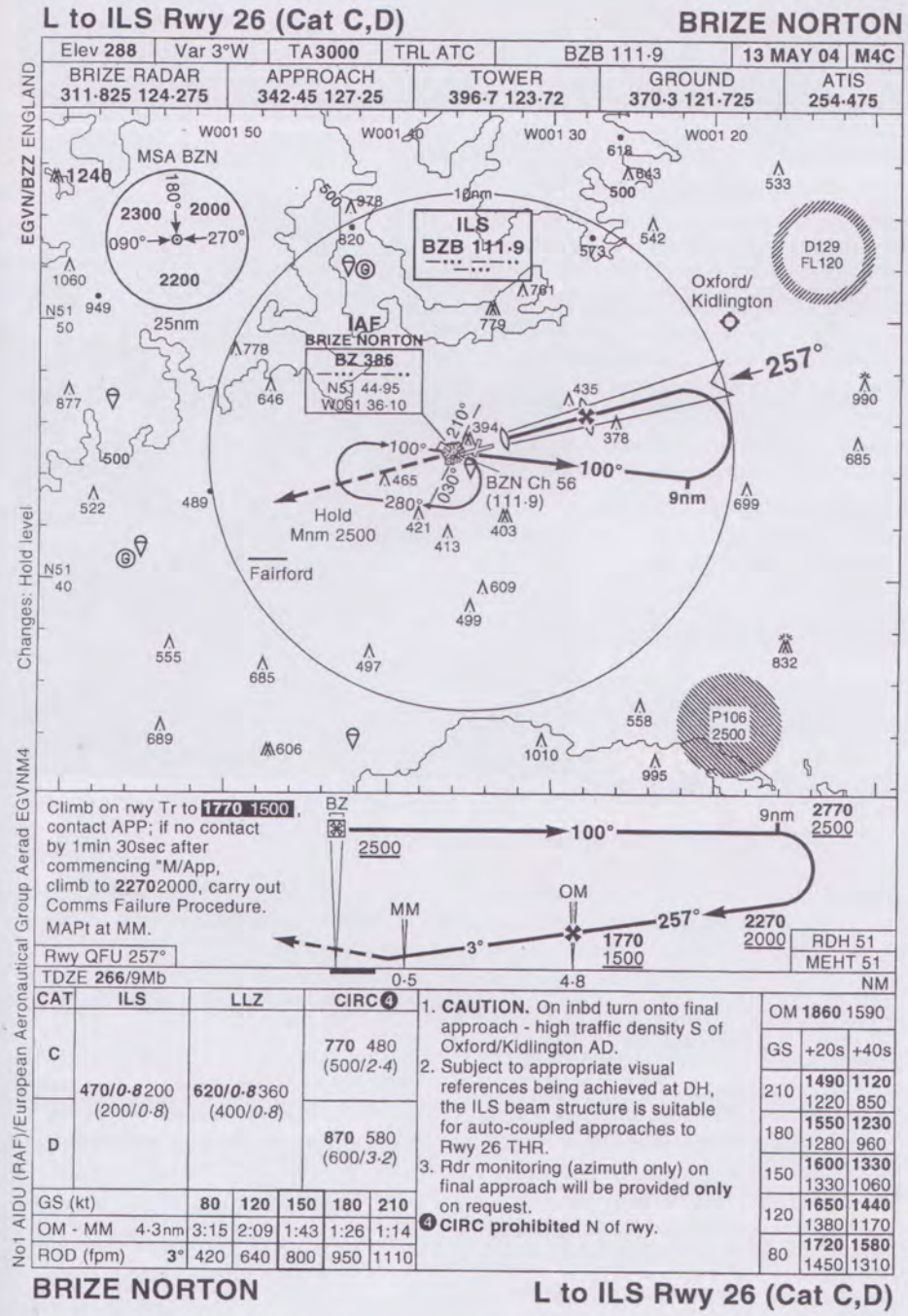
"Apart from the obvious physical differences with the controls, I was quite pleased with how the model fitted in with my experience of the real thing. I felt that flying the model had helped a lot and I did feel more comfortable in the VC10 than during my previous piloting experience in a Cessna 150!

The amount of physical work involved in moving the yoke and the delay in the resulting movement was more than I expected and I only found this out at rotation speed. It did take some getting used to and a lot of the basics went out of the window because of it.

I was comfortable with the controls by the time I was doing the visual circuit, but sadly the visual circuit was something I hadn't understood at all and had practised wrongly! I ended up in the kind of situation where I'd land the model on the PC but think it was unrealistic, so it was great to land the proper sim nicely from a position that hadn't looked good to me. I was well pleased with both of my landings.

Since we flew the tasks at a set weight of 95 tonnes, I was able to collect lots of useful data for power settings and speeds in different situations. The model has now been updated using this data and it performs pretty realistically within the normal operating limits. If you can fly the latest model on the tasks we did, you could do it in the real thing. That's the easy bit though – Andy demonstrated the procedure for double engine failure on take-off and it was a struggle to follow any of it. "

How's that for concentration! Dave Booker takes the controls



The runway 26 approach the two Daves were tasked with learning

reason for using the sim apart from training on initial conversion to the aircraft.

It was now time for the Daves to have a go and after the toss of a coin DM got into the co-pilot's seat. I knew that he was really looking forward to the challenge but that he was also very nervous about it. In the flight sim world he was used to there being only one person to do all the flying, but now he had a full crew to help. This at least meant that he could concentrate on the handling aspects of the flight. After a quick brief it soon became apparent, as expected, that he knew his way around the cockpit very well. DM and DB had based their original model on the cockpit of the VC10 at Brooklands, so there were a few differences between that one and the RAF aircraft, but not enough to cause any trouble.

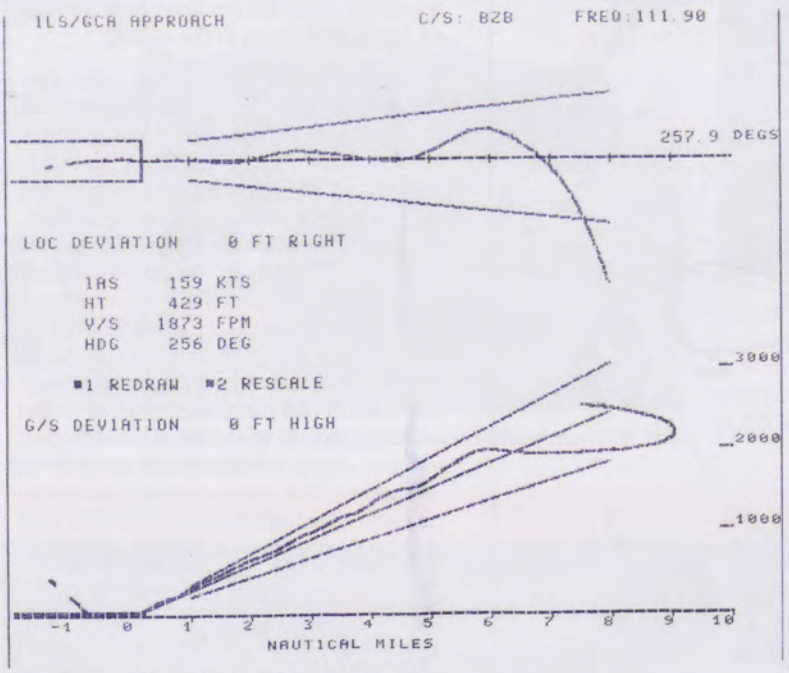
Dave lined us up on the runway, applied take-off power and off we went. The first surprise occurred on Rotate: "Bloody hell it's heavy..." came the cry, "...didn't expect that!" At light weights the VC10 performs very well and we were soon levelling off at 2,500 feet. A valiant effort during the retraction of the flaps kept the height there or thereabouts and the autopilot was then engaged. DM had already gathered that the power characteristics on his model did not accurately reflect the real thing (a problem now corrected) and was glad of the help with the throttles; on the VC10 the pilot asks for powers by percentage and the engineer sets them.

DM turned the aircraft back to the beacon and then flew a very good approach and excellent roller landing, even getting the aircraft neatly on the centreline of the runway. The visual circuit was then flown before a final landing (again, very nice) completed the end of the challenge.

It was now Dave Booker's turn to feel nervous. He climbed into the seat with the

VC10 C1K model upgraded

David Maltby's RAF VC10 C1K model now boasts updated textures and engine sounds, a new panel and improved flight dynamics. These images only show you the visuals, so download the updates for the full flying experience. All the details are available at www.dmflightsim.co.uk.



The computer never lies – Dave Booker's approach

There are good days out, and then there are very good days out!

obvious advantage of having seen the whole scenario once before and his flight was equally successful. The use of the autopilot from flaps up until the start of the ILS certainly helped. The two Daves had tried to model their FS autopilot as accurately as possible so both were well aware of its limitations. DB's ILS was very nicely flown, with particularly accurate attention to the required speeds.

Another nice landing, although a little to the right of the centreline, and we were airborne again and into the visual circuit. DB's visual approach was very precise and we were lined up with the runway at about 500 feet for a straight-in approach. For both Daves we had set the sim up with a 10-knot wind straight down the runway as a crosswind landing in the VC10 is fairly hard work. Again, another fine landing – although the roll out was a bit wobbly!

From the wide grins on their faces I was sure that both Daves had found the flight fantastic. Of course, there's a great deal more to real aviation than just hand flying the aircraft and both Daves said they couldn't have done anything else, such as setting (or calling for) powers or talking to the crew, as well as handling the aircraft. For my part, I have to say that I was duly impressed by the quality of their approaches and landings.

The ease with which they were able to read and interpret the instrumentation must obviously be down to the accuracy of their model, and the accuracy of the FS aircraft's flight dynamics surely helped in no small part with their handling of the aircraft. It is difficult to replicate the heaviness of a large aircraft in Flight Simulator, but I think DM has done a great job.

Finally, I would like to express our grateful thanks to Flt Lt Beeston and his crew for looking after us on the flight and to all the staff at the VC10 Training Flight and the VC10 Flight Simulator for their help. ■

Flt Lt Andy Townshend