655 Maintenance & Preservation Society

Issue No 25 **Spring 2011**

XM655 taxying during the VTTST Aircrew Training Day

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The Chairman's Introduction
Charles Brimson

Welcome to the Spring 2011 edition of the MaPS Newsletter, our first in a new smaller format. The change has been forced upon us by increasing postage costs, which now make the old format unaffordable, but we are pleased with the result, and we hope you will enjoy reading it.

This is getting to be like Groundhog Day.....for the second consecutive January (why do we always pick the coldest month?) we have just successfully completed the removal, inspection, cleaning , reinstallation and testing of one of our mighty Olympus 301 engines. Read all about it in the Engineering Report on Page 5.

Meanwhile we have continued to work closely with our friends at the Vulcan to the Sky Trust at Hinckley (or I should now say Finningley/Robin Hood Airport) with the two way flow of help and support culminating in the XH558 aircrew 'borrowing' XM655 for their pre-season procedural/emergency training in March. The aircraft performed magnificently – the jet efflux of four Olympus being felt by some of the volunteers as Phil O'Dell manoeuvred the aircraft around in a figure-of-eight on the inactive runway! We were joined by the Assistant Editor of Global Aviation Resource, an on-line aviation publication, who covered the day in detail. The article is well worth reading and is available at **www.globalaviationresource.com**. Gareth Stringer has promised to return to Wellesbourne a little later on this year and write an article exclusively about MaPS – watch out for that on GAR!

Talking about press coverage, we have also been privileged to feature in a double page spread in the Focus magazine that accompanies the Stratford Herald just before Christmas. The title of the article 'Big Boys Toys' says it all!

BIG BOY'S TOYS

AND THEY DON'T COME MUCH BIGGER THAN AN AVRO VULCAN JET BOMBER!

WELL that's what Charles Brimson and his team have to play with. Maybe 'play' is the wrong word for describing the work this dedicated group of un-paid volunteers carry out in order to keep this vintage warbird in ground running condition.

THE 655 Maintenance and Preservation Society, as the group is called, consist of a nucleus of around twelve active members; most of whom spend every Saturday all the year round maintaining the aircraft, entertaining the public and answering questions on the history.

In other non-aircraft news, we have recently purchased two much needed 20' containers to allow us to reorganise our growing collection of spares, equipment, tools and other sundry items. This has given Derek the perfect opportunity to move things around as well as make the new containers habitable and secure. Derek has been helped in this task by a group of Air Cadets from 150 (City of Oxford) Sqn, who will be helping us one day per month from now on – thank you to David McCulloch for arranging this.

One of the questions that comes up from just about every visitor to XM655 who peers into the cavernous bomb bay is "so where did the bomb(s) actually hang?" It is true that with an empty bomb bay it can be difficult to imagine how the space was used.....well, after a lot of behind-the-scenes work we are now able to show our visitors exactly where the (conventional) bombs would go as we have acquired on long-term loan a 'seven-store carrier' or in other words, a 7 x 1,000lb bomb rack. We are most grateful to the RAF Museum and in particular the Reserve Collection in Stafford who have graciously agreed to the loan of one of their two examples of this very rare piece of kit (the other is on display at Hendon in the Bomber Hall standing underneath their Vulcan B2).

Those of you familiar with the story of the Black Buck bombing missions during the Falklands War will know that the RAF was struggling back in 1982 to source enough of these to supply the Vulcans on Ascension Island; you can imagine therefore that there are not very many around 30 years later! Before we can display our seven-store carrier in its place in the bomb bay we still need to

source (or as an alternative to manufacture our own) two hangers from which to support the carrier across the width of the bomb bay. We have some ideas about this, but just in case anyone out there knows of any hidden away in a shed or under a bed somewhere, we would be most grateful to hear from you! On a related subject, Roger Bowen has been busy talking to the 1,000lb bomb OEM, Portsmouth Aviation, who have kindly agreed to provide us with lightweight and non-explosive examples of the bombs and fins to make the carrier display truly authentic. As many of you will know, some years ago we acquired the petrol-engine driven hydraulic lifting device that was used to hoist the loaded carriers into place (up to three carriers in a single Vulcan bomb bay). So we are getting tantalisingly close to the time where we will be able to 'arm' XM655 once again, but don't tell anyone – we might find ourselves helping out the under-funded and under-resourced RAF in Libya!

Whilst on the subject of recent acquisitions, we have also invested in two ex-military 12' x 12' canvas tents – you will see these in use adjacent to the MaPS Stand at Wings & Wheels on June 26 this year. In the past we had to borrow from the TA in Liverpool and whilst we were very grateful for their support it was inconvenient having two long return journeys to fetch and return the tents each year.

Since our last Newsletter I am pleased to announce that the number of 'regulars' who attend most Saturdays at Wellesbourne has increased by five – we are delighted to have Avril and Bryan (who you will remember from their 'appearance' in XM655's cockpit in the last Newsletter), as well as Damaris Tapp and her son Ben – Damaris has been a breath of fresh air in terms of the amount of fund-raising ideas she has brought with her as well as her organisational skills which we are making great use of as Wings & Wheels 2011 is fast approaching. Finally we have welcomed Jocelyn Remy, another VTTSC stalwart, who has been helping out regularly. We are always on the look out for willing volunteers to help of course, it doesn't matter what your background or experience is, there is always something to do on, in, or near to the aircraft!

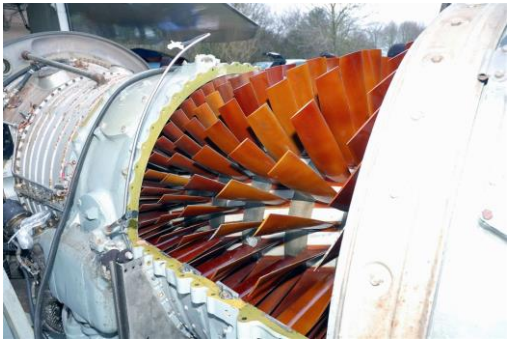
Continuing with the theme of fresh ideas, we will shortly be embarking on a re-launch of our MaPS merchandise range – please watch this space! If any of our readership has any ideas that they would like to see transformed into merchandise that will help to raise funds for MaPS then please get in touch with one of us or email **xm655maps@aol.com**.

We hope that you will enjoy reading Martin Withers' article on page 10 about his experience of displaying the only flying Vulcan in the world – we have taken a little liberty with this article which is after all about XH558, but as Martin is also one of 'our' pilots (and will indeed be driving XM655 on June 26) we hope you will forgive us!

Engineering Report
Eric Ranshaw

You may remember that winter came rather early. On a bitterly cold day towards the end of November, with snow forecast, we bolted a steel plate down to the concrete pan to which we were able to attach the nosewheel tie-down. That together with an additional 1500litres of fuel loaded into the forward tanks gave us the confidence that XM655 would not suffer the fate of XL319 at the North East Air Museum, which tipped onto its tail during the previous winter snows. With the larger than usual quantity of fuel held in the forward tanks, we soon noted a small fuel leak, and moved some of the fuel to another tank. More on that later.

Our major project this winter has been the inspection of our number 3 Olympus engine, following on from the successful inspection of No 4 last year.



We started preparation work at the end of December, and the engine was lowered from the airframe in mid January. The top half casings of both the LP and HP compressors were removed, and all the stator and rotor blading was found to be in excellent condition. We took the opportunity to change two stage zero stator blades which had fatigue cracks, but apart from that, no remedial work was required beyond a thorough clean of the LP compressor. Six weeks after removal, the engine was hoisted back into the airframe.

Dave and Jocelyn have started a programme of corrosion removal and rectification in the areas of the elevons, power bay, and engine doors, which is currently still ongoing. Dave also repainted the No 3 engine bay whilst it was unoccupied.

Badly corroded steel repair plates in the cold air intake inboard of the boundary layer splitter of both wings have been removed by Fred and Roger, and we are now in the process of sourcing suitable replacements. Throughout the winter, Roger has also been replacing all the engine door rubber seals with replacements kindly supplied by VTTST.

We have had a defective pressure switch in the EHPP system for some time, and have been unable to obtain a serviceable replacement. This was partially to blame for the burnt out motor we described in the last newsletter. In the absence of a "correct" replacement, Eric has installed a modern commercial pressure switch to do the same job. As it is significantly smaller than the original, we hope to be able to fit it into the old case to keep the system visually correct.

Apart from the fuel leak mentioned above, we have also had leaks from the refueling pipework in the port main undercarriage bay, and from various joints in the defueling system. We have also found a broken linkage to one of the manual defueling valves. All of these have been worked on during the winter by Derek, Fred, Bovril, Charles and Eric, and it seems we now have a leak-free aircraft.

The ground equipment has continued to take up much of our time. After a day of extensive use pushing aircraft jacks around, the Coleman tug suddenly decided to start applying random and unwanted amounts of rear wheel steering. This was caused by a broken feedback rod, and we were able to source new ball joints and repair it without too much difficulty. Bovril, Phil and Mark have worked extensively on the Sentinel tug, which has had most of its ignition system replaced.

Phil and Nigel have completed a modification to the aircraft towing arm to make it easier to use on uneven ground, and the first results at the XH558 aircrew training day were encouraging. Some further improvements have been made, and it will get a full work-out at Wings and Wheels.

In addition to his ongoing work on the aircraft radar equipment, Len has replaced some of the circuit breakers on the Houchin GPU, which we hope will improve its reliability.

Wings & Wheels Sunday 26 June 2011

We are delighted to announce that Wings & Wheels this year will be on Sunday 26 June 2011 – please note that this is the Sunday ***after*** Fathers Day, and has been selected to avoid the clash with the Kemble Airshow and also Cockpit Fest at Newark Air Museum. We hope that this one week change will prove popular with our thousands of happy spectators including all our loyal members.

Our aircrew for the day will be Wg Cdr Mike Pollitt (RAF Retired), Sqn Ldr Martin Withers, DFC (RAF Retired) and Sqn Ldr Barry Masefield (RAF Retired). Unfortunately, our ever loyal 'usual' Captain, Sqn Ldr David Thomas (RAF Retired) is otherwise engaged as he is the airshow organiser for the RAF Waddington show and as Wings & Wheels is the weekend before Waddington, David will be very busy at Waddo. The goods news (for us anyway) is that 2011 is David's last year organising Waddington, so normal service for Wings & Wheels will be re-established as from next year!

We will stick to our tried and tested basic running order for the day – because it is popular and it works. We are however trying very hard to freshen up the choice of exhibitors, trade stands, catering stands and visiting aircraft for the event – planning is still happening at the time of writing, and we hope you will be pleased with what we have arranged by the time June 26 arrives.

I am also pleased to announce that our friends at Air Atlantique at Coventry Airport will be providing their lovely de Havilland Dragon Rapide for pleasure flights throughout the day. You will be able to book a short flight on the day – the booking table will be not far from where the Rapide will be parked at the intersection of the two runways.

I can confirm that the Battle of Britain Memorial Flight will be providing the Lancaster, Spitfire and Hurricane to perform a flypast just before XM655 performs her fast taxy run at 2pm. This arrangement comes with all the usual caveats concerning aircraft serviceability and weather, etc. I hope that we will also have several exotic and historic aircraft flying in for the day and being displayed in the static display area at the northern end of Rwy 05/23. Finally we hope that one of our regular Air Cadet Squadrons will be providing a marching band to entertain you at lunchtime. It all promises to be a great day – and as usual it is all free for MaPS Members, and you will find your ticket(s) enclosed with this newsletter. Please encourage all your friends, neighbours and family members to join us – the entrance fee for non-members is an astonishingly low £5....

Visitors to (and from) XM655

Not surprisingly the number of visitors during the cold winter months is a lot lower than during the summer, nevertheless we have still had our fair share of people eager to meet or reacquaint themselves with XM655:

The British Association of Balloon Operators had their AGM at Wellesbourne Airfield in December and before the meeting a number of their intrepid members came to visit XM655 including a former Concorde engineer who delighted in being shown our version of the Olympus engines by Fred Barter.

Also in December we were visited by a young film maker called Charles Edwards who investigated the possibility of using XM655's cockpit as the background for a scene of a film that they were floating with film producers in the USA – watch this space!

On Sunday 30th January 12 of the MaPS volunteers had a 'busman's holiday' and trooped off to RAF Lyneham to spend a couple of hours looking over XH558 and have a chat with the duty VTTST engineers as the aircraft was coming toward the end of its winter maintenance programme. As has become traditional when visiting VTTSC engineers, we took with us a significant supply of Jaffa Cakes as they seem to live on them during the dark winter months. Indeed they get through so many of these things that they measure them in yards – Clive's photo shows about 15 yards ready to be handed over to the hungry chaps. Our thanks to Engineering Manager John Hufton, Aircraft Access Manager Toni Hunter, Rick Lee and not least our own 'shared' volunteer Damaris Tapp for their hospitality and professionalism in dealing with a dozen hardened Vulcanites! XH558 looked superb and it was very nice to be able to see several former parts of XM655 up close once again.....

In February we were visited by Mike Osborne, who lives locally. Mike is an ex-V Force Radar Technician from the days of the Vulcan B1 and he has kindly

given to us all his Course and Lecture Notes from the mid 1950s – at some point these will no doubt prove invaluable as our own Len Hewitt continues with his long term ambition to get all the magic stuff at the two Navigators positions working as advertised.

In March Ben Clarke and Howard Knott, who each served their apprenticeships at RAF Locking nearly 50 years ago, both visited us. Ben who became a 'Fairy' on 9 Squadron Vulcans at RAF Cottesmore, has particular reason to remember XM655. Our aircraft was the last ever brand new Vulcan to be delivered to 9 Squadron in 1964 and Ben fondly recalls how they tried to maintain its youthful good looks for as long as possible. Ben's verdict on how 655 looks now 47 years later? "Better than ever!" – thanks Ben, you can come and visit us again any time...

We were very touched to be asked by our 'tame' photographer, Clive Hanley, for permission to allow a lady called Sally Chambers to visit us with her husband whilst we were doing our EGR/aircrew training on 26 March. Sally, whose maiden name was Gamble, is the daughter of Sqn Ldr Albert Gamble who was the AEO tragically killed along with the other three back-seat crew in Vulcan B1 XA897 which crashed at Heathrow at the end of a round trip to Australia in 1956 (the two pilots escaping following successful deployment of their ejection seats). Sally was only a few months old when her father was killed, it was very poignant showing her where her father would have sat and worked in the aircraft. It was also a great treat for us to be able to show Sally and her husband Jim, a working and moving Vulcan at the same time.

Finally, in early April, we were visited on consecutive weekends by the West Midlands branch of the Spice Adventure, Sports and Social Group, and by the Chipping Norton Astronomers Group, who are pictured below.

Tin triangle - display-flying the Vulcan in 2009
Martin Withers

I had a super summer in 2009 display-flying the world's only airworthy Avro Vulcan bomber - an aircraft I first got my hands on in 1971 as a co-pilot at RAF Waddington with 44 Sqn. I went on to do a tour as a captain and later had the honour of taking the aircraft into battle during the Falklands War in 1982, on Operation Black Buck.

Since leaving the Royal Air Force I have had a series of airline flying jobs, most recently on the Boeing 767 with Zoom. I had hoped to fly for Zoom until I retired at 65, but unfortunately it folded in 2008. I had a job offer from Thomas Cook this year, which I did not accept as at the time I was the only qualified Vulcan display pilot available. So I ended up having a fantastic summer because I flew the delta bomber on 28 occasions and only missed one 2009 display.

At the start of the 2009 season the usual crew was myself in the left-hand seat, former RAF Vulcan Display Flight (VDF) co-pilot and Panavia Tornado GR4 pilot Kev Rumens in the right-hand seat and ex-VDF air electronics officer (AEO) Barry Masefield in the back. Phil Davies is another ex-Vulcan AEO who flew some displays. Later, Kev Rumens qualified as a display pilot, sharing the "onerous task" when he was available on his Virgin Atlantic roster. We were joined by ex-Vulcan co-pilot Bill Perrins (also a former Tornado driver and now a Virgin Boeing 747 pilot) and Phil O'Dell (ex-RAF Blackburn Buccaneer, Sepecat Jaguar and BAe Hawk pilot and now Rolls-Royce chief test pilot).

The hardest feature of displaying the Vulcan is not the flying of it, but keeping yourself correctly positioned. The view through the cockpit windows is a little like looking through a letter box, and you cannot see across the cockpit so if you are running in with the display centre on the right you need the other pilot to call "two, one, now" because you cannot see it. Similarly, when making a right turn you need him to tell you to slacken off or increase the bank as you are coming round.

This can make displays where there are operating restrictions more of a challenge. At the Silverstone racing circuit, for example, we were not allowed to over-fly the Porsche centre, which meant we had very little room to get back on the display line when manoeuvring and I was relying entirely on the guy in the right-hand seat to give me the calls as I never knew whether I was over it or not.

XH558's cockpit differs from the Vulcans I used to fly in the RAF in that the old military flight system is replaced by a Bendix-King "artificial horizon", and there are new LCD compasses. The radio altimeter and machmeter have gone and a Garmin GPS receiver occupies their place on the instrument panel.

The AEO is responsible for reading the checklist, and most of the radio calls, which keeps him busy, and he also monitors the flight using the instruments in the rear. In RAF days the nav plotter, who was one of the Vulcan's three rear crew during its operational service, was very involved in the display calling speeds and heights etc. But we have not been doing it that way in XH558, as all our pilots are airline flightcrew, so we are used to the routine of monitoring and talking to each other. We rely on the AEO to observe and just call us when we are below a certain target speed or height.

Although the Vulcan's two pilots sit on Martin Baker ejection seats, the AEO's only means of escape is to bail out through the crew hatch that is right in front of the nose gear leg. The gear is hydraulically actuated and in any emergency, such as an engine fire, one of the first drills is "gear-up" for rear crew escape, as if you lose the hydraulics and the gear is down, it stays down.

The type of display we fly varies depending on the venue. We have a standard routine over normal-sized airfields such as Waddington and Fairford, where there are no operating restrictions on heights or no-go zones. Seaside displays are also usually fairly standard, but at smaller places such as Goodwood, which involves displaying over a racetrack, there are limits, which means we have to modify the routine.

At Shoreham airfield restrictions meant we had to be above 1,500ft (460m) over a built-up area and we had to avoid a school and making noise over a field full of horses. Manoeuvring around these restrictions is not easy in a big aircraft with a large turning circle. The Vulcan goes up very quickly, but does not come down very quickly.

It was wonderful to display at Windermere, but we had to modify the routine because of the terrain. We were unable to arrive at high speed because the radius of turn would have been far too great at 300kt (555km/h) without overstressing the aircraft to get round the hills. We try to limit it to 1.55g.

We also have to modify the display for low cloud. The rules imposed on us as an ex-military "permit" aircraft do not allowed us to fly the Vulcan in cloud.

XH558 can carry up to 29,500kg (65,000lb) of fuel and because we always carry a safe amount - mainly for holding -we never operate particularly light. We have an absolute minimum of 4.5t for landing - the Vulcan's fuel is spread around 14 tanks and the gauging is inaccurate. For the display at the Royal International Air Tattoo at Fairford we carried about 11t, meaning our all-up take-off weight was around 57t.

The delta wing does not have any high-lift devices - pitch and roll control is provided by four large elevons on each trailing edge - which keeps everything simple. The airbrakes above and below the wing have three positions - "in", "medium drag" and "high drag".

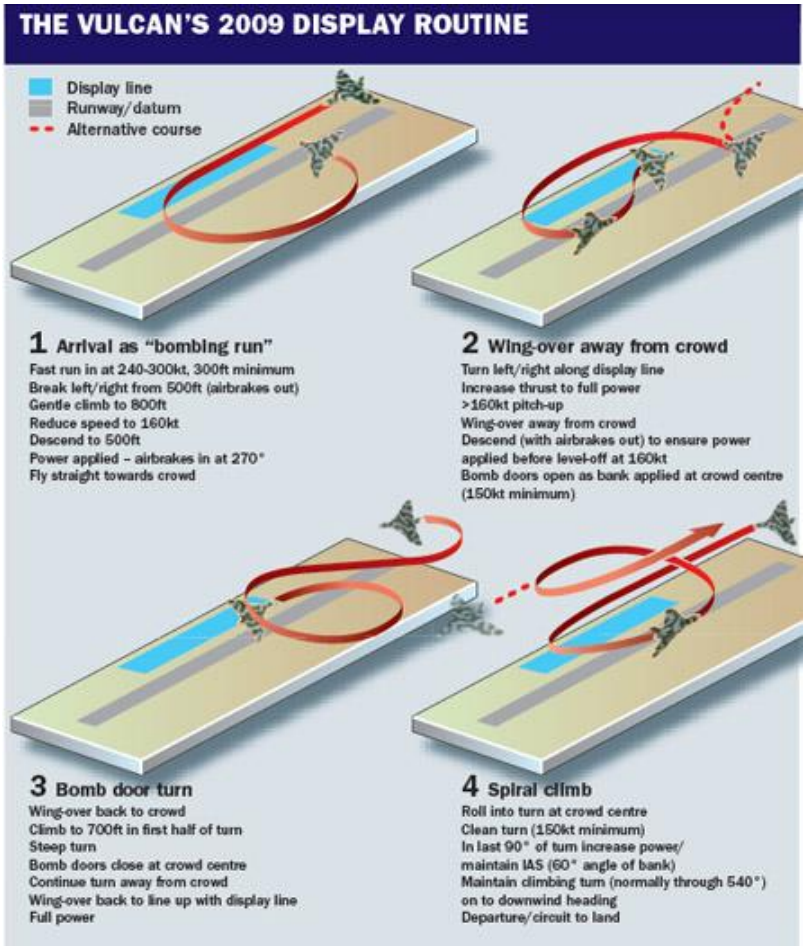
For a display take-off, full power is selected and the Vulcan quickly accelerates to 150kt, at which point we rotate into a steep climb. Although the nominal rotate speed is around 140kt, we hold the nose down a bit longer so we can pitch up straight into a steep climb. We try to conserve the engines, so do not always use full power - sometimes about 90%. There is a critical "resonance band" of 93-96% in which we must not loiter because of vibration so we try to keep the power at either full thrust or no more than 90%.

On rotation we progressively pitch the nose up to an initial deck angle of around 35° and then gradually increase to 45°. This is all done by eye and by feel and monitoring the speed to make sure it stabilises at around 160kt, controlling purely with pitch. Once airborne, the pilot flying applies the wheel brakes for 4s and calls for the pilot not flying to retract the gear.

Once the gear is up and the take-off checks are virtually all completed, the delta wing configuration means there is no limiting speed, one minimum flying speed and one stalling speed, like a Tiger Moth. We hold 160kt and quite quickly - at around 1,200ft - roll the Vulcan to kill the climb and level off at around 1,500ft. We then position for the start of the routine. Power comes

back to 75% on the four RPM gauges mounted in front of the throttles, and we begin descending to position "crowd rear" accelerating to around 250kt.

Last year we never really went above 180kt on any part of the display - meaning that we were flying at the same speed as a Lancaster, but making more noise. This year I decided to start the routine with a low, high-speed run-in to look more like a jet bomber. For that first run-in we like to fly a curved arrival to show the upper side of the wing to the crowd, descending to a minimum of 300ft. We bring the power back on and accelerate to up to 300kt by the end of the display line.



At the end of the "bombing run" we close the throttles almost to idle and deploy the airbrakes for a level break, turning back in to come head on to crowd centre, with speed reducing to about 160kt. We then turn steeply on to

the display line and open the throttles fully - it takes a few seconds to reach full power - and pitch up into a steep climb to 1,200ft. We are probably climbing at 60°, but as there is nothing on the instrument panel to help us, it is all eyeball and a feet on the horizon job.

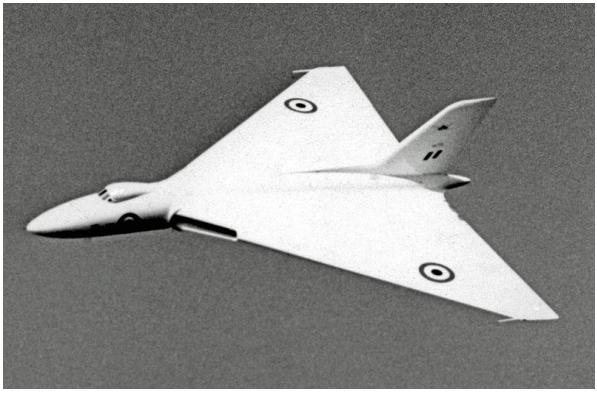
We then start a roll away from the crowd and over bank so that the nose starts coming down again. Once it is coming down with the power back to 70%, the speed reduces to around 150-160kt and this, along with the rate of descent, is controlled using light buffet - and sometimes the airbrakes. We descend to a minimum of 500ft, turning to point at the crowd centre and then reverse the turn to approach the display line for the "bomb-door turn". As we fly past crowd centre with the belly up to the spectators, the PNF calls "bomb doors in: two, one, now", and the AEO in the rear opens the doors.

We fly a 360° turn with 45° of right bank - to avoid the risk of over-stressing the aircraft - during which we climb and descend 200ft so it looks level from the crowd's perspective. As we come back past crowd centre, on the call "bomb doors - two, one, now" and the AEO makes the selection to close the doors in the back. We continue the turn through to 60° from the crowd line and then roll off and pull into another wing-over back towards to the display line, pitching up to climb to 1,200ft. Descending back to 500ft, the speed is controlled with buffet/airbrakes. We try to avoid bringing the throttles right back because of the engines' slow acceleration rate.

We fly down the display line and at crowd centre we roll into a bank away from the crowd to make another orbit. As we are pointing at crowd centre, the power is put back on, and the jet is pitched up and the bank increased to 60° for the spiral climb through 540° up to 2,500ft - or higher if it suits the routine. We then join the down-wind circuit to land. As soon as we want to go down the gear is deployed (the limiting speed we use is 200kt) and with the airbrakes out the Vulcan descends pretty quickly. We effectively fly a glide-approach. The downwind leg is flown with thrust in the "high 60s" - around 68%. The Vulcan is flown on a speed-stabilised approach at around 160kt until 600ft with medium airbrake selected and the thrust at around 65-66% - we use the higher setting for better engine response. The final approach speed is nominally 140kt and VREF 130kt, depending on the weight. High drag airbrake is used to reduce to VREF.

Once the nose gear is down the wheel brakes are applied and we slow to taxi speed. There is enough pitch control to hold the nosewheels off until about 70kt when landing on a long runway, which looks lovely and means we can slow down with little use of the brakes. We do not use the parachute brake - it is treated as a emergency device as we have only got three chutes and they cost around £3,000 to be repacked in the tail.

The loss of VX770 ~ Pilot Error?
Eric Ranshaw



The first Vulcan B1 prototype, VX770, eight years old and being used by Rolls Royce as a test bed for the Conway engine, broke up at low altitude and crashed whilst opening an airshow at Syerston in September 1958. All four crew and three people on the ground were killed, and the aircraft was totally destroyed. There seems to be a general belief that the official report blames the pilot, Keith Sturt, for exceeding the airframe's structural limits with a high speed pull-up, but there are those who believe this judgement is unjustified. My interest was aroused when I read a description of the crash, and then came across a video which didn't seem to me to match the explanation.

As I regularly visit The National Archives doing family history research, I decided to see what information was available, and found a file containing the official Board of Inquiry report. It is the office file of the AIB Chief Investigating Officer Eric Newton, and as well as the various official documents, it also contains his hand written notes and drafts which provide some insight into the investigation.

By 8pm on the day of the crash, long before the Board of Inquiry had been convened, Mr Newton had been contacted personally at home by Rolls Royce asking him to attend. He travelled to Syerston the next morning, and walked the debris field accompanied by representatives of Rolls Royce and A.V.Roe Ltd. It was obviously in RR's interest to ensure that their engines were not blamed for the crash, and Avro would not want the airframe to be blamed. During this examination, one of the starboard aileron actuators was found, and it was noted to be almost fully extended.

On his return to the office on Monday morning, Mr Newton wrote a manuscript file note explaining his visit and describing what had been found. Part of his note states that there was no evidence of metal fatigue, that the starboard aileron showed almost full up aileron applied, and that this was consistent with

an upload with torsion failure of the outer part of the wing due to over-stressing. Two days later, he drafted a statement for the Board of Inquiry making broadly the same case. Reading the manuscript draft of the statement, it is clear that Mr Newton was minded to make an even stronger condemnation of the pilot, but he revised his choice of words to be less severe.

On the same day that this statement was prepared, J R Evans of Avro, who was present when the actuator was found, wrote to Mr Newton. He had been in discussion with the manufacturer, Boulton Paul Ltd, and ascertained that the actuator would continue to run for some 14 seconds after the power was removed. He concludes that the actuator position as found gives no indication of the position at the time of break-up. It is apparent that Mr Newton saw this letter, as he has initialled the original against his name, but he made no change to his statement to the Board of Inquiry, and there is no indication that the Board were made aware of the discussions with Boulton Paul.

However, the statement by Mr Newton was not the only technical input to the Board of Inquiry. The Board's own Technical Officer, Sqn.Ldr. D L R Bird, examined the wreckage and produced a detailed statement which forms Appendix 2(ii) of the report. It indicates he had found evidence of possible metal fatigue of the wing attachment main forging, and that the distribution of the crash debris might suggest an initial failure at the root of the starboard wing.

Faced with different opinions as to the possible causes of the crash, the Board of Inquiry concluded that the primary cause of the accident was a structural failure of the starboard mainplane, that the reason for the failure had not been determined by the Board, and that the airframe wreckage had been sent to the RAE Structures Department where a full investigation was being made.

The next document in the file is a covering letter dated 18 months later from the RAE to Mr Newton enclosing two copies of their report, identified as Accident Note Structures 307. The covering letter is the original top copy, but the file does not contain the report which accompanied it.

I have searched the catalogue of The National Archives on several occasions, and there is no sign of Accident Note Structures 307 amongst the RAE

documentation. I have also contacted QinetiQ and the Defence Science and Technology Laboratory (as successors to RAE), the National Aerospace Library, the Avro Heritage Group, the RAF Museum at Hendon and the Air Accident Investigation Branch, none of whom has a copy of the report.

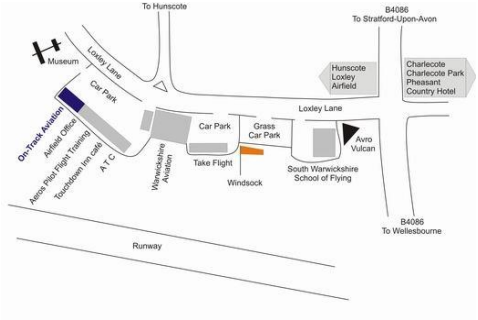
There are references in published literature to the content of the report, but they are inconsistent, and provide no help in locating a copy. The film of the aircraft commencing its run past the crowd and breaking up is available on-line, and it shows a gentle roll to starboard, presumably intended to show the planform of the aircraft to the crowd. It is also clear that the initial signs of failure involved a break-up of the leading edge just outboard of the starboard air intakes, and not a failure of the outer wing as proposed by Mr Newton. There is no indication of an attempt to pull-out or climb before the wing starts to break up. It is important to remember that to "pull g" the aircraft has to actually make the manoeuvre; it is the change of direction or attitude which generates the g force, not simply the operation of the control surfaces.

In the absence of the RAE structural analysis, it is impossible to reach a final conclusion. However, the fact that the Board of Inquiry was never reconvened to consider the report they had requested, and the fact that although the report was definitely produced it is not available in any of the obvious archives, suggests that perhaps it was quietly allowed to disappear because it didn't reach the "right" conclusions. As to whether it really was pilot error, I'm not convinced; are you?

This is a much-abbreviated version of my analysis of the available information regarding the loss of VX770, and does not include contradictory eye witness accounts, or concerns about the prior condition of the airframe. If anyone is interested to learn more about the incident, please contact me via the MaPS email address, **xm655maps@aol.com**.

MaPS Annual General Meeting Saturday 9th July 2011

The AGM will be held at 1 pm in the Wellington Room at On Track Aviation, Wellesbourne Airfield on Saturday 9th July 2011. All members are welcome and tea/coffee and biscuits will be provided.



The agenda will be as follows:

Chairman's introduction and annual report.

Treasurer's report and approval of annual accounts.

Resignation of Membership Secretary

Appointment of auditor for the coming year.

Committee proposal to increase annual single membership from £12 to £15.

Committee proposal for changes to the 655MaPS rules.

Any other business.

Details of the proposed changes to the MaPS Rules are given on page 19, and the Treasurer's financial report for the year is on page 20.

Any items that members wish to add to the agenda must be sent in writing to the MaPS Group Secretary, PO Box 313, Malvern WR14 9FJ to arrive no later than four weeks before the AGM.

Picture Credits

Page 1 ~ Gareth Stringer
Page 2 ~ Stratford Herald
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Page 15 ~ RuthAS
Pages 16 and 17 ~ The National Archive
All others ~ Charles Brimson

655MaPS Rules ~ Changes proposed by the Committee

MEMBERSHIP

iv *A family membership is defined as two adults and ~~up to two~~ children under ~~sixteen~~ fourteen years of age.*

655MaPS MANAGEMENT

i *Committee – the management of* **655MaPS**, *in order to best achieve the objectives of RULE 2, shall be vested in a committee of not more than ten* **655MaPS** *members. This committee shall include, as a minimum, the Chairman, Vice-Chairman, Treasurer, Secretary, and two Technical Group Members. The committee shall have the power to co-opt additional committee members, and to set up and dissolve sub-committees, chaired by a committee member and responsible to the committee, to achieve specific tasks.*

ii *Officers – The Chairman, Vice-Chairman, Treasurer, and Secretary of* **655MaPS** ~~*elected by the committee,*~~ *shall be elected by the membership at a General Meeting, and shall be designated officers. These officers shall hold office until resignation, death, or until removed from office by a two-thirds majority approved resolution of ~~the committee~~ a General Meeting.*

iii *Technical Group Members –* **655MaPS** *volunteers with suitable experience shall be appointed by the Committee to be responsible for technical matters concerning Airframe, Avionics, Propulsion and Ground Equipment activities.*

SUBSCRIPTIONS

iii *Membership subscriptions must be paid in ~~Pounds Sterling (£) and made payable to '~~***655MaPS***~~', crossed 'Account Payee' and forwarded to the Treasurer of~~* **655MaPS** *a manner approved by the committee.*

FINANCE

ii *A bank account shall be maintained in the name of the society, and all cheques must be signed by the treasurer or chairman. All online banking activities shall be carried out by the treasurer.*

vi *All expenditure in excess of ~~£10.00~~ £70.00 must be approved by two other committee members, and in excess of £100.00 by a committee meeting. These approval requirements are to be applied on a per project basis, not for each line item.*

These changes are proposed to bring the Rules into line with existing practice, and will be discussed and voted on at the Annual General Meeting on 9th July 2011. Additional text is shown thus, and removed text is shown ~~thus~~.

FINANCIAL REPORT OF 655 MAINTENANCE AND PRESERVATION SOCIETY
for financial year ending 31st March 2011

	2010/2011	2009/10
Income		
Donations	£5,375.22	£3,577.64
Membership	£3,934.00	£3,625.00
Sale of Merchandise inc P & P	£1,897.58	£1,787.53
Run Day Income	£5,782.00	£4,816.80
Interest	£10.96	£9.67
Total Income	£16,999.76	£13,816.64
Expenses		
Merchandise Purchase	£1,363.00	£560.94
Aircraft Spares & Repairs	£677.49	£685.73
Aircraft Fuel	£6,276.89	£3,396.92
Run Day Expenses	£1,113.37	£1,256.49
Ground Equipment	£1,106.63	£1,522.50
Ground Equipment Fuel	£563.64	
Transport	£126.92	£1,210.39
Membership Expenses	£885.28	£997.87
Buildings, Residence etc	£4,436.43	£1,942.29
Tools, Consumables etc	£788.17	£1,048.55
Public Relations	£140.00	£75.00
Woodford Operation	£0.00	£2,613.68
Total Expenses	£17,477.82	£15,310.36
Surplus (Deficit)	(£478.06)	(£1,493.72)

Note~ the figures presented for the 2009/2010 year differ from those published at the last AGM. This is because the petty cash account was reported separately as an additional single line item. This has now been distributed across the income and expenditure categories for comparison purposes. The totals remain the same.