

Cameron Bailey

Well, good morning Cameron, today is Thursday, January 23, and you had asked me to put down some thoughts regarding the supersonic flying in the Arrow. Before I get into details of the actual arrow flying, I thought a little background the supersonic flying generally might be of interest to you. While I was in test pilot school in the 1944 and 1945 period, supersonic flight then was a complete unknown. We were shown in the increase in drag with aircraft speed graphically and all that was known those days was the drag increased asymptotically as you approached Mach 1. In other words, it went up very high it made an increase of about 0.9 Mach, didn't reach any peak and then at Mach 1 nobody knew what happened and then at after Mach 1 the drag was shown to decrease and settled to an acceptable level past Mach 1. That was commonly thought and not substantiated at that time that an aircraft passing the sound barrier at Mach 1 could possibly disintegrate and that was about what was known at the time then. Well, come 1947, Chuck Yeager as you probably know is the first man to fly supersonic in the Bell XI high-speed rocket research airplane. The special research airplanes went on then to various models by various manufacturers and they finely exceeded Mach 3 in the dive. Well these of course were far from being operational airplanes. However, by the mid 1950s there were operational fighters that were exceeded Mach 1. The Lockheed F104 Starfighter, Conair's F102 - A Deltadager and the American's F100. They were all capable of supersonic flight but they didn't have much range and it was rather just the fact that they were supersonic rather than being a strict operational capability. Anyway, prior to finding the Arrow, all three of us Jan, Sputton and myself all went down to the desert palm vale adjacent to the Nairobi desert and their Convair had their production line for the 102 and we were allowed to get some experience on the 102 by flying production flights. Well the 102 was a supersonic airplane certainly but it took quite a bit of time to get supersonic. The acceleration wasn't fantastic and I was somewhat disillusioned with the 102 because it was a very good airplane in many respects. It went like a rocket to 50 000 feet but above 50 000 the ones we were flying could barely get them to 55 000 which was just about their peak altitude but then they were that was it. They wouldn't go any further. Anyway, we got the experience of flying the high-speed Delta configuration and it presented no problems at all. Actually I think, in my experience, the high-speed Delta configuration is an easy airplane to fly and land than many of the more regular conformed airplanes. To the best of my recollection now the 102 made the transition reasonably smoothly with a few little trim changes but everything was easily controlled, no problems at all. Vastly different to our earlier attempts to get the CF100 supersonic in the dive. I know we all tried this and with the CF-100 you could get some of them to go supersonic in the dive but it took a really hard effort and the technique was to take the airplane to 45 000 feet, roll it over on its back under power, and then start into a vertical dive. During this dive if you could get a sufficiently quick acceleration, some airplanes were cleaner than others, you could just add some supersonic to about 1.010 to 1.01-1/2 but the thing was by the time you got to these sort of transition stage it was snaking but that's the tail oscillation and also lateral oscillation on the ailerons where you had to really sort of almost fight the airplane to keep it steady and then you could just get supersonic. By then time you are getting down to the denser air and drag was increasing rapidly and you fell back subsonic almost immediately. That was the type of experience

on flying a subsonic air plane with supersonic speeds when it is not designed for it. However, with the Arrow, I think it is the most amazing air plane that should have existed for the transition point of view. Because basically about 17 000 feet the arrow flew or made the transition from subsonic to supersonic with absolutely no trim change at all. It was virtually hands off the controls as the acceleration when through Mach 1. The main thing you noticed was the being rear engine normally and subsonic flight you had your basic engine rumble. As you made the transition the engine rumble noise disappeared because you couldn't hear what was happening behind you and you started picking up more slip stream canopy noise and the instrument indication your Mach meter took a jump from about .9798 to 1.02 and your air speed indicator also took the jump. This jump was caused by the sort of shock wave settling initially on the pitot-static pick-up give the pressure readings to the air speed indicator and Mach meter and as the shock wave stabilized and then passed so that the pitot-static picked up the pressure changes but actually it was all done in a so little jump you never got a complete smooth flow on the indicator from the throw mark when it took a little jump there. But you mentioned you wanted to know my own particular experience on this is. Well, normally on first flights you sort of have to take the air plane round pretty gently but we have always been working on the Arrow cockpit so long in the past on the basic cockpit layout design that sort of thing and we had all done some ground ones on the arrow we knew the cockpit just as well as the cockpit of the CF-100 so we all felt pretty familiar with the airplane before we even took it off the ground and the first flight I made with conventional takeoff we never used the afterburners on takeoff because basically they gave us more power than we needed because acceleration with burners was so great that you would normally tend to exceed your safety at down speed before you could get the gear retracted. Normally we just did a normal takeoff without burners and then if you were going fast let the burners once you got the gear up and every sort of stowed nicely for normal flight. In my particular case I did a conventional take off so I got the feel of the air plane passing through 17 000 on the climb mark and I lit the burners at 17 000 feet maintaining a fairly steep climb and I was able to make I sort of went supersonic on the climb at 40 000 feet I was in a climbing turn at Mach 1.2 and was still climbing and absolutely no change in control responses at all. It was the most amazing thing that could happen at the time. The test plan for my flight at this time includes some work at Mach 1.5 at 50 000 feet which was completed but even then one could tell from the fact that the amount of power I had on to obtain 1.5 Mach there was quite a bit left. You knew it could go an awful lot faster than at as it was well proven but it is just incredible. You can sit at 1.5 with a delightfully stable air plane. It was a most impressive thing. And another thing with the Arrow on the landing too that air plane was so very stable on the approach. You could set up your approach speeds way back on the finals. You got a fairly relatively high angle of attack being on the Delta plan form but you could just get your speed set up. You were so speed stable you could maintain that speed nicely unto you got over the edge of the runway just lined up, check the throttles and that air plane would just about settle all on its own with very little else for you to do other than just check it a bit prior to touch down. And then, of course, we used the tail breaking drag chute to slow the airplane down a bit to avoid excessive use of the brakes. During my flying career I have flown over 100 different types of airplanes and I can honestly say that the Arrow was the most impressive machine I ever had the privilege to fly, it was just a beautiful machine

and we also had a lovely cockpit layout where by you felt part of the airplane. With the CF-100 I thought it was a terrible cockpit generally and I got the impression that with the CF-100 you were demanded to fly the airplane, the airplane was never part of you where as the Arrow we had the cockpit slightly reclining ejection seat and a lovely instrument control layout we all worked on this in the prototype and I think we had achieved the best compromise between what the pilot wants and what the engineers could give us. The cockpit man mainly responsible for this was an engineer named Wilf Farrons and Wilf had been the chap who designed the cockpit for the Martin Baker 5. I flew the Martin Baker 5 in England and this was as one of prototype at the time and it was competing against the Spitfire and Hurricanes and never got any production recognition but that again was a delightful plane to fly with a very nicely designed cockpit and then Wilf Farrous moved to Canada and worked on the Arrow cockpit and I think everybody will agree that who ever saw that cockpit, it was the best layout that a pilot could really want. It had the sort of main instrument panel with ranges we wanted it to be and you had your double consoles on either side with the electrical electronic equipment and all that sort of thing where by the stuff you needed most was right handy. Secondary stuff was a little bit off the one side and you just felt that you were part of that machine when you flew it. It was a delightful experience. Well, Cameron, I am not sure how you wish to use this tape but feel free to use all or part of it in any manner you want and without any reservations about that at all. If you wish to have any further elaboration to go with it. It could be sort of splashed in it during I would be happy to provide any other information for you. At this stage basically I think I covered the point you wanted and that's a pilot's reaction to the initial flight of the airplane. So please feel free to give me any comment you want and I look forward to hearing back from you. There is just one other point I thought you might be interested in by way of just a side issue that during the course of the Arrow program I was the only pilot to land the Arrow away from base. One flight I was on, while I was air borne, at TCA viscount for some reason or the other I do not know what the circumstances were, had an undercarriage gear collapse and he collapsed right at the intersection of the two major runways of Malton than we could use to land on. In other words I didn't have a suitable runway to land on back at Malton so the decision was made that I had enough fuel on board to take into Treton at the east end of the lake. So I took the arrow to Trenton and Trenton had a pretty good runway but wasn't as long as was used to so I worked the plane in there certainly the slowest approach I have made on it normally we came in on final at about 170 knots and I remember right there went into treadmill at about 150 on the clock and again absolutely no trouble at all. We pulled up, able to turn up if we got to the end of the runway but we did get quite a massive reception at Trenton because the Arrow was the hottest thing going at the time me and they even put a guard around the airplane to stop people from getting all over it. Anyway, that is just a sideline. So I think that will do it now Cameron and I look forward to hearing back from you. Bye bye for now. Yours Peter.