

A taped interview with Al Wheelband at his home in Klineburg February 10, 1984. We've gone over in pretty detail Al's memories previously in the interview I had with him but now, thanks to George Wright, California, we've been out to look at some patents and they've jogged Al's memory and I think we've got a more comprehensive story here now that Al is going to sort of update for us of the previous interview that I had with Al back in the summer of '83 in conjunction with these patents we've got. So now, Al Wheelband.

Al. O.K. So, here I am with George and I've been through these patents and they have put things in a logical kind of order, really. I've written some things down here that I'm going to read to you. I've put...

1. This is where it all started with the John Frost, what you call the big engine, which is the big, flat, engine which produces all its own power with all the jet efflux going outwards. This was first put together and the first patent I see that was written on this really was all the work that had been done on the engine with not too much thought put into what kind of airplane it would go into, just a rough outline of an airplane with the jet efflux being turned aft and making use of that as a very powerful control on the back. This was followed immediately by more concentrated work done on the design of an airplane that would accommodate this type of engine. This airplane developed into a spade shaped airplane knowing no better at that time what we call a tail sitter which would sit at some angle of 60 odd degrees and would take off at that angle with

all the jet efflux, at this time, turned aft. And the jet efflux would always be turned aft in this airplane. Now at this point in time I've made a note between what I call 1 - which is big engine, non-descriptive aircraft (original concept) and 2 - big engine, spade shaped aircraft, tail sitter. At about this time, during the time of the spade shaped/^{aircraft}tail sitter was being, the aircraft of this thing was being developed, John Frost, John Dawbry, Waclos Cherenski and Desmond Earl went to England. I think they were possibly sent there by the people from AVRO, Canada to find out, get a second opinion if you like, as to whether they were wasting Canada's time and money by looking into this concept. They went to Farnborough. I think the report was semi-favorable. I don't think it was all favorable because they're boffins anyway, but I think it was semi-favorable but while they were in England they called at AVRO, Manchester and the AVRO, Manchester boys are, I guess probably Roy Dobson told them to look at these crazy guys and see whether they're doing anything that's worthwhile. And the Project Office grabbed hold of it and I've read their little report. They started off with the stuff that John Frost took there. They examined it. They made some comments about it and they came to the conclusion that eventually, the Americans came to the conclusion also, that, yes, perhaps this engine would be an engine of the future but the most important thing is, when we've got this engine what kind of airplane will it really go into and how will this airplane perform. They took a totally different tack, if you like, and they came up with the,

I think they really were trying to look at the tail sitter concept to see if the tail sitter concept would work. And there are a couple of sketches with engines pointing aft in them...Delta shaped airplanes, probably no more than the kind of airplanes that were being worked on at that time in the United States as tail sitter jet propelled airplanes and I think that was probably the end of the little excursion that the people in Manchester went with this concept and sent their report back to Canada on that. Then I've gone on after that. We did all this spade shaped stuff and, with the tail sitter and then, I don't exactly know when, how or who, but I do remember a guy by the name of John Cockrel, who's well known for developing the ground effect machines in England, came and visited John Frost and they had long talks. I can't remember whether John Frost summoned him or whether he came to see John Frost, but, however, they were both working at that time on the ground effect. The air trapped between an airplane or a surface and the ground and how you could use that pressure that was trapped under the airplane to provide lift for take-off. That time I remember particularly, John Frost got very excited about this, what he called his flat riser and I think this is really the next phase of the airplane. It went through the big engine; it went through the spade shape with the tail sitter, because he thought that was the only way he could get it off the ground and suddenly he realizes now that he has a round airplane which he can stand flat on the ground and can rise flat, vertically flat and then accelerate forward. Little did he realize

I think, at this time perhaps, if I might digress a little bit, that although he gained a tremendous advantage in this flat riser in that he wasn't embarrassed with the pilot laying on his back or as the British suggested, laying on his stomach looking out the bottom of it, he now had a conventional type of cockpit with a conventional type, something that pilots would like a lot more and I think possibly air forces would like a lot more, too. But what he didn't realize was, that at that time, at least I don't think he did, that he lost this very, very powerful control that, if you understand that on the flat, on the tail sitter, spade shaped airplane, the efflux always went aft, always went to the back of the airplane, so he could make use of this as a very powerful control at any speed. Now when you have a flat riser you have to start pumping all this air out around the rim of this thing to get it off the ground and then you have to turn it all aft after you get in the air. And of course, this added all sorts of control complications. You'll find patents at about, around about that time, that started investigating all the complicated control mechanisms that were necessary to engineer this hot, very fast, hot gas, in several directions during the airplane's flight envelope. And this, I think the Americans got quite worried about. I should digress a little bit between what I call three, which is the round aircraft flat riser and what I call four, which is the development of the flat riser aircraft. This was the time, I think, after coming back from Farnborough, John Frost and his buddies went to the United States

to try and get some money for this thing. And, of course, the Americans were very excited about it. They came to, I think, the very same conclusion, although in a different way that the English people came to. Yes, we think the round, flat engine is a tremendous breakthrough that will one day be a wonderful thing, but, let's prove first, let's get the cart before the horse, let's prove that this round, flat airplane of yours will perform as an airplane. Let's make sure that the airplane that we can put this flat engine into is a viable proposition. So, they immediately started saying well, o.k., we will give you the money to develop this big, flat multimillion dollar engine providing you can prove to me that you have an airplane that can use it effectively. Then the emphasis now goes into how can we cheaply, if you like, how can we most cheaply get a hot efflux pointing outwards around the rim of the circle, so now we can play with it and make it fly an airplane. And, of course, the first thing that came to everyone's mind, including John Frost's was, O.K.- Let's take a bunch of basically standard, well known, good performing engines and face them outwards. And so, through the good graces of AVRO in England, at that time who were merging with Armstrong Siddely, we managed to obtain some Viper engines from England. So, O.K., Viper's the name, they are cheap. Now we can get them. So we did a few calculations and we found that if we took eight of these engines and we pointed them radially outwards, the jet efflux from them we could flatten the jet pipes, if you like, and made them into, instead of round jet pipes, we'll flatten them into long flat tubes. We'll join the

tips of these tubes together and we'll effectively have a round jet pipe with all the air, all the hot gasses blowing outwards. We went to a considerable amount of work on this thing. The Americans I think, put some money into it for us. And we did, in fact, build a segment of this airplane or the guts of this airplane which was a viper engine with an intake on it supposedly from the center of the aircraft. We flattened out a jet pipe with all the necessary stiffeners in it and went through all the teasing problems of, you have to remember we were probably the first people in the world to make a jet pipe that was anything but round in cross section. And on the outlet of this lot which was now like a big fan, we put a control system which was quite complicated - which was a bunch of sliding plates which could squirt this stuff outwards, upwards, or downwards as however we liked. I remember this thing running on the test rig for some considerable amount of time. Now this thing, we did lots of drawings of 8 vipers facing outwards and then I think the Americans got a little bit worried. We got into the problems of this very, very hot gas, everything had to be made of stainless steel. We were into areas of twisting hot jets around that no one had done before and they felt it was getting a little bit out of hand and they said, well, fellows, is there any possible way that you could make this thing out of cold air for a start so that we can bite this thing off one thing at a time. And, at that time, I think the Americans cooled off a little bit and the money dried up for a while and that was when I go on to

number 6 of my list now where I say 6 vipers facing inwards. And in order to describe this I think, in looking back, that possibly John Frost went to AVRO Canada, or at that time it was I suppose, yes, AVRO Aircraft in Canada and possibly Roy Dobson got involved and some money came from internally within the Hawker-Siddely group, which was P.V. private venture 1794, which was just a number. This number really meant it was some money which was given to the company, given to John Frost effectively to develop a cold flow radial type of aircraft. This, there again we had the vipers on board so it was decided we would use the vipers and the vipers were now blowing inwards and driving a turbine which was coupled to what I call a Lungstrom compressor, which is really just a fan at top and bottom of a few stages so that the jet is blowing now inwards, is blowing through a turbine and then what's left of the dead man's breath is dumped out the bottom of the airplane. All the energy has now been transferred into this compressor which is whirling around the center of this thing and all the air is now, the cold air now is duct outwards, of course in a much fatter airplane because cold air, of course, compressed air requires more volume for the same amount of energy so that the aircraft was now fatter and we now start talking about the subsonic version of the airplane. And then of course when you write reports and you ask for money you have Phase 1, subsonic (cold) then you go on to Phase 2, (hot), then you go to Phase 3, (reheat), and then of course the old idea is now we can get back to our flat engine again now. We've tackled the problem of we can do it hot. But,

however, I'm going a little too far ahead. Number 6 I have written down, 6 Vipers facing inwards driving a Lungstrom compressor with all the cold compressed air going outwards and I've put in brackets (subsonic 1794, financed by AVRO Canada).

Les just reminded me that I made an error in numbers, and there are so many numbers here it's not hard to do. When the AVRO Canada or whether in fact some of the money came from England we'll never know, when they financed this thing I called it 1794, PV 1794 when in fact the numbers were wrong it should be PV 704 - which rings a bell with me because I believe AVRO in England had their PV 707 flat risers and all sorts of things later on, so I think it was a private venture money from the Hawker Siddely group effectively to provide a certain amount of money to produce all the necessary design work for the six vipers facing inwards and driving this Lungstrom compressor and so on and so forth. Now then it starts to get a little bit expensive when the machinery needs to be built. The company financed all the drawings and the design staff and you know, paid John Frost's traveling expenses and so on, but then when we had to start building things the money needs to come in much larger quantities and here again, John Frost goes to the United States, shows them all these drawings that AVRO has paid for, all these design schemes and says now I'm looking for some money to make some hardware and they came along with some money and they called the contract 1794 where they provided us with sufficient funds to build a 6 viper test rig which was really the center of

the airplane right out to where the cold gasses came out of the tip. This comprised of 6 viper engines facing inwards driving a Lungstrom compressor which incidentally was all designed by that small group of people. I remember the, it's a fairly exotic wording technique which had to be done in California. And I remember tooling having to be shipped. That was enforced? to California. And I can remember this huge compressor being built and I can remember running these engines one at a time. I remember remote control of these engines was quite a problem. I remember people worrying about the thing blowing up and putting 5/16 and 3/8 armor plate steel around it. This all took place behind the Schaeffer building at Moulton. And, to my knowledge, the thing never actually ran with six engines. It ran. It had its own integral fuel tanks but they did run into a balancing problem on the rotor which I think could have been cured but at that time I think the Americans started to cool their heels a little bit on that. And so I think we have to think about the next phase now. O.K. Les has just showed me now Patent 3020003 filed on July 2, 1956. For a little while it was a puzzle to me and I really think while looking this thing over that it was another way of producing this radial hot jet flow outwards rather than building John Frost's big, flat engine. It was another way of producing this same type of radial hot flow at the tip of the airplane. When I refer to 3020003 filed July 2, 1956, now I'm looking at the pictures and I see Sheet 2 of the pictures. I think this is possibly the first version of it. We see an engine facing outwards which I think

there were three. These were just three simple jet engines which was fed from the center.... just a minute here. There's, it's also driving a fan, the intake on the top of the airplane. This engine is driving a fan and the efflux from this fan is being blown out-board into a chamber which now contains some ram jets around the tip. These are definitely, there is definitely a single stage fan being driven by these jet engines. Why would, I can only assume the only reason why they are facing outwards is so that they can grab the cold air from the, the compressed air from the fan to feed the engines which is like boosting the engines, if you like, and I can only assume that the efflux from these engines was then turned inwards again to drive this fan. I'm sure it had to be, it had to be. Then we turn from Sheet 2 of this patent to Sheet let's go here, mostly controls and how you're going to operate the controls and then we go to Sheet 8 which now shows the engines facing inwards which looks to me a much better way of driving this fan. And that's really what it is. And now there are four of them. You know, these were really just pictures and various ideas of doing away with the expensive flat engine and providing some medium that was much cheaper to provide the same effect at the tip of the airplane to prove that the airplane would work. And so now we have four engines facing inwards which effectively drive this fan which is on the top of the airplane and the efflux from this fan now goes out into this plenum chamber and is reheated with these ram jets. Now from Sheet 8 we turn to Sheet, I think 11.

11 - where we find another way of driving the fan. It's driven now by engines which are disposed vertically in the center of the airplane drawing their air from the bottom of the airplane but not really from the bottom but drawing it from a plenum chamber and they are driving yet another fan which is producing air to push out of these ram jets. I think these, this whole patent is three versions of a way of providing hot air at the tip of the airplane. I think that's really where we are. The pilots in various positions, almost to the _____ really. I suppose the engine goes in the middle, the pilot has to go somewhere else. That's what, the difference between 11 and 8 does mean. The other one is the pilot is looking out of the bottom because it's a flat riser and that's where he wants to look out. It's probably the only convenient place you can put him because the whole airplane is filled up with hot air ducts and cold air ducts and intakes and so on. I think really that without... I tell you what. I'm going to read this thing over much more thoroughly and I'm going to get back at you. And I'm going to make more sense than I'm making right now. But, I really am convinced now that Patent 3020003 is yet another way of producing the effects of having a flat engine if you like, without having one. It, on the face of all the evidence we have in front of us now, neither of any of those ideas included in that patent really got off the ground. Never got past the paper stage. And I think possibly the radial outfacing engines was the way that it went. I think this was just another

way of perhaps trying to get some money to do it and it may well have been a good way to do it but it seems to me that the 8 viper engines facing outwards won this battle.