

Jack's D.G.ENG BUGLE

Part 2

Following on with the story of the Spectre engine I quickly learnt that the motor was a fully variable thrust engine, the rest of the world opined that this was not viable. During the very first start the instability was out of this world for about 5 seconds. In that first brief period I agreed with the opinions of the rest of the world. Strangely, even to this day, historic writers of flight do not realise that the German Walter motor in the MEL63 and the DHE Spectre were steam engines. Like the Walter the oxidant used in the Spectre was High Test Peroxide (HTP). The Spectre had silver plated catalyst gauzes which decomposed the HTP into oxygen rich super heated steam at 600 degrees C. The Walter and the Spectre ran on decomposed HTP and in this condition on the Spectra was known as 'cold running', giving an 800 to 3000 lbs. thrust. Unlike the Walter motor, the Spectre used the oxidant rich super heated steam to ignite kerosene; this was termed 'running hot' giving 1800 to 7000 lbs. thrust. At maximum thrust HTP consumption was 100 gals/minute. The turbine ran on decomposed HTP and drove both the HTP and fuel pumps and exhausted the combustion chamber. The instability at start up was the result of rapidly changing pressure drops and rises across the turbine during the changing rate of HTP flow. With a small throttle opening the engine stabilised to a degree. Injection of kerosene as the throttle was advanced caused further fluctuations. Once in the stable state the motor was highly responsive with lightening acceleration to max .thrust. During this unstabilised state the needles of analogue gauges, as they were then, could not be seen. We had two flying crews for the Canberra, my boss Roger Grimston with the least experienced pilot, Malcolm Muir. The Company were uneasy about Roger flying on these tests, (that should have sent a message to me!) so he was confined to those where his expertise was important. I made up the second crew with John Nicholson, I being the least knowledgeable rocketeer. Unfortunately I kept no record of flights other than the flight test reports.

From memory we commenced flying during the summer of 1956. Reliability was never a strong point during test bed running; the motor had a strong will to spit its combustion chamber off during unstable conditions. Due to the political situation at the time there was a strong incentive to prove the motor for the SR53 interceptor. We entered into the flight programme with some trepidation. We had what may be called the most up-to-date safety devices but that did nothing for the imagination to play tricks with the thought of flying in close proximity to a 600 gal. tank of HTP.

The flight test programme was conducted at RAE Bedford (Thurleigh) for reasons of safety.

There being, at that time far less habitation around Thurleigh than at Hatfield. The period at Thurleigh was turned into a gross extravaganza. We would on occasions fly as many as six aircraft from Hatfield. These would be, the Canberra, Venom chase, Night Fighter (NF) Meteor photographer and for ground crew Heron, Dove and Proctor. We used the less glamorous Proctor when the Canberra had been left overnight at Thurleigh. Malcolm and I had an agreement that we would partner up and he would allow me to fly the Proctor with him in the right hand seat, my licence legally allowing this.

The Spectre 1A was the first and only rocket motor in the UK to be approved for flight in manned aircraft. The first flight of the Saunders Roe S.R.53 XD 145 was from Boscombe Down on 15 May 1957. One year later after 9 hrs & 35 mins of subsonic flight the speed of sound was exceeded at Mach 1.14 at 46,000 ft. Unfortunately XD 151 was destroyed on take off at Boscombe killing the pilot John Booth on the 5 June 1958. The accident was not related to a malfunction of the Spectre or its equipment, the cause was never proved but was thought to be a loose instrument panel. The first aircraft XD145 recorded a speed of Mach 1.46 on 13 Sept.1959. The last flight of XD 145 No.46 was on the 20 Oct.1959 when the programme was cancelled.

I had been deferred from National Service all this time and thought that I may be forgotten but this was not to be. The call-up papers duly arrived. De-Havilland requested further deferment but this cut no ice. I duly sent the papers back with a letter requesting the opportunity to be selected for aircrew. I had an initial interview and thence to the selection course. This went well, but I would have to sign on for a 9 year commission to be considered for pilot training. I asked the question as to my future should I fail flying training. The answer was unpalatable as no guarantee could be given as to the field of work I may end up on. I would not receive a commission and to add cream to the cake, it would be held to the 9 year period. After a word of 'No thanks' I was on my way. I then applied to fly with the Army Air Corps. I had several confusing interviews as, literally, nobody new what the recruiting policy was for the newly reformed Air Corps. I finally went for an interview in Whitehall. I was puzzled as I was ushered into an office, the occupant being a Marine Colonel. He did however have some idea of the new Air Corps. We spoke for a few minutes and he showed interest. It became clear that I would be required to join the Artillery for 3 years before being considered for flying duties. So once again it was 'No thanks'. Plan C was immediately activated. I telephoned the Superintendent Engineering at P&O Shipping who agreed to

see me that morning. The long and short of which was that I reported for Dock Staff duties King George V Dock the following Monday. A letter to National Service Recruiting did not reach the right desk and about 7 weeks later my mother received a phone call requesting my whereabouts. 'At work' says mum. The following day the Military Police arrived at the gates of De-Havilland Stag Lane to collect me. I was in the London Docks for about 4 months before a voyage to Japan. Just under a year later I was back in London and at over 26 Years old, free of National Service. I spoke with my boss at De-Havilland regarding a job back with the company but they were under a black cloud as a result of the 1956 White Paper. Having spent a few weeks touring Scotland, I returned to perusing the jobs vacant columns of the newspapers. Finally, I accepted an appointment at the British Oxygen Company (BOC) Research and Development (R&D) at Morden and here commenced the darkest period of my whole career. I joined the Engineering Department which was a small activity within the organisation. It supported the various programmes which on paper had appeared attractive, but, this was not to be so. At the time of joining BOC they became the 2nd or 3rd company to be scrutinised by the newly formed Monopolies Commission. The bottom line of their report was that BOC had a token R&D policy and that greater ambitions in the R&D field should be made to meet the competition of up and coming companies particularly from overseas. The solution was simple; enlarge the workforce from approx 100 to just under 500 but no extra work was considered necessary. As the staff increase covered all sections, work (or rather the lack of) became sparse. This led to loss in moral all round. The work could have been interesting with the right leadership. I worked on dry lubrication of mechanical devices in gaseous and cryogenic conditions, mainly compressors and liquid pumps. The general atmosphere of relationships became strained which made me more determined to return to aero engineering.

The aero industry was still reeling from the 1957 White Paper and had just entered the period of amalgamation and contraction. I made an application to join the Civil Service and was successful. A few weeks later I attended an interview at AID (now DQA) Chessington. I was offered a job in Glasgow, a place that really did not send me into raptures; however I accepted and became the Senior Regional Inspector (SRI) covering an enormous area from the north of a line through Newcastle and Northern Ireland. We had District Offices in N. Ireland, Glasgow, Edinburgh and Newcastle indicating that the work load of the region was high. I enjoyed

my first 6 weeks during a teach in with Ralph Woods in Manchester. Ralph was an amusing man with a good sense of humour despite having an invalid wife with acute arthritis which meant that he had to do everything at home as well as completing busy days with AID. Ralph drew up a very full programme and we visited and saw companies with some real problems, it was a very useful period. Then on to Glasgow. A member of the Clerical Staff welcomed me and showed me to the office. There were huge piles of paperwork on the desk and floor. I asked if this could be cleared, 'No' was the answer, 'this is your correspondence from the last 2 years the time that the previous SRI had retired'. This set alarm bells ringing. Was this to be another BOC with no work? Fortunately this was not the case. The next morning I met Mr. S. May the HRI. I knew from the first few minutes of conversation that this was to be a happy posting, Mr. May was charming but had that hint of discipline that made things tick - with interest.

The word soon circulated the District Offices and thence to the Companies that there was a new man in the SRI post. For the first few months I was on a continuous Duke of Edinburgh tour of factories which was interesting and what shall we say, convivial not to say heavily time consuming which did nothing to reduce the piles of paper in the office. After 18 months it was decided that I needed some experience of AID work at the coalface. I was posted to Rolls-Royce Hamilton assisting at East Kilbride (EK) when necessary.

Rolls-Royce Hamilton at that time was the development centre for the established EK engines and also the Napier Gazelle. The very first person to telephone me at Hamilton was Bill Downey and from then on without knowing it, I was in training to become an RTO. I was given the impression and was expected by the Company to be in a position to reply to any query concerning MoD equipment thus I became a joint QOI/c and A/RTO. Bill was at Rolls-Royce Hillington, some 15 miles from Hamilton so for daily type problems I could be helpful to him for which I was pleased to assist as the AID duties were not too arduous. When accepting the initial job in Glasgow, I was told that the posting would be for 3 years. After 18 months at Rolls-Royce Hamilton, I accepted a job at Lucas Aerospace. My stay at Lucas was a very happy one, the work being very varied and interesting and Lucas respected and encouraged our participation. Many a bag packet design was made during a meeting. Beside Willesden and Hemel Hempstead Lucas took over AEI Coventry which enlarged my responsibilities somewhat. It was

amazing to see the workshops of AEI at that time in 1968; they were still as per wartime with fully equipped and maintained magneto assembly and test areas. Initially I worked in the same way as at Rolls-Royce Hamilton until after a few weeks a polite RTO, Bill Moschini, reminded me of his duties and my involvement at LMC's. Time went on and being well satisfied with my own little empire I became aware of some deliberate intentions by Staff at Chessington to apply requirements that were neither timely nor applicable. No matter the opinions they were determined to press home their ideas. At this time Jim French, who had taken over from Bill Moschini (being newly promoted to become C/RTO) also wanted a move to St. Giles. I applied for the RTO post at Lucas and got it.

It was a challenging time at Lucas with three major projects being funded by the Government. These included the 24,000 rpm Constant Speed Drive and alternator, GG220 gas turbine APU for the Boeing 757 and the Mk. 2 version of the GTS/APU for Pegasus in the AV8b Harrier. The 24K rpm CSD and alternator was a very real step forward in the development of a/c electrical systems with claimed improvements in generation quality and a massive weight saving of 30%. Airbus was very interested and it was chosen for the A320 Airbus. Unfortunately the CSD was miniaturised to such a degree that oil churning and consequent high oil temperatures seemed to be beyond Lucas Engineering Staff to solve. Airbus realised that they could be seriously delayed and switched to the well-tryed 12K system from Sundstrand. There was next to no discussion with MoD and the project was cancelled

The GG 220 APU was a similar scenario. The basic engine was the first all-Lucas design, previous units being based on the Noel Penney/Rover/Alvis designs. The 220 had, from memory, a six stage axial compressor, annular combustion chamber and a single stage turbine. I cannot remember the designed power output but on the 1st.run it produced 85% of the design figure. Boeing, like on other projects, were non committal in their opinions of the unit but requested Lucas to provide a complete costed programme to point of delivery. An ex-Rolls-Royce engineer became Project Manager and the consequent programme was an extravagant one based on the type submitted by Rolls-Royce with full Government Funding. At this stage no consultation with MoD had taken place. Without a firm commitment from Boeing, Lucas unilaterally decided yet another cancellation. Boeing were not amused as they had high hopes of an alternative supplier with fresh modern ideas. Boeing were forced back

to Air Research who supplied a simplified version of the flight engine in the Embraer/Shorts Tucano trainer aircraft, a very expensive overpowered unit with weight penalties. The varied products of Lucas made the posting a most interesting time. I think I ended this posting myself; applying for the RTO/E post at Rolls-Royce Leavesden but was not successful due to lack of main engine RTO experience. To give me this experience however, I went to Leavesden as the RTO/Gem. This was a baptism of fire in all areas, the engine was teetering on the edge of failure, morale at Leavesden was at a low point and pressure from St. Giles was relentless from a newly appointed AD. Slowly the engine turned the corner but was inconsistent and had no pattern in development and suffered random in-flight failures. Despite the problems the Intensive Flying was commenced with very good results. I was approached during the holiday shut down period, when both St. Giles and Company staff was away, to place the engines 'On condition'. This was requested by Roy Heathcote based on the trouble-free programme, little deterioration of performance and non-availability of further replacement engines. I had been sympathetic toward the view that, although failures had been random, stripped time expired engines were always in good condition. I was in a difficult position. If I did not agree to go 'On condition' the intensive flying programme was at an end. If I agreed I was opposing the opinions of St. Giles. I discussed, at length, the pros and cons with Roy Heathcote and 'On Condition' was our decision. I faced some serious rebukes on the return of St. Giles staff but they were big enough to agree that the right decision was made as the programme was completed satisfactorily. By this time the engine was advanced in production, but there were a number of specification parameters that were not met by flight engines. We spent many hours discussing penalty clauses with Rolls-Royce and formulated an agreed list of penalties.

The Company placed a strong team of engineering staff on the production line to support the initial build. The engine had a successful build and test period, the first twenty engines were delivered, one engine only was penalised for oil consumption just above specification. This point became the departure date for me to join Tommy Woolford despite my protestations to Colin Hockenull who had met with opposition to the move from St. Giles staff which surprised, me but lifted me to some extent. Much of the work with Tommy was known to me because of my posting to Lucas, however, there were small firms on the list that provided great

interest. The work content was diverse and geographically spread across the UK. From piston engines at Hants & Sussex Portsmouth, magnetos and ignition systems at Lucas Coventry to Bradford where Lucas had taken over the aero business from Associated Electrical Industries (AEI) covering engine starter systems to constant speed drives for electrical generating systems. Being so diverse we dealt with many of the A/C project offices in St. Giles which was enlightening.

Tommy Woolford retired in about 1980 with a round of send-off events at the Companies that indicated the respect commanded by Tommy. The section was taken over by Peter Pearson for a short time before Andy Bystra was promoted to the position. Many people forecast friction between Andy and me as he had worked for me in the days of AQD at Lucas. During that time we enjoyed working together and had many interests in common. I was confident that the relationship would not change and it did not. I hope that my efforts were helpful to Andy and that he enjoyed that period as much as I did

After too many attempts to gain promotion I was finally successful on a Board for a post that was involved with environmental problems and natural physical effects on engine characteristics. The job was then abolished - wrong successful candidate? Finally I was able to gain promotion through a board and was lucky enough to be appointed to a post covering the large transport A/C engines. I was the obvious candidate having spent most of my time in engine research and development on the very smallest of gas turbine, main engine starters. I soon slotted into the task, the engines being mainly civil orientated many systems having been created on the Ghost 50 in the Comet at De-Havilland. So I had in a very real sense finally 'come home'.

The job went well gaining the confidence of both the RAF and the Contractors. For a while the RB 211 engines fitted to RAF Tristar's were at the top of the league table for fleet reliability competing with world wide airlines. This enabled Rolls-Royce Airmotive at Derby to bring the serviceable spare engine up to 78% of the total. It had been common practice in airline operations for those in trouble to be supported on a temporary basis with equipment and spare engines. With the co-operation of the RAF we entered into three loan agreements with British Airways (BA), Transport Aero Portugal (TAP) and LTU (a German airline operating Tristars between Dusseldorf and Los Angeles). I don't think any of them actually installed an engine having overcome their original problems.

We were allocated the CFM 56/2 in the Boeing AWACS, an engine originally

designed by SNECMA, who approached other manufacturers for partnership manufacture and GEE were chosen. The engine was turned down in the UK for lack of a commercial future and for not embracing aspects of modern technology at that time. The CFM 56 range of engines is the commercial success story of gas turbine sales standing at over 20,000 units in 1992. What it is now would be interesting to know. We had dealings with SNECMA Paris as they covered all activities in Europe, Africa over to the Indian sub-continent. My dealings with the French which commenced with Micro Turbo on the BAE Hawk starter systems was most enlightening and this continued to be so with SNECMA. They were determined to maintain the range of engines as civil and would not entertain any changes just for the RAF. They were puzzled by the insistence of both the RAF and MoD Contracts Branch to award a PDS contract and categorically stated that they would not change the engine away from the civil standard. This became somewhat of a 'Warranty Impasse' with Contracts Branch whose attitude voiced at a meeting with CFM was 'we have never had a warranty on any engine purchased so why have one now'. This went down like a lead balloon with the RAF and even more so with me. We had spent time with CFM to gain an improvement to warranty times because of the projected low utilisation. CFM was prepared to offer a revised warranty at this point. My protestations would not be heard within the department but they were outside and the engine was transferred to Ted Woodgate and another Contracts Branch. By this time retirement was looming over the horizon and I was concerned that I would find the financial side a little constrained - but this was not so. The more important aspect was how I would cope without aircraft and engines and the interesting people and problems that came with them. I shocked myself in this respect as I had said that I would like to be involved in some form of work, but, after a few weeks, I found that I did not miss the old life. Requests for assistance were received and I completed several tasks which I did not enjoy in the first year. By this time, like most retirees, I was too busy at home to take further work, so that was it. A completely satisfying career with many happy memories was over and I could now take an interest in tasks without politics and the intervention of the gifted All-Rounder's.

This completes Jack's story and I hope that you have taken the technical stuff in because there will be an examination at the next DGE re-union. Thanks again Jack!

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