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27

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**Ex Officio*

BOMBER HARRIS – A NEW LOOK

Address to the Royal Air Force Historical Society by Air Commodore Henry Probert following its Annual General Meeting held at the RAF Club on 5th June 2001.

Thank you for this opportunity to tell you a little about my new biography of Bert Harris (as his Service contemporaries called him), or 'Butch' (according to his men), or 'Bud' (as his second wife Jill referred to him), or 'Ginger' (as the irreverent did - to his great annoyance), or - of course, 'Bomber', as the world at large did, indeed still does.

Let me start by answering a question frequently put to me. 'Surely', I've been asked all too often, 'quite enough has already been written about Harris; why on earth do we need yet another book about him?' While I immediately accept that his wartime work at Bomber Command has been endlessly described and appraised, in that context I point out that too much of what has been said is inaccurate and that there remain various unanswered questions. I then tell them (and many do not know) that thus far only one biography has ever been written, namely by Harris's former radar officer, Dudley Seward. This, I go on, was written early in the 1970s with Seward's master looking over his shoulder and, at Harris's insistence, not published until after his death ten years later. So inevitably there was very little on Harris's almost forty post-war years and his reactions to the continuing controversies. His period as CinC was, as one would expect, dealt with at length but still with many biographical aspects touched on only superficially, and there were many gaps in the earlier story. To take three brief examples, there was virtually nothing on his schooldays and most surprisingly nothing at all on the period in 1917 when he was operating as a Flight Commander over the battlefield of Passchendaele and shot down five German aircraft. Even worse there was not a word about his first marriage in 1916. This lasted seventeen years and produced three children, all of whom were dumbfounded when Seward's book was published in 1984 and totally ignored them. I have said enough here to indicate how inadequate I - and many other historians - considered Seward's book to be, and my researches were soon to show how much more remained untold.

Another important factor in my decision to take on the job emerged when I realised the nature and quantity of Harris's own personal papers now sitting in the RAF Museum at Hendon and was told that thus far nobody had been able to study them in depth. A few days leafing through them soon showed me that here was a treasure trove. To my surprise I realised that Harris had spirited away his more important demi-official files from the Air Ministry in 1937, from 5 Group in 1940, from DCAS in 1941 and from Bomber Command in 1945. Saward had obviously seen some, but not many, and not until the late-1980s were they passed to Hendon by Harris's daughter Jacqueline. Now, knowing that, sooner or later, someone was inevitably going to exploit this unique collection, I began to feel that the first 'someone' might be me. I could vividly recall the wartime days; I had met Harris personally in his closing years; I should be able to gain the trust and co-operation of his family, together with the support of other historians active in the field. I would hope too to have the backing of the relevant old comrade's associations, of the RAF Museum, of the Air Historical Branch, and not least our own Society.

So the project got underway five years ago. Harris's family - both sides - have proved immensely supportive, giving me full access to much additional material which is still in their hands, and providing invaluable comment, advice and introductions to other informants both at home and abroad. In response to appeals I have received numerous letters which have given me further perspectives, and I have drawn substantially on a wide range of published books and journals, including our Society's Proceedings.

We must now get into the subject itself, and the first question to consider is 'what were the qualities Harris developed in his earlier life that made him appear so suited to take over Bomber Command in 1942?' To start with he had no close family life in his formative years. Being sent to boarding schools (not top class) and, since his parents were in India, spending his holidays 'boarded out', he acquired early on a marked degree of self-reliance and practical skills and while getting nowhere in the world of academe was marked out early on for his drive and leadership. His decision to leave school at the age of 16 and seek his fortune in the exciting and challenging

atmosphere of Rhodesia was very much in character. Then came the war, when like so many of his contemporaries he felt obliged to do his bit, and when he returned to England in 1915 he came back as a worldly wise, confident young man, well capable of looking after himself and organising and directing others. No wonder then that, having joined the RFC, he not only quickly learnt to fly but was soon doing duty as a Flight Commander. So it was in WW I that he developed his considerable flying skills, thought hard about how to do the job better and how to train others to do it, demonstrated his concern for the groundcrews on whom he and his fellow pilots depended, and showed himself a strict disciplinarian. All of these were characteristics he would exhibit for the rest of his career.

I've already mentioned that Harris never said much about the Battle of Passchendaele. Yet it certainly made a deep impression, convincing him, like many other airmen, that if another war did ever take place there must be a better way of fighting it. Intriguingly FM Lord Birdwood, one of the few generals ever to be seen in the forward area, and who probably thought the same, wrote to Harris twice in 1942-43 to congratulate and encourage him and Bomber Command.

Now, again briefly, to the inter-war years, when Harris's impatience with higher authority did not enamour him of civil servants in England and of soldiers in India. In Iraq, on the other hand, he made a name for himself in providing his Vernon transport aircraft with a bombing capability and then using them to help deal with a tribal rebellion. This story is familiar, but it also links up with one of the better known RAF songs:

In the year anno domini one-nine-two four
 'Twas just outside Suleiman there started a war.
 HQ got excited and sent down to 'Bert'
 To pull operations staff out of the dirt.
 No bombs at all, no bombs at all;
 If our engines cut out we'll have no bombs at all.

The rest I leave to your memories!

It was Harris's achievements in Iraq, followed by those in command of No 58 Sqn at Worthy Down, that firmly established his reputation with high authority as a professional bomber airman and firm, no-nonsense commander, and when he was selected to go as a

student to the Camberley Staff College in 1928 his value to the RAF was further recognised. Why Camberley and not Andover, one might ask; maybe the answer is that Harris already knew the Army, would firmly argue the air power case and would stand no nonsense. One paper he wrote and used in 1931 during an Army exercise in Cairo has survived and it gives a good indication of his ability as a ‘thinking airman’. In quoting it at some length I have included a new principle of war which he propounded: ‘the exploitation of range’. Yet in 1933, when he happily took over a flying boat squadron at Pembroke Dock, it may have seemed as though he was being sidelined. Then a mere four months later he was on his way to the Plans Branch of the Air Ministry.

This was a critical change of tack, almost certainly occasioned by events in Germany and the urgent need for a bomber man in the key Plans post. He was DD Plans for four years (during which his first marriage ended in divorce and he re-married), and to illustrate what people thought of him I offer you this quotation from a letter written to him long after the war by Sir James Barnes, who had worked with him as an Assistant Secretary in the mid-1930s: ‘at the time I and many others (but not all!) thought that if there was no war you would be out on your ear; if there was a war you would have the highest command.’ On a lighter note, and to illustrate the apposite and humorous turns of phrase that often characterised his staff writing, let me quote from a report he sent to Whitehall during his short visit to the States in 1938. Describing the American War Office as lacking the grandiose entry of Berlin’s Air Ministry and the grubby greeting of Adastral, he went on: ‘in their place a strictly utilitarian and obviously efficient hot-dog stand occupies most of the front hall. I left during the lunch hour, as Colonels and messengers elbowed for counter room and access to the communal mustard pot, Hamburger in hand – I would hate to eat the victuals in evidence on the counter.’ Later he castigated the internal air conditioning. ‘By an ingenious, complicated and very expensive mechanism a pallid populace achieves wholesale and whole time semi-asphyxiation in a damp, tropical and fume-laden atmosphere during even the balmiest temperate spring. They conclude that this is an astonishing achievement in engineering. So do I.’

Now to the war, where Harris's first three tours of duty present marked contrasts. His fifteen months in charge of 5 Group's Hampden force indicate much of the command style he later used as CinC: concern to rectify the shortcomings of his aircraft; determination to fight on behalf of his crews; insistence on the critical importance of training; close attention to his squadrons' operations, with the weather factor particularly important; and impatience with the Air Ministry. Let me give you a further quotation, this time from a letter to Ludlow-Hewitt, his CinC, early in 1940, complaining about the Air Ministry. 'All our urgent operational requirements seem to go meandering through a maze of offices and, no matter how urgent, to be subjected to endless scrutiny, delay, obstruction, idle chatter and superfluous minuting by whole legions of departmental subordinates, some of whom quite obviously haven't the vaguest idea what it is all about.'

Less than a year later Harris himself was back in the Air Ministry, where, despite his many irritations with the system, he did a good job. Then in mid '41 he was off to the States, building invaluable friendships with their leading airmen and some of the top politicians, while still reporting honestly to his colleagues back home on the general attitude of the Americans as he and his staff saw it. A letter to Wilfred Freeman, VCAS, concluded as follows: 'the Americans will come into the war when they think we have won it - but if they come in in any other circumstances, short of being kicked in, I'll stand you a dinner and eat, as my share, a pink elephant, trunk, tail and toenails - and raw at that. I am not out to depress you, but I note such a vast divorce between things as they are out here and the wishful thinking evident at home (but not by you!) that it seems appropriate to state our view of the US as it appears to us.' He was still there at the time of Pearl Harbour, and it was in the aftermath of this that Portal and Churchill agreed that he must return to take over Bomber Command.

I haven't time here to discuss in detail the relationships between Harris and these two key figures, except to say that they were crucial to Harris's work at High Wycombe for the rest of the war. I must stress, however, the importance of his position vis-à-vis Churchill. Fostered by their relatively frequent meetings at Chequers, there was a closer rapport between them than Churchill maintained with most of his other military commanders. They shared an overriding conviction

that one wins wars only by taking them to the enemy. The offensive spirit, the single-minded tenacity, the outspokenness that Churchill observed in Harris were qualities that matched his own. Here was the kind of high commander he needed in those dark days, a man who shared his convictions about the nature of the war they were fighting and the hard things that had to be done to win it.

Moreover, Harris and his Command were serving an essential political purpose, ie to demonstrate to Stalin that Great Britain could at least do something worthwhile to assist the Red Army's desperate campaigns on the Eastern Front. This was where the great bulk of the German Army was engaged and until 1944 it was only by referring to Bomber Command that Churchill could counter Stalin's repeated allegations that the West was doing far too little to help his country fight the Germans. On several occasions in 1942 and 1943 they exchanged messages in which Stalin praised the bombers, and the many critics of Harris's concentration on Berlin in the winter of 1943-44 need telling that Churchill, having referred to this offensive in a message to Stalin on 12th January 1944, was told in reply: 'our armies have been successful recently, but it is still a long way to Berlin. Therefore you do not have to lessen the bombing on Berlin, but should endeavour to intensify it using all means.' While I have found no evidence that Harris or Portal knew of this message, and indeed I have never seen it referred to by other British historians, it does suggest that Harris's winter campaign could hardly have found disfavour with Churchill. Incidentally the message itself was found in the Russian archives by a reputable German historian, Götz Bergander.

Another new bit of information which I came across relates to the Yalta Conference a year later. According to the conventional wisdom, the only German cities specifically requested for bombing by the British and American air forces in the 'Eastern offensive' were Berlin and Leipzig, but the Chiefs of Staff's own interpreter still clearly remembers the discussion and insists that not only did General Antonov also specify Dresden for attack but that Stalin himself interjected strongly in support of it. I have met the interpreter, I consider him a reliable witness, and I think this is a significant addition to the complex Dresden story which I have felt it essential to

discuss in relation to Harris. My conclusion, incidentally, is that if the decision to go for Dresden had been his alone, ie if there had been no specific pressures from on high, it might never have taken place at all.

I have of course discussed other controversial issues which are totally impossible to consider this evening, for example the Pathfinder Force and the exhausting debates over diversions and panaceas which often brought Harris and Portal - and his staff, most notably Sidney Bufton - into dispute. I do wonder, with regard to oil, the greatest 'panacea' issue, whether Portal really did need to go on pressing his argument with Harris in the winter of 1944-45 as long as he did - and why, if he really felt it essential to leave no stone unturned, he did not have Harris briefed on the German ENIGMA cyphers whose interception lay at the root of the most significant intelligence information about German oil supplies? Harris was never in fact informed of the ENIGMA source; had he been his habitual suspicion of SIGINT might have been overcome.

However, with time pressing, I want now to say a little about the way he did his job. There have been many criticisms of his command style, not least of the way he distanced himself from most of his headquarters staff and seemed unreceptive to the ideas they would have liked him to consider. It's certainly true that many of even his closer subordinates never met him for other than immediate business, and that many of the suggestions from down the line were filtered out and never reached him. Yet we must always remember how great were the pressures on him, not just from within his Command but from outside it as well. The responsibility for making the key decisions about when and how his bombers were to be committed to operations was his; he had to make them daily for more than three years and at the same time cope with constant questioning from Portal and his staff - not to mention Churchill - and many who served in his headquarters or visited him were prepared to match their doubts with understanding. When I discussed these matters with Professor R V Jones shortly before his death, he told me how dismayed he had been when Harris was appointed CinC - he had been so critical of electronic warfare. Jones then added, 'but who else could have stood up to what he had to do'?

There was, of course, another side to Harris's work at High

Wycombe, one whose significance I only came to appreciate fully while doing my research. I refer to the use he made of his home - Springfield. Here he and Jill played host to literally thousands of guests, many overnight and many more over lunch. He loved entertaining, and was ever the charming, relaxed, considerate host, a role he combined with talking business. There were many RAF senior officers from Trenchard downwards; numerous Naval and Army officers (including Wavell and Montgomery); and politicians of the main parties such as Cripps, Bevin, Sinclair, Eden, Bracken and Morrison - a strong supporter of the bomber offensive. There came, too, many American military and political figures from Marshall and Harriman downwards, important personalities from the Commonwealth, Free France and the Soviet Union, and - most important - a lot of representatives of the home and overseas media.

Harris's attitude to the media - in those days the press, radio and cinema - was dominated by his conviction that it was critical to his crews' morale to try to ensure that the value of their efforts was not belittled in public - including Parliament. This was a constant theme throughout the war, and indeed for the rest of his life. He, backed by Trenchard, never felt that higher management pressed the cause sufficiently and as the CinC he felt he must weigh in. Nor did he approve the equivocation, Ministers' refusal to admit in public what deep down they knew to be true. As he told the PUS, Sir Arthur Street, in early 1944, it ought to be made clear in public that the cities of Germany - including their working populations, houses and public utilities - were literally the heart of the 'war potential' that he was being required to attack. It never was admitted, and he himself was left to carry the can, and take the consequent vilification that was increasingly heaped upon him, especially by the enemy. As the Daily Mail reported a German radio programme in August 1944: 'brutality, cold cynicism and an undiluted lust for murder are his chief characteristics. You have only to look into his eyes to know what to expect from such a man. He has the ice-cold eyes of a born murderer.' It is no wonder that Harris devoted much time to meeting the Allied press and trying to keep them on-side.

Here then were some of the unceasing pressures upon him, but there were more. What of leadership? As Slessor posed the question,

‘Harris virtually never visited his units, yet on the whole I think no one would say he was anything but a good CinC Bomber. So how did he get across to men who were suffering terrible casualties?’ It is true that he rarely got out and about, though on the odd occasion when he did he came across extremely well. It would, however, have been totally impracticable to do so on any scale, so the images in the media, the frequent and pungent messages of exhortation and congratulations, the careful questioning of such individuals as came to see him, his constant efforts to improve his men’s aircraft, equipment, training, working conditions, etc, his determination to have the right men as AOCs and in other key appointments; all were important. But what of the casualties? Did he actually care? At the time few really knew how he felt, and this was partly because he could never have done his job as it had to be done if those under his command thought he was weighed down by doubts about having to send so many men to their deaths. Just occasionally Harris’s defences slipped a little, as when he wrote to Alec Coryton, AOC 5 Group, in February 1943 to explain why he was to be posted elsewhere. Among the reasons, Harris said, was that Coryton could not bear the thought of casualties. ‘You have no monopoly on this’, Harris continued, ‘I only hope you may never have on your heart and conscience the load which lies on mine.’

There is much more to the subject of leadership, to which I devote a whole chapter, and elsewhere I concentrate on some of the practical issues which he rightly considered so important — the aircraft, bombs, equipment, techniques, etc, though understandably he did not find it easy to keep up with the increasingly rapid pace of technological change. But there is another less well known area of activity which deserves some comment here, namely Harris’s active support for the Eighth Air Force. Here his friendship with Eaker and the other top American airmen, with influential politicians in Washington, and later on with Eisenhower, were invaluable. Right from the start Harris insisted that the 8th must receive the maximum possible support from his own Command in establishing their bases and getting themselves organised in the UK. Then, when he realised that the 8th was not getting the priority it needed at home and the build-up was taking much longer than Eaker was hoping and planning

for, Harris started to weigh in on their behalf. He did so not only via the Air Ministry, via Portal, and indeed Churchill, but also directly with important Americans, notably Averell Harriman and Bob Lovett, the key civilian in the War Department in Washington. I don't think any one individual in the UK can have done more than Harris to encourage and support the Eighth Air Force build-up in the UK and its subsequent operations, and the close bonds that still remain between our two air forces owe much to his efforts.

During the OVERLORD period, of course, Harris was directly answerable, through Tedder, to an American, namely Eisenhower, and on this I will offer you just one quotation. When Harris was working on his own memoir in 1946 (most of the work on this was incidentally done by his former press officer, John Lawrence), he sent him some extra text which he wanted included, but for some reason never appeared. This is what it says, and apart from anything else it's a wonderful piece of original Harris prose.

'I was saddled personally, throughout my tenure of command, with the additional most wearying and exacting task - on top of my other sufficiently onerous duties - of attempting to keep a straining ship on something of a constant course through a sea so confused by every wind that could blow as to require the services of a Master of all Mariners, and a Hoogly pilot to boot, if progress in any recognisable direction and security against hazard were to be achieved. As the harassed mate of this sorely beset vessel, engaged mainly in keeping the sails filled and the rigging taut despite the galaxy of ever-changing captains and amateurs temporarily at the wheel, I recall only one period of calm sailing in those three and a half bitter years - a veritable centre of the hurricane - when all went well, when all pulled together, when there was at last continuity of contact between the compass course required and the lubber line - and that was during the all too short period when Eisenhower was Admiral and Tedder the Captain on the bridge.'

It's the last phase of Harris's campaign that has always proved the most controversial. I've already touched on the oil debate between him and Portal and would add that I do not agree with those who think Portal should have removed him in January 1945. Since there was no certainty about how the war would be brought to an end there was

everything to be said for continuing to hit the enemy as hard as possible in the attempt to do it quickly, and none was more determined about this than Harris. It is very hard to see what purpose would have been served had he been removed at this time, except maybe to provide some comfort to the Germans.

This prompts me to refer to German morale as a target for attack. Up to mid-1943 this was specified in the directives Harris received and certainly he believed it to be vulnerable. Later on, however, it disappeared from the directives and even Harris came to doubt that it could ever be broken. Post-war researchers and writers, even Harris himself in his memoir, have gone along with this, and the conventional wisdom here and in the USA has been that morale did not prove to be a worthwhile objective. On the other hand some German historians, notably Horst Boog and Götz Bergander in his book about Dresden, draw an important distinction between private morale and war morale. The former, broadly defined as self-preservation, was never broken. The latter, reflected in people's ability to think about future prospects, was severely damaged, and much more than had first been thought. Bergander is convinced that the bombing of cities and industry shook the foundations of the war morale of the German people and was an important and intentional result of the strategic air war. I personally think there is much to be said for his point of view and for the argument that the morale factor had a pervasive and major influence on Germany's war making potential. Perhaps the point we need to take in here is that no real attempt seems ever to have been made to define what 'morale' really meant. A lesson for today?

Finally I must say a little on the questions surrounding Harris's treatment after the war. He himself was from the start incensed by the lack of proper recognition of his Command's achievements, and particularly by Churchill's omission of the bomber offensive from his VE Speech to the nation. I am inclined to think that the main reason may lie in the military tensions between the Western Allies and the USSR at that precise point in time. There is need for more research here. Harris was equally incensed by the absence of a campaign medal for the multitude of ground personnel who had served in Bomber Command; he blamed Churchill for this - and was right to do so. So

he stated that he himself would accept nothing other than the Defence Medal and - while having to accept the GCB just conferred upon him - quietly made it clear he would not take the peerage which he was told was on offer. Much has been written on this subject, with Attlee, Stansgate and Strachey all being blamed for its absence, and there is much conflict of evidence, with Harris himself at times seeming to endorse the 'Strachey explanation'. I have gone into all this as deeply as I can and conclude that it was not the Labour government that denied him his peerage but he himself, essentially for the best of reasons: his loyalty to the men and women of Bomber Command. Also entering the equation was his financial position; he simply could not afford to live in England and accept the responsibilities that would go with a peerage. He needed a properly paid job and wanted to find it abroad, away from what he considered an ungrateful nation.

Harris's foray into the merchant shipping business in South Africa, his retirement years at Goring-on-Thames, the long-continuing controversies (not least those aroused by the publication of the official history), his exchanges of letters with Albert Speer, and his many efforts on behalf of his 'old lags', some of whom I am delighted to see here this evening. So now over to you all for questions - and in due course, I hope, to read the book.

GUILD OF AVIATION ARTISTS

The Guild of Aviation Artists' major exhibition in 2002 will be making a special feature of Bomber Command in WW II. It will be held in the Mall Galleries (on the right just beyond Admiralty Arch) between 22nd and 27th July. There will be no charge for admission.

QUESTIONS AND COMMENTS FROM THE FLOOR

Wg Cdr Jeff Jefford. Two questions. First, I have heard it said that Saundby declined a command of his own in order to stay with Harris; was that the case? And, secondly, you suggested that some of the ideas being hatched by Harris' staff failed to reach him; was that just routine or some kind of Machiavellian plot?

HP. No, I don't think the filtering process was in any way malign. Harris had a substantial staff and there was just no way that he could have handled everything personally; a lot of responsibility simply had to be delegated. Even so, in examining the files, I was surprised to see just how much correspondence Harris had, at least, signed and he certainly took a close interest in matters relating to his aeroplanes and their equipment, and to his men. Much of this would, of course, have been part of the normal process whereby senior staff officers kept their CinC in the picture while getting his signature on letters to their particular parts of the Air Ministry.

While Harris certainly paid a lot of attention, for instance, to questions of leadership and morale, it would have been quite impractical for him even to have attempted to consider all the ideas on operational matters that were being submitted. As a result, there was some criticism from people who felt that the upper reaches of the hierarchy were closed off; others complained that the senior staff failed to deal adequately with some of their proposals and some of the seniors were also criticised for their lack of operational experience. While much of this was, I think, rather unfair, it was probably also inevitable because people at the bottom of the heap often failed to appreciate what was going on in the middle, let alone at the top, of what was a very large enterprise.

And Saundby? Yes, he was more than keen to stay with Harris who said, at one stage, that he thought Saundby would be the right man to succeed him. He seems to have changed his mind later on, however, as there is written evidence to show that he wished Cochrane to be his successor should that ever become necessary. Nevertheless Saundby was a very useful chap in a great many practical ways. I think Air Chf Mshl Hodges might agree that Saundby acted as the front man for the CinC, both within the

Headquarters and, less formally, but just as importantly, in dealing with influential visitors to the Mess. I think Saundby's greatest weakness was that he was often not prepared to stand up to his boss when there was a difference of opinion. Sam Elworthy, for instance, recorded just such an incident. Personally, I don't think Saundby would really have been a suitable choice as CinC of Bomber Command, but Cochrane probably was good enough.

Air Chf Mshl Sir Lewis Hodges. Can I just say that Saundby was a great co-ordinator. Every morning we'd have a meeting in the Operations Room when Bert Harris would come down and decide on the targets for that night but it was Saundby who got all the staff together and so on and effectively conducted the proceedings.

Humphrey Wynn. I had the opportunity to look at Saundby in connection with my work for the Dictionary of National Biography and it is extraordinary how the whole of his RAF career was overshadowed by Harris - Egypt, Iraq, Worthy Down and finally Bomber Command.

HP. Yes, it is strange how closely their careers followed each other. The only significant gap was at the Air Ministry. They both spent five years there but not together. On the operational side, however, you are quite right.

AVM Nigel Baldwin. I once read a rather scurrilous piece about Saundby and the fact that he could never say 'no' to Harris, which suggested that he might have wanted him around as a 'yes man'. Is that possible?

HP. There may be some truth in that. Whether it was wise or not, however, I can see that Harris might well have wanted someone whom he could trust totally and upon whom he could rely when representing his views to the staff. It is a matter of leadership 'style' and I would have needed a book twice as long to attempt to analyse that. But if you put yourself in Harris' position, what kind of deputy would you have wanted? One can criticise, but Harris needed all the help he could get in absorbing the strains and stresses and Saundby was a man he had known and trusted for years. Would things have worked any better with someone else? We shall never know.

Dr Michael Fopp. I was fortunate enough to spend some time with Sir Arthur but there was a question that I failed to ask him and I wonder whether you discovered anything in your researches. Did Harris have a specific view on the use of the atomic bomb against Japan?

HP. Two brief points on this. First, Harris was aware of the possibility that the Germans might somehow manage to develop an atomic bomb. This may have been a factor contributing to his belief that the war had to be pressed to a conclusion as quickly as possible. Second, in a brief interview in late August 1945, he did refer to the implications of the atomic bomb; while I cannot now recall precisely what line he took, I very much doubt that he had any doubts about its use against Japan.

Sir Freddie Sowrey. After the war Freeman and Harris both refused peerages, both on grounds that included the expense involved. Should Harris not have accepted a title, Lord Harris of High Wycombe perhaps, or Harris of Springfield, if only as a token gesture on behalf of his crews?

HP. The first point I should make is that when Harris did finally accept a baronetcy from Churchill in 1952, one of his main reasons for doing so was that he now felt that it would demonstrate to his chaps that their achievements in the bomber offensive were finally being recognised 'at the top'. It is important to appreciate that the title was not a late offer from the Labour administration. But as soon as Churchill had been re-elected, Harris let it be known, through Brendan Bracken, that he would now be content to accept a baronetcy. Back in 1945 the atmosphere had been such that Harris would not have accepted it under any circumstances. At that time he was totally disenchanted with the entire establishment and, temporarily, even with Churchill once he had learned that his ground crews were going to get no recognition other than the Defence Medal, Harris believing that Churchill had been behind this decision. In fact he had first raised the matter in 1944 when the whole question of war medals began to be considered. The Honours and Awards Committee was the body specifically responsible for ruling on these matters,

although its recommendations did need the endorsement of the PM. The committee had taken the traditional line that campaign medals should never be awarded to people who had not set foot outside the United Kingdom; those who took part in operations from UK bases were a different matter, of course. This rule applied to all three Services, not just the RAF, and Churchill took the view that it would be quite wrong to start tinkering with it. After all, if one bent the rules for one group one would set a precedent and where would it all stop? It was agreed, therefore, that the Defence Medal would have to suffice for everyone who served only in the UK. Harris was not alone in disputing this decision, incidentally; other CinCs were equally perturbed but, once the Coalition and Caretaker Governments had been replaced by the Labour administration, Attlee did not see fit to change Churchill's ruling and there the matter rested.

Harris was absolutely livid about this. In one of his hastier moments, and he was quite capable of acting on impulse, he let it be known that, under those circumstances, he himself would accept nothing other than the Defence Medal. In the post the next day he received his GCB, which presented something of a problem as he felt obliged to accept it, although he did make it clear that he would not accept any further awards. Nevertheless, this episode had confirmed his impression of an ungrateful country. He had had enough and he wanted to get away – to South Africa where the last thing he would have wanted was a peerage. A peerage in South Africa, he said, would be as inappropriate as a hippopotamus in Trafalgar Square! The whole issue was very contentious; Churchill, who was unaware of much of this at the time, was absolutely furious when he discovered that Harris had not been awarded a peerage at the end of 1945.

Sqn Ldr Tony Iveson. If we could have a Montgomery of El Alamein and an Alexander of Tunis, why not a Harris of the Ruhr? (Laughter)

HP. Well, it's a thought, isn't it, but it does lead to an even more intriguing possibility. I am fairly certain that, when some thought was being given to finding a further appointment for Harris in the autumn of 1945, one of the jobs for which he was considered was that of Commander-in-Chief of the British Zone of Occupied Germany! I

have been unable to find conclusive evidence for this but I am sufficiently confident that it happened that I have mentioned the possibility in my book, which may perhaps encourage someone else to dig a little deeper. Another possibility that was definitely floated was the Governorship of the Isle of Man, which Harris simply dismissed on the grounds that it ought to go to Billy Butlin! (Laughter)

Talbot Green. I have just finished reading Alanbrooke's diaries. Towards the end he was pondering whether or not to accept a baronetcy as CIGS. It would have cost about £200 a year and he was not sure that he could actually afford it. At much the same time, the later stages of the war, he also confides some fairly derogatory remarks about Churchill, especially after a particularly hard day, although he does temper these by his understanding of the burden which the PM carried. Nevertheless, he seems to have thought that Churchill was pretty befuddled by the end of the war. This raises the question of his having ignored Bomber Command in his Victory speech. Had Churchill fallen out with Harris, or did he perhaps, just 'turn over two pages at once'?

HP. I found it very difficult to get to the heart of the Harris/Churchill relationship during those final few months. Jock Colville, Churchill's Private Secretary, records, for instance, Harris dining with Churchill at Chequers after Dresden when they had lengthy discussions about what might happen in Central Europe. What would the Russians do? Would they keep on rolling West? From Colville's account it is quite clear that Harris and Churchill were on good terms at that point - and that was definitely post Dresden. It was not until later that Churchill suddenly blew his top, in private of course, not in public, about the continuing bomber offensive, and Dresden in particular, although there is no doubt that Churchill had been content with the attack on that city at the time.

It was only at the later stage that Churchill called Dresden a step too far, a target too far. Things do seem to have gone a bit 'peculiar' at that point and then, just after VE-Day, Churchill spoke on the radio, his words being extensively reported in the Press the next day. He went through the whole story of the war, giving credit to just about every aspect of the British war effort, from the Battle of Britain

onwards, but totally ignoring Bomber Command. It just doesn't add up because, only two days later, Churchill sends Harris the warmest of congratulatory messages, to him and the whole of Bomber Command, on their valuable contribution to the winning of the war, and that was extensively reported in the British Press. It really was rather odd. I asked Martin Gilbert if he could shed any light on this. Had he perhaps come across a draft of Churchill's speech and, believe it or not, he had never even heard of the VE Speech! Nevertheless, he did have a look for me but he found nothing of any relevance. So what could account for this anomaly? Frankly, I do not know, but I have offered a speculative explanation for which you will have to read the book.....

Sqn Ldr Alan Riches. I read somewhere, although I can't actually recall where, that Harris had a lower opinion of Dominion aircrew than of his British crews. Was that true and, if so, how did he reconcile that with his own colonial experiences?

HP. I don't think it was true at all. Harris thought very highly of most of his men. Where he did have some difficulty was with the different policies of the Governments of the countries concerned. The Canadians, for instance, wanted all aircrew to be commissioned. Ottawa was also unhappy about accepting our tour lengths and at one stage the Australians pressed to have their aircrews withdrawn to the home country after one operational tour. There was also pressure to have all-Canadian manned squadrons and, indeed an all-Canadian group, which they eventually got. In fact, a lot of Canadian aircrew were not particularly happy about this. Many of them believed that an integrated Bomber Command would have been more efficient, more effective, than a force divided into nationally-sponsored units reflecting different conditions of service, different views on the constitution of crews and so on. They also thought that they would learn more, and thus become more professionally competent, by serving in a united arm than by operating in semi-private air forces.

The sort of complications that these differences created caused a lot of problems and it was an issue in which Harris was occasionally obliged to become personally involved. He certainly did not get on too well with one of his senior Canadian commanders, although he

had a very high opinion of the last one, 'Black Mike' McEwen, and he had a New Zealander, Carr, commanding another of his groups – and there was Bennett, of course, who was an Australian. As far as the men were concerned, I am sure that Harris had just as much time for his 'colonials' as for anybody else.

BOMBER SYMPOSIUM

The Bomber Command Association is planning a symposium which will revisit the bomber campaign of WW II. The speakers will include Sebastian Cox and Air Cdre Henry Probert. Some of the arrangements have yet to be finalised but the event will be held at the RAF Museum, Hendon on Saturday 12th October 2002. Start and end times are expected to be 1000hrs and 1600hrs and the cost will be of the order of £20-25 per head, which will include coffee and lunch. Once confirmed, details will be available from the Association (Doug Radcliffe on 0208 358 4841).

CAN YOU HELP?

Eunice Wilson, a member of the Society and an accredited researcher at the PRO, is tracing the history of Rudloe Manor and the adjacent quarries and tunnels. Used for underground storage of munitions in WW I, during WW II the site accommodated HQ 10 Gp and subsequently HQ P&SS. Ms Wilson's specific enquiries concern an Abwehr agent named Treck who settled in the area in 1936 and succeeded in infiltrating the upper reaches of society, in that he married a baroness and became a member of the Beaufort Hunt, before disappearing in 1939. It is suspected that his primary concern will have been Stuart Menzies (SIS/SOE), who lived locally, but that he may also have been interested in activities at the manor. If anyone can provide any leads, or any information at all, on Treck would they contact Ms Wilson directly at 143 Harbord St, London, SW6 6PN (Tel 020 7385 9242)

BALLOONS: WHAT HAVE THEY EVER DONE FOR US? **The contribution of the balloon to the history of air power**

by

Squadron Leader Alan Riches

In 1996 the Royal Air Force Historical Society established, in collaboration with its American sister organisation, the Air Force Historical Foundation, the Two Air Forces Award, which was to be presented annually on each side of the Atlantic in recognition of outstanding academic work by a serving officer or airman. It is intended to reproduce some of these papers from time to time in the Journal. This one was the winning RAF submission in 2001. Ed

Introduction

One of the more enjoyable aspects of my job in Defence Studies (RAF) is giving lectures on air power to University Air Squadron students. I often start by asking them the following question: when was a manned aircraft first used for a military purpose? A simple enough question; however, although there are often a number of ‘spotters’ in the audience, no one has yet given me the correct answer. In fact, it is widely accepted that the first military use of a manned aircraft occurred on 26 June 1794, when the French used a balloon to observe Austrian troop movements at the Battle of Fleurus. I use this question to make two points: firstly, that air power is not just a twentieth century phenomenon – its history goes back over two hundred years; and secondly, that for the first half of its history, air power could only be generated by means of the humble balloon.

Given that balloons have played such a seminal part in the history of air power, it is perhaps surprising that so little has been written about their use. What may also be surprising is the wide range of military uses to which the balloon has been put. British Air Power Doctrine (AP 3000 3rd Edition), which was published last year, identifies seven core capabilities of air power and outlines the roles that are derived from them. For those who are not familiar with this publication, the seven core capabilities are: Information Exploitation; Control of the Air; Strategic Effect; Indirect and Direct Air Operations; Combat Support Air Operations; Force Protection; and

Sustainability. The purpose of this article is to show that a role for balloons has been found, or at least envisaged, in respect of all seven core capabilities.

It is important to stress at the outset that I shall only be considering the use of balloons - not airships, dirigibles, blimps or zeppelins. The addition of a source of power – other than the wind - makes for an entirely different kind of platform, one which is beyond the scope of this article.

Information Exploitation

‘Reconnaissance, or observation, can never be superseded; knowledge comes before power; and the air is first of all a place to see from.’

Sir Walter Raleigh

Reconnaissance is as old as war itself. Five centuries before the birth of Christ the Chinese strategist Sun Tzu instructed his captains to ‘know your enemy and know yourself and you can fight a hundred battles without disaster’. More recently, the Duke of Wellington ascribed much of his success to his care in studying what was happening ‘upon the other side of the hill’. The best military commanders have always been those who realised that the more they knew of their opponent’s positions, the greater was their opportunity for engaging him at a time and place most calculated to ensure his defeat. Air power platforms and systems play a vital role in gathering data and information, and the timely exploitation of information is thus a key core capability of air power.

Until the end of the eighteenth century, however, reconnaissance was restricted to that which could be seen from the top of a hill or from the back of a horse. The development of the flying machine changed all this. The first manned flight, by the Marquis d’Arlandes and Jean-Francois Philatre de Rozier in a Montgolfier hot air balloon on 21 November 1783, seemed to offer a new dimension to the art of warfare. Typically, perhaps, the military establishment in Britain regarded ballooning as an amusing new sport rather than as a means of gaining advantage in warfare. The French, however, took a different view and, in the war against Austria and Prussia which

followed the Revolution in 1789, they developed a mobile apparatus for producing hydrogen on the battlefield. In April 1794 the world's first military aviation unit, La Première Compagnie d'Aerostiers Militaires, was formed near Paris, and in June its first balloon, *L'Entreprenant*, was deployed to Meubeuge, Belgium, for use by the French Republican Army against the Austrians. The first operational ascent was made on 26 June when a certain Captain Coutelle carried out a series of observations of Austrian forces manoeuvring on the battlefield at Fleurus. Coutelle was airborne for a total of ten hours and was accompanied later in the day by the French commander, General Jourdan. Messages were transmitted to the ground by means of semaphore, luminous balls hung on the basket or written information slid in sandbags down the mooring cable. The observations made a decisive contribution to the French victory¹.

This ascent led to a classic military response to the air weapon. The Austrian troops panicked at the sight of the balloon – a typical reaction when soldiers first come up against a 'secret' weapon. Not long afterwards came the next almost inevitable step – the disbandment of the balloon company by Napoleon in 1799. The reason given was that the balloons' speed of deployment did not comply with his concept of fast moving operations, although there is also a suggestion that he disapproved of the glamorous reputation that soon became attached to the French aeronauts – the 'Brylcreem boys' of the Republican Army. History can only reflect on what would have happened at the Battle of Waterloo in 1815 had Napoleon possessed a balloon which could have peered over the Mont St Jean Ridge and seen Wellington's troop dispositions.

With the peace in Europe which followed the defeat of the French at Waterloo, the military development of observation balloons stalled. It was not until the 1860s, when significant progress was made in the fields of photography and telegraphy, that interest was renewed.

Balloons were used extensively during the American Civil War. In October 1861 the first Union Army Balloon Corps was formed under the command of Thaddeus Lowe with a complement of 50 men. By early 1862 the Corps had seven balloons. A converted coal barge was

¹ R Jackson, *The Guinness Book of Air Warfare*, Guinness Publishing Ltd 1993, p9.

used to transport and tow the balloons during operations along the Potomac River – arguably the world’s first aircraft carrier. The Balloon Corps proved its worth time and again, especially in directing artillery fire by aerial telegraph. In response, the Confederate forces operated their own balloon in the spring of 1862. It was manufactured from silk dresses donated by Southern ladies, but because the only gas supply was in Richmond, Virginia, it had to be inflated there and then towed to the front by train. The Union Army Balloon Corps, on the other hand, had portable hydrogen-making equipment².

Impressed by the success of the balloons used in the American Civil War and the Franco-Prussian War (see below), the British War Office asked the Royal Engineers to look into the practicability of using balloons with the Army. The Army Balloon Equipment Store was established at Woolwich in 1878 under the command of Captain James Templar, an experienced aeronaut, who thus became the first British air commander. The first British Army balloon, named *Pioneer*, was constructed in 1879, and officers and men of the Royal Engineers were trained in aerial reconnaissance, photography and signalling. In 1884 a balloon unit travelled to Bechuanaland as part of an expedition sent to repel Boer incursions, with useful results. Another unit was sent to the Sudan the following year, after the fall of Khartoum and the death of General Gordon. In 1892 the Royal Engineers Balloon Depot was given a permanent base at Aldershot and a school of ballooning founded there³.

In December 1899, at the start of the Boer War, a Royal Engineers balloon detachment carried out observations during the Battle of Magersfontein. The balloon could have been used for aerial reconnaissance of the enemy trenches before the battle started, but the British commander, Lieutenant General Lord Methuen, neglected to issue the necessary orders, with the result that his forces were committed to action with no real knowledge of the Boer trench systems. The British suffered heavy casualties, which would certainly have been heavier still if balloon observation had not detected enemy movements during the battle itself. The activities of the balloon

² *Ibid*, p10.

³ *Ibid*, p11.

detachment persuaded some senior British officers that aerial reconnaissance was a valuable asset, although most remained convinced that scouting by cavalry remained the best method⁴.

Meanwhile, following the outbreak of war between the United States and Spain in 1898 over Cuba, a US Balloon Company was sent to the Caribbean island in support of an American expeditionary force. On 1 July 1898, some 8000 American troops were struggling along a congested jungle path towards Spanish positions on San Juan Hill. Travelling with the troops, though a hundred feet or so above them, was a balloon from which one Lieutenant Colonel Darby attempted to make observations of the enemy positions. The jungle was so thick, however, that all Darby could see below him was a blanket of green foliage. The Spanish could not see the American troops either, but they knew exactly where they were because Darby's balloon was directly over the top of them, acting as a marker. As a result, a heavy barrage of fire rained down on the Americans, causing heavy casualties. Later that day the balloon, with a carnival aeronaut named William Ivy aboard, was badly holed by enemy fire and dropped into the water. Ivy survived and lived until 1955, with the dubious distinction of having become the first pilot in history to be shot down in war⁵.

A hundred years after their debut at Fleurus, balloons had made a useful but hardly decisive contribution to warfare. They were awkward to deploy, they lacked mobility and they were difficult to control in strong winds. Despite these shortcomings, however, they were the only aerial observation platform available. Then, on 17 December 1903, an event occurred which heralded the eventual eclipse of the use of balloons and their cousins, airships, as observation platforms. This was the first powered flight of the aeroplane *Flyer*, designed by the Wright brothers, at Kitty Hawk beach in North Carolina. Although at first this invention received little encouragement from the military in America or Britain, a French syndicate purchased the patent and took the lead in aeronautical

⁴ *Ibid*, p12.

⁵ G Regan, *The Guinness Book of Air Force Blunders*, Guinness Publishing Ltd 1996, p28.

progress. By the time the First World War began in 1914, aeroplane technology had developed to such an extent that heavier-than-air machines were already on the inventory of all the major combatants.

Nevertheless, the balloon was to play an important part in the First World War. The problem of control was solved by the German invention of the sausage-shaped *Drachen* or kite-balloon, which had tail fins to keep it pointed into wind; moreover, the static nature of trench warfare meant that the balloon's lack of mobility was rarely exposed. Thus *Drachen*-style kite-balloons were used extensively by both sides throughout the war and proved very useful for observation and artillery spotting⁶. Ultimately, however, the inherent characteristics of the aeroplane - height, speed, reach and flexibility – appeared to condemn the balloon as an observation platform to the pages of history.

It is therefore all the more surprising that, at the end of the 20th century, balloons are enjoying something of a renaissance as high-technology surveillance communications platforms. In the USA, a chain of radar-equipped aerostats (the American term for a tethered, non-rigid, payload-carrying balloon) plays an important role in the country's anti-drug campaign. US experience of surveillance aerostats has shown the technology to be both technically and cost effective. In a senatorial hearing in 1993, the US Customs Service put on record detailed data on the operation of what has become known as the Tethered Aerostat Radar System (TARS) which forms a key part of the USA's anti-drug National Air Interdiction Strategy. The network comprises fifteen operational sites which provide continuous coverage of the USA's southern border from Puerto Rico to the Pacific Coast. The 71m aerostats, manufactured by TCOM LP and equipped with Westinghouse radars, are designed to detect a 2m² radar cross-section target within a 280km radius. On-station costs per hour are \$300-500, compared with \$3500 for a fixed-wing airborne early warning aircraft such as the Lockheed P-3 Orion⁷. So successful has the experiment with surveillance balloons been that other agencies are now showing

⁶ Sqn Ldr C R Pickthall, 'The Military Application of the Hydrogen Balloon', *RAF 1995*, p74.

⁷ M Streetly, 'Up, Up and Away', *Flight International* 11-17 August 1993.

an interest in developing their own capability.

Control of the Air

'Anyone who has to fight, even with the most modern weapons, against an enemy in complete control of the air, fights like a savage against modern European troops.'

Field Marshal Rommel

One of the primary considerations of any commander is to shape the battlespace so that friendly operations can proceed at the place and time of his choosing without prohibitive interference from an opponent. A second important consideration is to ensure that friendly military forces are safe from attack. One of the core capabilities of air power is, therefore, to achieve and maintain the degree of control of the air required to ensure the success of the operation. Friendly control of the air aims to restrict an opponent's ability to use air power against friendly forces.

Following the Montgolfier brothers' successful experiments with hot air balloons in 1783, the air power theorists of the period were soon painting lurid pictures of balloon-borne fleets sailing like galleons in the sky, armed with 200 guns apiece and engaged in death grapples as part of an invasion from the sky. In 1810 a Prussian officer, Julius von Voss, wrote, apropos balloons, that they had the task of observing the enemy from afar, but '...the enemy, eager to conceal his intentions, did not hesitate to send up his own light craft in order to drive back the enemy balloons; and so in the heavens above skirmishes developed between advanced patrols...'⁸. A century later, von Voss's prediction was realised over the trenches of France, but by aeroplanes rather than balloons. Dependent on the prevailing wind for their direction and speed, balloons' lack of basic manoeuvrability would limit them to a passive but nevertheless important role in the struggle for control of the air.

The concept of using balloons for air defence (or Defensive Counter-Air Operations in the modern idiom) originated in Britain

⁸ Quoted in D Brown, C Shores & K Macksey, *The Guinness History of Air Warfare*, Guinness Superlatives Ltd 1976, p2.

before the First World War. ‘The general idea was to build a stockade of nets in the skies and thus enmesh hostile aircraft on their way to the defended area’⁹. During the last years of the First World War, the British employed the barrage balloon in response to attacks by German Gotha bombers on London. The London Balloon Defence in 1918 consisted of seven ‘aprons’ formed by a chain of balloons linked by cross cables carrying weighted wire streamers. The aprons were regarded as an essential element of the air defence system and were designed to force enemy bombers to use a restricted height band which could be effectively covered by fighters and anti-aircraft guns¹⁰. A German prisoner said that the aprons were ‘sufficient to keep all machines at their maximum height’¹¹. The Germans had developed similar ideas and by 1917 had formed balloon barrage detachments to protect industrial targets. In January 1918, a British FE2b was caught in a German net and the pilot emphasised the ‘fearful mess which the balloon cable had made of his machine’¹².

The threat of another war rekindled interest in balloons in 1936, when a second balloon barrage was designed. The Air Staff laid plans for a ring of balloons around London, without the connecting apron, spaced at about ten balloons to the mile and requiring 450 balloons. This plan was quickly changed when it was realised that a ring of balloons merely forced an attacker high to cross the ring, after which he could come down to bombing height once more. Instead, ‘field siting’, an irregular pattern all over the area, was adopted¹³. RAF Balloon Command was formed in November 1938 and by September 1939 a barrage of 444 balloons was flying over London. During the Blitz, 102 German aircraft struck balloon cables, resulting in 66 crashes or forced landings¹⁴. ‘An outstanding example of the

⁹ *Roof Over Britain*, HMSO 1943, p66.

¹⁰ C Cole and E F Cheesman, *The Air Defence of Britain 1914-1918*, Putnam Press 1984, p307.

¹¹ *Roof Over Britain*, HMSO 1943, p66.

¹² *Ibid*, p66.

¹³ I V Hogg, *Anti-Aircraft: A History of Air Defence*, MacDonald & James 1978, p170.

¹⁴ Major F J Hillson, ‘Barrage Balloons for Low-Level Air Defense’, *Airpower Journal* Summer 1989.

disconcerting effect balloons have upon attacking aircraft was observed at one British cathedral city in the spring of 1942. The target, already twice attacked, was provided with a defensive balloon barrage against the probability of a third visit. The enemy returned, but by far the greater proportion of his bombs were discharged well outside the city boundary'¹⁵.

Both fixed and mobile barrages were widely used during the Second World War to deny the enemy use of low-level airspace from where accurate bombing was possible. At its maximum strength, Balloon Command consisted of 52 operational squadrons, equipped with almost 2500 balloons and manned by 33 000 personnel¹⁶. Besides cities, balloons protected ports and fleet anchorages, and balloons mounted in boats defended estuaries against mine-laying aircraft. Four thousand balloon personnel even took part in the invasion of Normandy, crossing the channel to protect beach heads, artificial harbours and ammunition dumps¹⁷.

The Germans learned the hard way that balloons could enhance low-level defences. Only after the Ruhr dams had been breached did they erect an aerial barrage to prevent repetition of the raid by No 617 Sqn. Since its success depended upon low-level weapon release, the raid could not have been accomplished had a balloon barrage been earlier incorporated into the dams' defences.

The increased service ceiling of bombers coupled with the improvement in weapon aiming techniques from high level and at night diminished the importance of balloon barrages during the latter part of the war. The hazard to friendly aircraft posed by balloons and cables up to 20 000 feet was also not inconsiderable. Barrage balloons did, however, go out with a bang. To help combat the threat created by the use of V1 flying bombs in 1944, the 'largest balloon curtain in history'¹⁸ formed the last layer of Britain's defences, and was credited with 278 kills. Nonetheless, Balloon Command was eventually

¹⁵ Flt Lt R F Delderfield, 'A Study in Passive Defence', *RAF Quarterly* Vol 16 1944-45, p166.

¹⁶ B Collier, *History of the Second World War: The Defence of the United Kingdom*, HMSO 1957.

¹⁷ Flt Lt R F Delderfield, *Op Cit*, p167.

¹⁸ *Ibid*, p169.

disbanded in February 1945. Though used in small numbers by US forces in Korea, balloons have not figured significantly in air defence planning since 1944.

Strategic Effect

‘Air power has become predominant, both as a deterrent to war and, in the eventuality of war, as the devastating force to destroy an enemy’s potential and fatally undermine his will to wage war’.

General Omar Bradley

The concept of ‘centres of gravity’, first espoused by Clausewitz as a way of describing how to compel an opponent in conflict to bend to your will, has stood the test of time. In Clausewitz’s day, the enemy’s army was considered to be his centre of gravity; in modern times, an opponent’s centre of gravity may take many forms. Air operations for strategic effect are intended to destroy or disrupt the defined strategic centre of gravity of an opponent and thus undermine his ability, will and means to continue fighting.

When the Marquis d’Arlandes and Jean-Francois Philatre de Rozier made their historic ascent in a Montgolfier hot air balloon in November 1783, one of the onlookers that day was the US envoy Benjamin Franklin. Alive to the sense of a new age dawning, Franklin wrote of the flight: ‘The invention of the balloon appears to be a discovering of great importance and may possibly give a new turn to human affairs. Convincing sovereigns of the folly of wars may perhaps be one effect of it, since it will be impractical for the most potent of them to guard his dominions. Five thousand balloons capable of raising two men each could not cost more than five ships of the line; and where is the prince who could afford to cover his country with troops for its defense that 10,000 men descending from the clouds might not in many places do an infinite mischief before a force could be brought to repel them?’¹⁹ Franklin’s concern about the irresistible nature of the new way of war predates by 150 years Stanley Baldwin’s famous assertion in 1931 that ‘The bomber will always get through’. His idea acquired credibility when a hydrogen

¹⁹ Quoted in E J Kirschener, *Aerospace Balloons*, Aero Publishers 1985, p11.

balloon crossed the English Channel for the first time in January 1785. Thus, when England and France once more went to war in 1793, it was tempting for propagandists and alarmists to inspire the dread of airborne invasion at a time when the Royal Navy prevented any such happening by sea. The Montgolfier brothers themselves had a strategic purpose in mind for their balloon: nothing less than the capture of the British garrison at Gibraltar. They planned to build a whole fleet of balloons and lift thousands of French soldiers to the top of the Rock. Fortunately for a large number of unnamed French soldiers, the Montgolfiers were prevailed upon to move more slowly²⁰.

It was thus the potential strategic effect of balloons that first caught the theorists' imagination, and although balloons actually began their military career in observation work, their strategic possibilities were not forgotten. Ironically, it was the Austrians, who had panicked at the sight of the new aerial phenomenon at the Battle of Fleurus in 1794, who were the first to put the concept into practice. During the siege of Venice in March 1849, the Austrians conceived a plan which, they hoped, would force the Venetians to surrender without the need to storm the city: they would bomb the civilian population. Two hundred small, unmanned hot-air balloons were constructed, each fitted with a 30lb bomb which would be released by a time fuse. The idea was simple: the balloons would be floated over the city to release their deadly cargo on the unsuspecting Venetians, whose will to continue fighting would thus be broken. When at last the wind was favourable and the attack launched, it produced reactions among both the victims and the attackers which were to be seen again during the strategic bombing campaigns of the twentieth century. Though at first alarmed, the citizens of Venice rapidly assumed a disdain for the new method, particularly since no casualties resulted. The Austrians, on the other hand, made exaggerated claims of the damage and casualties they had inflicted and the effect on their opponents' morale they felt must have ensued. Nonetheless, the experiment was not repeated²¹.

²⁰ G Regan, *Op Cit*, p24.

²¹ D Brown, C Shores & K Macksey, *Op Cit*, p2.

Almost one hundred years later, on 18 April 1942, sixteen B-25 bombers from the aircraft carrier USS *Hornet*, led by General James H Doolittle, bombed Tokyo in retaliation for the attack on Pearl Harbour four months previously. The raid did little physical damage, but the Japanese Imperial High Command were shocked at the violation of their homeland. Reprisal raids were demanded, but there were no suitable airfields within striking distance of the continental United States and precious aircraft carriers could not be risked. Enter the balloon! Japanese balloon technology was the most advanced in the world, and Japanese scientists knew that intercontinental, free-flight balloons were possible. By making use of the prevailing wind currents, they could send death-dealing balloons to US shores within a matter of days.

Two years later, at a cost of nine million yen (about two million pre-war US dollars), the Japanese had perfected a weapon that could travel over 6000 miles to American shores, drop a payload of incendiary and anti-personnel bombs and, with a small explosive device, self-destruct. On 3 November 1944, the first balloon rose slowly and silently from its launching site on Honshu's eastern seaboard. More than 9000 bomb-carrying balloons would follow.

When the first balloons began drifting over US shores, there was confusion and panic. It was soon established that the source of the balloons was Japan and, as more and more balloons reached the United States and Canada, their detection and interception became a top priority. Of vital concern was the payload the balloons carried. The destructive explosive power was small, but the incendiary threat was incalculable. With huge forests all along the West Coast and extending inland, a massive incendiary raid during the dry season could envelop the entire area in a gigantic, uncontrolled holocaust. From this alone, the loss of lives and property would be enormous.

Under great pressure, the US military was forced to establish a defence against the balloons. The SUNSET project, initiated in early 1945, aimed to track the balloons by radar and shoot them down. Scores of interceptor aircraft of the US Fourth Air Force, including P-38 Lightnings and P-61 Black Widows, and literally thousands of military personnel were tied up in balloon defence. Thus did the balloons achieve a strategic effect, although not the one for which

they had been conceived.

The Japanese balloons did cause some damage. Not only were six people in Oregon killed by the balloon explosives, but in a strange twist of fate, one of the balloons landed on transmission lines leading to the Hanford Engineering works in Washington where a portion of the top-secret MANHATTAN atomic energy project – soon to bring vast destruction to their own shores – was taking place. A power failure did occur, but safety controls triggered and electric current immediately resumed²².

Joint Force Employment - Indirect and Direct Air Operations

‘The greatest lesson of this war has been the extent to which air, land and sea operations can and must be co-ordinated by joint planning and unified command.’

General ‘Hap’ Arnold, 1946

The inherent characteristics of air power – height, speed, reach and flexibility – give commander a range of options to exploit it in joint operations. Indirect air operations are intended to destroy, disrupt, neutralise or delay the military potential of opposing forces before they can be brought to bear effectively against friendly forces – so-called ‘shaping the battlespace’. Direct air operations are conducted against hostile targets that are in direct contact with friendly forces on the battlefield itself.

The same inherent lack of basic speed and manoeuvrability that would prevent balloons from being used in offensive counter-air operations would also effectively disqualify them from being employed *directly* in anti-surface force operations, although the idea has been put forward on at least one occasion. During the war between the United States and Mexico in 1846 (which arose out of a dispute over the ownership of New Mexico), a Pennsylvania balloonist named John Wise suggested using a balloon to drop ‘a thousand percussion bombshells’ on the fort of San Juan de Ulloa at Veracruz, whose gun batteries were holding up the advance on Mexico City of American forces under General Winfield Scott.

²² See S Kennedy, ‘Ruby Beach: The Lonliest Battle’, *Military Review* January 1988.

Typically, the idea was ignored by the War Department, and the fort was eventually taken only after a bloody land assault²³.

Nonetheless, balloons can certainly be used *indirectly* in anti-surface force operations. Their observation and artillery spotting roles have already been covered, and recent advances in balloon and cable technology have opened up more exciting possibilities. In 1995, as part of the Pentagon's attempt to create a limited, operational counter-battery capability to destroy heavy weapons in the event of an attack by North Korea, senior US military officials in South Korea began examining the use of moving target indicators combined with synthetic aperture radars on board tethered balloons to monitor North Korea's mobile artillery and missiles²⁴. The balloons' cables could be used to carry secure data links that would allow controllers to guide the flight of cruise missiles from a ground station or ship. Indeed, the accuracy of a whole range of precision guided munitions could be increased during the final minutes of flight by allowing a person to take over terminal guidance of the weapon.

Joint Force Employment - Combat Support Air Operations

'Supply and transport stand or fall together; history depends on both.'

Winston Churchill

Combat support air operations cover the full spectrum of air power roles and emphasise the utility of air power around the spectrum of conflict. Essentially, combat support enables forces on land, sea and air to undertake their combat roles; combat support air operations include air transport, air-to-air refuelling, air surveillance and reconnaissance, combat search and rescue, electronic warfare and the suppression of enemy air defences.

During the Franco-Prussian War of 1870-71, the French used balloons in the air transport role. Sixty-six balloon flights were made out of Paris, under siege by Prussian forces, to unoccupied territory. The balloons carried a total of 110 passengers, more than 2½ million

²³ R Jackson, *Op Cit*, p9.

²⁴ D A Fulghum, 'Pentagon Sees Aerostats as Counter-Stealth Tool', *Aviation Week & Space Technology* 13 February 1995.

letters and carrier pigeons to fly back to Paris bearing microfilm messages. The early flights from Paris were made by skilled aeronauts, but later missions were undertaken by French Navy personnel, specially trained for the task. In response, the German firm of Krupp produced the world's first anti-aircraft guns. Five balloons and their occupants were captured by the enemy; of the others, two were lost in the Atlantic and one ended up in Narvik in northern Norway after a flight of 1400 miles²⁵.

While the balloon flights out of Paris – the first airlift in history – had been something of an epic, it was clear that the venture would have been a greater success if the aeronauts had been able to steer their craft. Some bizarre suggestions were put forward, the best of which was for a quartet of eagles to be harnessed to the balloons.²⁶ Ultimately, however, the Parisian experience gave impetus to the idea of building a dirigible balloon – an airship.

Joint Force Employment - Force Protection

'It is easier and more effective to destroy the enemy's aerial power by destroying his nests and eggs on the ground than to hunt his flying birds in the air.'

General Giulio Douhet

Air power depends upon a number of component elements – platforms, weapons, bases, logistics, command and control assets – the degradation of which may reduce its effective application. Force protection means preventing an enemy from attacking vital air assets, or minimising the effects of any attack, to enable air operations to continue.

During the Cold War, the greatest threat to NATO's air power was a massive Warsaw Pact attack on the Alliance's airfields. Since the Warsaw Pact lacked large numbers of stand-off weapons, its aircraft would have had to overfly the target to deliver their bombs and, to increase their chances of survival in the face of the SAMs, rapid-fire AAA and fighters of NATO's air defence system, they would have

²⁵ G Regan, *Op Cit*, p26.

²⁶ *Ibid*, p27.

had to make their attacks at low level. Although the British, American and German experiences with barrage balloons in the Second World War showed that balloons could be very useful in countering the low-level threat, their utility was ignored by NATO. Yet even today, for nations threatened by adversaries not equipped with precision, stand-off weapons, balloons would enhance the effectiveness of existing airfield defences at relatively low cost.

Balloons placed across valleys or along the dead side of high ground would prevent enemy aircraft from using terrain-masking to conceal their approach to a target and thus render them more vulnerable to early radar detection. Balloons deployed nearer to airfields would add to the attacking pilot's problems in reaching a position from which accurate weapon delivery were possible. Most importantly, well planned balloon barrages would force attacking pilots either to manoeuvre around or more probably pull up to avoid flying through balloons and cables. At higher level there is a much greater probability of successful GBAD engagement. Moreover, the increased time available to acquire and track targets would permit better co-ordination of missile launches against individual targets during mass attacks, thereby avoiding wasteful multiple engagements of single targets²⁷.

The utility of balloons in force protection does not end with aerial barrages. The concept of balloon- (or aerostat-) mounted radars, discussed earlier in this article in connection with US anti-drug surveillance, has also been applied to defence against low-flying aircraft. Both Saudi Arabia and Israel have an aerostat-based low-altitude surveillance system (LASS) integrated into their air defence network which is used to detect low-flying aircraft at ranges up to 300km. In Kuwait, an aerostat LASS was in service for six days before the 1990 Iraqi invasion, during which it was destroyed. Nevertheless, this limited experience of operating an aerostat system was enough to convince the Kuwaitis of its effectiveness; indeed, the system is reported to have given the first in-country indication of the invasion and may well have been instrumental in helping the Emir to

²⁷ Sqn Ldr P D M John, 'Aerial Barrages to Enhance Airfield Defences', *The Hawk* March 1984.

escape. As a result of the Kuwaiti experience, the United Arab Emirates has also purchased an aerostat LASS²⁸.

In the USA, research is also ongoing into the possibility of using balloons as a counter-stealth tool. Stealth aircraft and cruise missiles are built primarily to elude ground-based radar, so engine inlets, cockpits and other hard-to-disguise parts of aircraft are shielded from the ground but often not from an airborne sensor. Moreover, a radar looking down at fixed ground clutter can locate a moving empty spot produced by a non radar-reflective object. With improvements in balloon technology over the last decade, it ought to be possible to place an aerostat at 65 000 feet, above the most violent weather, for at least 30 days at a time. The aerostat, shorn of tail structures required for low-altitude operations and carrying a large aperture radar, would cost \$10-20 million with its mooring system and ground support vehicles. But the real benefit would be in its operating costs: compared with \$2700 per hour for a Grumman E-2 Hawkeye or \$8300 for a Boeing E-3 AWACS, the balloon system would cost only \$500 per hour²⁹. How ironic it would be if the solution to the problem posed by stealth, the newest air power technology, should be solved by the balloon, the oldest.

Sustainability

Sustainability is defined as the ability of a force to maintain the necessary level of combat power for the duration required to achieve its objectives. It is the function that ensures or denies the capability of air power to operate. It influences the tempo, duration and intensity of an operation. In its broadest sense, it encompasses all activities necessary for the employment of air power other than its execution.

The most important element of sustainability is personnel – the provision of trained, available manpower in sufficient numbers to man the force and to replace losses. In 1941, impressed with the part played by German paratroops in the capture of Crete, Winston Churchill called for large numbers of British soldiers to be trained in the art of parachuting. Owing to a shortage of suitable aircraft, it fell

²⁸ M Streetly, *Op Cit.*

²⁹ D A Fulghum, *Op Cit.*

to the balloon to provide the necessary airborne platform. Parachute training with balloons began at Tatton Park near Manchester the same year. It soon became apparent that balloons are ideal for ab initio parachute training as they allow the trainee to undertake his first descent in controlled conditions; there is no slipstream, and the trainee is able to parachute as a singleton, allowing the instructor to talk him safely down to the ground. After the Second World War, the balloon remained, with the C130, the main platform for parachute training. During the Gulf War, when most of the C130s were employed elsewhere, the balloon was the only facility available for Airborne troops to remain current³⁰.

Another key element of sustainability is equipment, in particular the provision of weapons that are fit for the task. Balloons have played an important role in the research and development of British weapons. In the 1960s and 70s, balloons were used in support of the Bloodhound trials and the Atomic Weapons Research Establishment tests in Australia and on Christmas Island. More recently, they have been used for testing the Low-Level Parachute and the British Army's Starstreak hyper-velocity anti-aircraft missile³¹. Balloons were also used extensively by the United States and Soviet military for the research and development of new weapons during the Cold War.

Last but not least, it should not be forgotten what a key part the weather has always played in the tempo, duration and intensity of air operations. As recently as 1999, NATO air operations over Kosovo in the early days of Operation Allied Force were severely hampered by bad weather. Accurate forecasting of weather conditions is an essential part of operational planning, and even in the age of the satellite, the weather balloon remains an important forecasting tool.

Conclusion

Before the development of powered aircraft – airships and, ultimately, aeroplanes – balloons were the only aerial platform available to military commanders. It is therefore not surprising that experiments in employing balloons in a range of air power roles were

³⁰ Sqn Ldr C R Pickthall, *Op Cit*, p75.

³¹ *Ibid*, p79.

carried out. The limitations of free-flying balloons quickly became apparent. Dependent on the prevailing wind for their direction and speed, balloons' lack of basic manoeuvrability soon rendered them unsuitable for active air power roles – offensive counter-air operations, strategic attack, anti-surface force operations and most combat support air operations – and accelerated the development of powered platforms. Tethered balloons, on the other hand, proved useful for aerial reconnaissance, artillery spotting, defensive counter-air operations and parachute training and continued to do so long after the advent of heavier-than-air machines.

Indeed, balloons are enjoying something of an air power renaissance at the dawn of the 21st century. Benefiting from developments in balloon and cable technology, and equipped with radar and secure data links, aerostats offer a cost-effective alternative to fixed-wing platforms in areas such as surveillance, airborne early warning, target acquisition, weapon guidance and force protection against both low flying and stealth aircraft. The wheel has come full circle, and the early pioneers – Captain Coutelle, Thaddeus Lowe, the unfortunate William Ivy *et al* – would be pleased at the way things have turned out.

FLYING FIRST GENERATION JET FIGHTERS IN THE RAF

Air Vice-Marshal Ron Dick

This paper, which was presented at the Goddard Space Flight Center on 9th September 1991, is based on the author's experiences as a first tourist with No 64 Sqn in 1953-54.

In the years immediately following WW II, air forces everywhere began to feel the impact of revolutionary change. The jet engine had its effect in varying degrees on everything an air force did. Operational and training concepts, engineering practices, logistic support, equipment design, and all kinds of administrative functions were remoulded by the hot breath of jet propulsion. Perhaps it would be more accurate to say that the need for remoulding steadily became evident. It did not always happen as easily or as quickly as it might have done.

Military organisations are notoriously conservative by nature and resistant to innovation. Air forces initially tended to the view that aircraft were aircraft, propellers or not, and they were often slow to recognise that change was being forced upon them, powered by the inexorable momentum of an idea whose time had come.

Seen from the personal viewpoint of the pilot in the cockpit, the disappearance of the propeller was a considerable challenge. For many experienced aviators, seasoned by endless hours behind the pistons of WW II, the absence of a reassuring whirling disc was unsettling, and the thin whining of the new engines when heard from the cockpit was no substitute for the earthy, heart-warming roar of powerful reciprocating machinery. Nevertheless, such pilots usually made light of the basic problem of converting to type.

The mere flying of the aeroplane and adapting to the different techniques involved seemed to be a relatively simple matter. Eventually, almost anyone could get used to having the silk scarf not streaming in the breeze because the canopy was closed all the time, and could learn not to lunge forward automatically with a large bootful of rudder every time the throttle was opened.

On the face of it, when some familiarity had been gained with this strange phenomenon, the air forces' new toys could encourage the thought that they were almost too easy to fly. Before the light dawned

that jets really were different, and all the experience in the world counted for little unless it was accompanied by a willingness to learn, that attitude killed more than a few old, bold pilots.

However, the majority of pilots who formed the first generation jet squadrons were straight from training and had little experience of any kind to fall back on. For them, their freshly won wings still conspicuously unblemished on their left breasts, the transition to the kerosene-breathing monsters was often a dramatic business; exhilarating, demanding, and, on occasion, frightening. Even when the basic conversion was successfully accomplished, getting to use the beasts effectively in their operational role was something else again.

In the Royal Air Force of the early 1950s, young pilots got their wings in the Harvard, the British version of the North American T-6. A classic trainer by any standards, the Harvard was a much loved and respected aeroplane, embodying in one airframe all those characteristics necessary for a pilot to experience the joys and fears of flying a propeller driven military aircraft. It demanded a student's constant attention if it was to be flown safely and well, but the rewards of concentration were great.

The front cockpit was roomy and functional, with everything to hand, and the rumbling radial ahead was responsive with enough kick to allow an aerobatic routine to be done without losing height. True, the engine did hide the landing area during the last stage of an approach, but, snuggled down behind its bulk, the pilot felt he was an integral part of the machine, and the sensation of pulling off a gentle three-pointer on a surface that could not actually be seen was bliss.

Of course, a wise man did not take time out to enjoy such an achievement. At least, not then. Many a Harvard used its tailwheel and its ebullient personality to wipe the ecstasy from the faces of those who relaxed too soon after landing. The golden rule was that the aeroplane had to be 'flown' from start-up to shut-down.

With all lessons learned about propellers and tailwheels, and wings duly gained, the RAF graduate of the early 1950s moved on to jet conversion in the Gloster Meteor. At this stage, few prospective aces had seen a Meteor from close-up. The first encounter almost invariably helped to remove some of the swagger from a young man's

step and dim the lustre of the neophyte wings. For a start, this creature was almost twice as long as a Harvard and three times as heavy. It had two engines, stuck well out in the wings, and the nacelle for each appeared big enough to swallow a Harvard fuselage.

It was obvious at a glance that what was left of the wing outside the engines could not possibly be adequate for the job of getting the whole creation off the ground. After all, the span of the wing was five feet less than that of the Harvard, and the Harvard wing was not encumbered with large rotating chunks of metal.

The cockpit was a nasty shock, too. The trainer version of the Meteor, the Mk 7, had its two seats in tandem. These were covered by a long and very heavy single piece canopy, which was hinged along its right side. To get into the cockpit, the pilots seized the canopy by handles on its left-hand edge and heaved it open. The perceived similarity to a coffin lid was immediate and unforgettable. (It was not for nothing that the RAF's pet name for the Meteor was 'Meatbox').

Once seated inside, a new pilot often felt the first stirrings of agoraphobia. There was almost nothing in front of him. Gone were the comforting curves of the cowling. As he clutched at the stick to hide his insecurity (Oh, heavens! It was a stick and not a spade-grip!) it was borne in on the young man that he was essentially in front of the aircraft. Far from being in integral part of anything, it appeared that he was to be separate from and pursued by this howling banshee.

Dropping his eyes, he could see that a few of the instruments were like those he had used in the Harvard, but there was much that was disturbingly unfamiliar. The altimeter had more needles, the airspeed was marked in knots instead of mph, and the engine instruments looked odd. There were airbrakes, high pressure fuel cocks and relight buttons. Clearly, there was a great deal with which he would have to become accustomed. Even the smell was different.

In due course, the new pilot came back to the cockpit, this time with the intention of getting airborne. Now crammed full of ground school theory about the Meteor and its emergency procedures, he was ready to try the real thing. Just starting the engines, however, could be alarming. The Rolls-Royce Derwents, direct descendants of Sir Frank Whittle's original engine, were remarkably reliable, but, as with all

early examples of a new technology, they had distinct limitations and needed careful handling.

When an engine start button was pressed, a low moaning began, rising steadily in pitch. Five seconds or so later, the undercarriage lights dimmed, and it was then necessary to move the appropriate high pressure cock lever (located near the floor to one side of the pilot's seat) to the half open position.

As engine rpm registered on the gauge and began to increase, the HP cock was eased slowly and steadily to the fully open position. Any tendency to hurry the process was rewarded by a terrifying resonance which shook the whole aircraft, a jet pipe temperature gauge needle which rose rapidly into the red zone, and a stream of invective from the back cockpit, among which was advice about closing the HP cock sharply and starting over again.

Some people never really did grasp the need to be gentle and attentive when handling the early jet engines. There was at least one first tour pilot who, overcome by the excitement of a dawn patrol scramble during an exercise, rushed the engine starts and failed to notice that the No.1 had not fired up. He waved away the chocks, opened the throttles, and completed a full circle to the left. He then shut down, jumped out, and berated the crew chief because the left brake was binding.

With both engines running successfully, the Meteor was a pleasure to taxi. Once the initial reluctance to move from standstill was overcome, it rolled along quite happily with the engines at idle power, and the exposed position of the pilot in the nose allowed him to find out what it was like to taxi in a straight line, instead of weaving drunkenly from side to side to see round the nose. In a tail-wheeled piston, like the Spitfire, the alternative was to get the groundcrew to help.

The Meteor's take off was exhilarating. After lining up on the runway, the engines were opened up to full power with the brakes applied. A final check of the engines (14 700 rpm - a startling figure compared with the Harvard's 2250 rpm) and then the brakes were released.

The acceleration was excitingly brisk under the impulse of the two 3500lbs thrust Derwents and the take off arrow straight. To counter

the built-in tendency of piston trained pilots to extend the right leg automatically, instructors usually had both boots clamped down hard on the rudder pedals at this stage. The nosewheel eased off the runway at 90 knots, and the Meteor took to the air at about 120 knots. Wheels had to be in the well before reaching 175 knots (or 201 mph, which was faster than most young pilots had ever flown - and that well before reaching the airfield boundary).

From then on, the thrill of seeing and feeling a truly dramatic expansion of the boundaries of aviation in every direction proved addictive to all but a few of those who experienced it. However, it was necessary to temper euphoria with caution, difficult though that might be. These jets were always ready to burn the casual hand, and, at that time, they were not fully understood, even by those who thought they knew it all. The Meteor, in particular, could be very unforgiving.

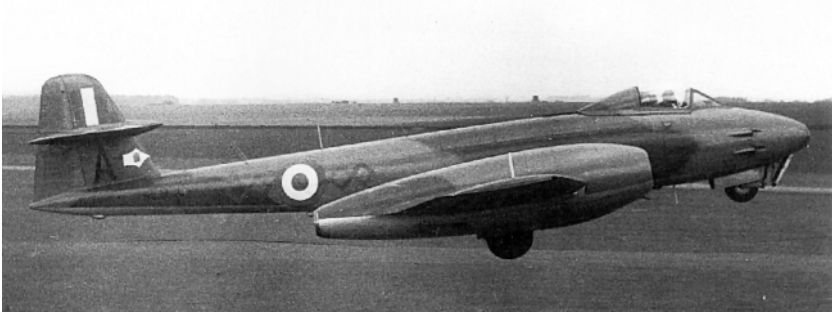
It is surprising now to think that pilots with a total flying time of less than 200 hours, all on single piston-engined aircraft, were sent off for their first solo in the twin-jet Meteor after only 3 hours 20 minutes dual instruction.

It really was necessary to change mental gears when converting to jet aircraft. Everything happened so much more quickly. Particularly things like eating up distance and running out of fuel. By almost any standards, then or now, the Meteor and most of its cousins became recovery emergencies immediately after take off.

Fitted with the extra ventral tank, the Meteor's full fuel load was 595 gallons. A climb to 40 000 feet could consume almost 200 gallons of that. Minimum fuel for landing was 80 gallons, and a certain amount had to be set aside for the recovery to base. Less than half was available for the rest of the sortie.

When the frequently dirty British weather is taken into account, together with the facts that there was then virtually no internal radar coverage over Britain and the Meteor had no navigational equipment to speak of (two ten-channel VHF sets, a G4F compass and an E2 standby compass), the scale of the problem becomes evident.

Young pilots whose navigational training had been completed below 10 000 feet within 80 miles of base could find themselves



Fg Off Paddy McCarty getting airborne in a Meteor F.8 of No 64 Sqn. alone over the North Sea at 40 000 feet, 150 miles from home with 200 gallons or less left. It concentrated the mind.

One of the most significant differences between the piston engine and the early jets was the throttle response. The clever devices of the 1980s which now allow jet throttles to be slammed open or shut with impunity did not exist. Rapid movement of the throttle in either direction could lead to flaming out an engine and severe embarrassment for the pilot. This was true even at low level and the problem became more acute with increasing altitude. Some idea of just how acute can be gained from examining something that happened to me one wintry day in 1953.

I was leading a pair of Meteor 8s of No.64 Sqn which had been scrambled during an exercise to intercept some targets inbound across the North Sea. We had taken off in close formation in driving rain and had entered cloud at 800 feet. The climb was a long one on a steady easterly heading through heavy cloud. After reversing course in the latter stages of the climb, we finally broke out at 30 000 feet and almost bumped into our intended targets, two USAF F-86 Sabres just brushing the cloud tops.

To my delight, they were in front of us and turning. I left climbing power on and eased onto the inside of the turn to cut the corner. Green and eager, I was gratified to see that I was closing on the leading F-86. My finger rested on the trigger and I got ready to take some gun camera film.

Suddenly I was closing too fast. His airbrake was out and he had tightened his turn into me. Instead of converting my speed into a

height advantage and starting again, I stupidly tried to keep my gunsight on the target and committed the cardinal sin of closing both throttles and using my airbrakes, too. That F-86 driver must have known a novice when he saw one. As mine went out, his went in. I had been fooled. He had never taken his power off and now he began to accelerate away from me. Annoyed, I punched in the airbrakes and slammed the throttles wide open.

The engines responded with a grumbling noise and then wound down. As the aircraft sank back into the murk from which it had so recently emerged, both generator warning lights came on to confirm that I was now flying a very inefficient glider. I told my wingman he was on his own (a statement of the obvious) and turned on to a westerly heading.

A number of typical 'early jet' problems now pressed forward for my attention. In those days, engines were not enthusiastic about starting above 15 000 feet, and even that height was very much the upper limit. The capacity of the batteries was not generous, so it was important to make the first start count. That meant I had to glide for a while, trying not to think about the fact that I was something like 80 miles from the coast of East Anglia and facing a headwind. Having reported my predicament to an east coast radar station, I switched off the radios to conserve the batteries and sat in silence, concentrating on flying a constant heading and an accurate 'best glide' airspeed.

Inside the cloud it was very dark and it rapidly became very cold as well. The cockpit heating depended on drawing warm air from the engines. It was never very efficient, but now, with only icy air available, the temperature drop caused a thick frost to form over everything, including the faces of the instruments. I scraped frantically at the glass covering the airspeed indicator, the directional gyro, and the turn and slip indicator. My instrument flying became less than accurate.

It got darker and I realised that the canopy (and therefore the whole aircraft, which I now could not see) was icing up on the outside. With that I flung caution to the winds and steepened the careful descent into a dive to get down below 15 000 feet quickly.

At 12 000 feet and still in heavy, turbulent cloud, I began the relight procedure. That was easier said than done. Apparently it had

not occurred to the Meteor's designers that anyone wishing to relight an engine would need to continue flying the aircraft at the same time. The high pressure cocks (closed during the glide) were low down on either side of the seat, and the relight buttons (which had to be kept pressed while the engine was winding up) were on the instrument panel.

I scratched the essential instruments clear, gripped the stick with my knees, and, with my left hand on the No.1 HP cock and my right hand on the matching relight button, tried to maintain an airspeed which would windmill the engines at 1200 rpm. The No.1 engine repaid these gymnastics and the ensuing relight procedure by remaining silent.

Now below 10 000 feet, I was beginning to feel a twinge of anxiety. The instruments were re-scraped, knees re-gripped the stick, and hands changed function. Press the relight button for five seconds, open the HP cock slowly while keeping the button pressed, and watch the engine rpm. After remaining comatose for what seemed like a long while, the No.2 engine finally responded to my urgings and was coaxed back to life. With a generator back on line, No.1 duly followed. All's well that ends well, but some lessons about first generation jets had been learned.

Another had been waiting in the wings. At 5000 feet with the engines still dead, it would have been necessary to consider ejecting.

The Martin Baker ejection seat was still new enough to be regarded with some apprehension by most aviators. It was a long way from being the sophisticated creation of today. For one thing, it relied on a gun rather than a rocket, so its upward acceleration was rather violent and inclined to be damaging to the user. For another, it was a 'manual seat'. In other words, nothing happened automatically; the pilot was required to separate himself from the seat once clear of the aircraft.

Those brought up to the routine of sliding open the canopy and bailing out did not at first relish the thought of sitting on a high explosive charge as they went about their daily work, and they certainly did not like the idea of having to wrestle clear of the seat before pulling the parachute ripcord. This took time and so it was wise to make an ejection decision with plenty of height available. Of

course, that was not always possible and many pilots were forced to take their lives in their hands quite close to the ground. As far as I know, the lowest successful ejection on a Mk.1 Martin Baker seat occurred with a ground clearance of only 350 feet when the handle was pulled. The pilot concerned subsequently left the RAF and became very successful in the wine trade.

Some of the older RAF pilots, particularly those trained in the golden age of biplanes, found it hard to accept the realities that went with flying the new jets. One celebrated air marshal was a case in point. He felt it important to use a front-line aircraft as his personal transport whenever he went on a trip. He had been accustomed to doing so in a series of high-powered piston-engined fighters and, in the early fifties, he switched to a single-seat Meteor.

The simple mechanics of flying the aeroplane, of getting it off the ground and back on again, gave the air marshal little difficulty, although the arthritic joints of his left leg led to some trouble with taxiing. If a tight turn on the ground was needed, it was always made to the left, since that leg could not bend sufficiently to allow full right rudder. The question of how he would cope with a failure of the port engine was brushed aside.

Also largely ignored were the entreaties of his staff to follow their carefully prepared flight plans and fly at altitude. He (and some others of his vintage) were- perhaps understandably- uncomfortable with the thought that jets really did go a lot further the higher they were flown.

He was used to operating at low altitude with a map in his hand, and he did not like flying above 30 000 feet, especially above cloud. For him, that sort of flying held little attraction. He felt much more secure and happy when he could enjoy the scenery.

On one occasion, he insisted on leaving on a trip to Europe when the weather was not entirely friendly. Low cloud covered his whole route. With some resignation, he listened to the briefing from his staff and accepted that he should climb through cloud to at least 30 000 feet, and maintain that height until he made contact with his destination, which was beyond the range of a Meteor at low-level.

True to form, he took off and stayed below cloud, at times winding through valleys to stay in contact with the ground. At one stage of the flight, he found a number of pretty fishing villages, which he orbited

for a better look. In due course, he noticed that his fuel was getting dangerously low and he was not yet half way to his planned landing airfield. What was more, from low-level he could raise no one on the radio, and it was beginning to get dark.

Quite by chance, he flew over a small and remote grass strip with a few flying club aircraft parked alongside. Without more ado, he lowered wheels and flaps and landed, stopping the Meteor with its nose in the hedge at the far end of the field.

The local villagers were very hospitable, but their one telephone was not working. The air marshal spent a delightful evening at the village inn, and was discovered there the next morning by his distraught official hosts. He was in the midst of a sumptuous breakfast and was quite unperturbed by all the fuss.

His case was extreme, but it was not unique. The older aviators were often unsettled by the developments which inevitably accompanied the introduction of jets. The unforgiving link between height and range was unwelcome to those brought up in an age of rudimentary navigation aids when the best insurance policy was eye contact with the ground.

Indeed, many of the challenges particularly associated with the early jets were in part the result of the unprecedented ease with which pilots could operate at altitudes above 30 000 feet. Rates of climb were not spectacular by the standards of the 1980s but they were markedly better than the Harvard's, and jet aeroplanes kept climbing.

The Meteor 7 could be through 40 000 feet some 12 minutes after take off and it was often taken to 46 000 feet. As the trainer version, it was not weighed down with the luxuries carried by its day fighter sisters, such as ejection seats, guns, ammunition boxes, armour plate, etc. It therefore was frequently used by wingmen flying in the top cover section of a squadron battle formation during exercises, simply because its performance was slightly better than the single-seaters.

The problem with that was that knowledge was patchy about the effects on aircraft or aircrew of flying at great heights. Besides combat equipment, the Meteor 7 lacked pressurisation and the people who flew it wore nothing more than the standard package of flying clothing: lightweight flight suit; Mae West; thin leather gloves; boots and a soft flying helmet with a flexible, leaky oxygen mask. Not a

thought was given to pressure breathing equipment, nor even to having masks that were tight and properly fitted. Limiting all Mk 7s to a maximum of 30 000 feet might have been sensible, but nobody seemed to think that the medical reasons for doing so should be taken seriously and, anyway, they were needed to fly top cover.

During the course of the Mk 7's career, a number were lost 'cause unknown' after flying at high altitude, but it is more than probable that, in most cases, the pilot had collapsed because his oxygen supply was inadequate. Many Mk 7 aircrew suffered minor cases of bends and headaches, and pains in the ears were frequent, not to mention rumbling stomachs.

Flying with a cold could be excruciating. If ears could not be cleared during a descent, the Meteor did not have the fuel to allow a pilot to take his time. More often than not, it was a case of having to keep the descent going, putting up with the pain until reaching a doctor's healing hand or, all too frequently, until the ear drum burst, bringing silence and blessed relief.

Vision was a problem at altitude, too, although it was not generally appreciated at first. Budding fighter pilots were conceited about their eyesight and there was keen competition on a squadron to see who could call in the most 'bogies' during a sortie. With very little radar on the ground or in the air, sharp eyes were vital to an operational squadron. Unfortunately, later research showed that the lack of visual cues at altitude makes most eyes drift to a resting position, focusing only at one distance quite close to their owner. Aircraft several miles away, although perfectly visible under more normal circumstances, cannot be seen.

Apart from the reduction in operational effectiveness, there was a hazard here. Aircraft on a collision course, particularly from head-on, could get surprisingly close before the pilots became aware of each other. Even the early jets went about their business above 20 000 feet at 8 or 9 miles a minute, so the time left for avoiding action could be brief, perhaps less than four seconds per mile of separation distance.

Of course, separation from other aircraft was the furthest thing from the minds of young pilots in the years following WW II. Proximity was



No 64 Sqn's formation team reaching for the sky in 1954.



No 64 Sqn's 1954 display team: Sqn Ldr Harry Bennett (Leader – in the cockpit); Sgt J 'Izzy' Izzard (No 2 – bottom left); Fg Off Johnny Heard (No 5 – centre); Flt Lt Reggie Spiers (No 3 – bottom right); and Fg Off Ron Dick (No 4 – top right).

actively sought. Most of the squadron and flight commanders were combat veterans and, for many of them, there was only one way to train combat pilots. Aircraft had to be flown frequently, to their limits, and as often as possible in simulated combat.

New boys, freshly arrived from training, could hardly believe the difference between the rigidly controlled and physically limited world of the Harvard and the riotous freedom of a jet squadron. Sometimes it seemed as though life was one long dogfight and, apart from the fact that the guns were not being fired, the rules were pretty loose. Rival squadrons would challenge each other and the briefing would consist of an agreement to 'meet at 30 000 feet over Ipswich with twelve aircraft each.' The encounter was invariably exhilarating but it has to be said that it was unnecessarily hazardous for a peacetime air force.

The Meteor, for one, was not always as controllable as it might have been at high speed. It more or less ran into a brick wall at Mach 0.82 and, if pressed beyond that, it resisted the experience with some

spirit. The aircraft snaked, a strong nose-up change of trim occurred, and the ailerons were given to irregular snatching. Finally, one wing dropped sharply and the Meteor went off on its own for a while, deaf to the entreaties of its pilot.

It was quite easy to induce this sequence of events when dogfighting at high altitude and absorbed in the thrill of the chase. Locked on to the enemy framed in the gunsight, a pilot would not notice the Mach No increasing until suddenly the aircraft was buffeting, the ailerons were snatching the stick left and right, and then the Meteor was on its back and heading downhill towards the comforts of thicker air and a lower Mach No. It was infuriating to be forced to leave a dogfight in this involuntary fashion, but nothing could be done until the aircraft had recovered its composure several thousand feet lower down.

In the absence of 'formal' arrangements between squadrons anything that moved was fair game for a simulated attack and that included non-military aircraft. Squadron briefing rooms were places to exhibit gun camera pictures of as many types as possible, and new ones, especially prototypes, were given pride of place. The Comet 1, the world's first jet airliner, caught during its initial flight trials, adorned many a crewroom wall.

After some years of all this untrammelled enjoyment, to the inevitable accompaniment of several accidents and countless near misses, a straw finally broke the camel's back. Two Meteors, initially operating as a pair, got split up during an impromptu dogfight involving four different types. Besides the Meteors, there were Venom night fighters, F-86s and a solitary Canberra.

As luck would have it, the Meteors eventually picked on the same Venom and curved in to attack it from opposite sides. Belly to belly, they met about 100 yards behind their target. Both pilots ejected safely from their suddenly uncontrollable machines and were fit enough to hold a glass in the officers' mess bar that evening. Remarkably, until each heard the other's story, neither was sure that his emergency had been the result of a mid-air collision. Indeed, none of the participants proved able to recall the sequence of events in the dogfight with anything approaching logic or consistency. (Unsurprisingly, perhaps, since dogfights are, by their very nature,

confusing).

The Commander-in-Chief listened to the sorry story and decided that enough was enough. There would be no more unauthorised dogfighting on his watch. The peacetime air force began to take itself seriously.

Fighter pilots, old and new, viewed the CinC's restrictions as an unwarranted attack on their manhood. Prudence and caution do not rest easily with virile spirits, particularly when the aggressive elements of their virility are actively encouraged by the nature of their chosen calling. As air forces grew accustomed to both peace and jets, however, it was inevitable that airmen's egos would be squeezed and their freedoms would diminish.

Nevertheless, there were plenty of other things about operating with a fighter squadron in the early '50s which challenged a young man's moral fibre, and not all of them were reasonable or necessary. Many were (and are) just part of flying high performance aircraft in a military role, but others were frankly irrelevant hangovers from the way things were done in the heady days of WW II. Since the experienced squadron aviators operated that way, new pilots gritted their teeth, copied their idols and did not feel that they had joined the 'big boys' until their flying had acquired the flair, dash and bad habits of their elders.

Superficially, safety was important on a fighter squadron. It was paid lip service, but, all too often, it was not fully supported by the personal example of the Squadron and Flight Commanders. It was too difficult to set aside those things which they had always done and which gave a bit of an edge to life.

'Nobody lower than me' was a phrase used by many a leader to set a minimum height for a low-level sortie in battle formation. When he then left a wake on the surface of the sea, or passed between the hangars on a rival's airfield, most members of his squadron were too occupied with the exciting business of basic survival to pay much attention to the merging of his aircraft with its shadow.

Early jet sorties were necessarily short because of limited fuel, but their enjoyment was often so great that it was hard to accept the need to go home. On days when the airfields were blanketed with cloud, any extension of an upper air exercise by 'just another minute or so'

increased the pressure on pilots to be slick and rapid in their recovery to base.

New boys frequently found that this was easier said than done, and leaders could be infuriated by the antics of wingmen desperately trying to get into close formation for a descent through cloud which needed to start within seconds. Dashing in towards the lead, a pilot had to be keenly aware of the closing speed between the two aircraft.

Without the natural brake of a propeller, airbrakes had to be used, but when was critical. Too late, and the leader was overshot; too early, and there was more catching up to do. In either event, the slowness in response of first generation jet engines could be embarrassing. Unlike the piston engine technique, it was necessary to move the throttles before power (or lack of it) is actually wanted. Judgement of tendencies in relative motion between aircraft became an important skill, whether joining for or established in close formation.

Given the shortness of the time available and the attractions of the flying, it is hardly surprising that the recommended minimum fuel state for landing, 40 gallons per engine in the Meteor, was not always observed. Indeed, familiarity bred contempt and the minimums were sometimes blatantly ignored.

On one occasion, returning to base with the squadron formation aerobatic team, I was asked by the leader for my fuel state when we were three miles out for what I was sure would be a simple break and landing. '10/20' I told him, keeping my voice flat to belie any anxiety I might feel over being so far below the safety level of 40/40. 'OK', he said, 'we will do two loops with a bomb-burst off the second one, and land off the burst.' The need to impress those on the ground with our prowess clearly overrode the demands of my fuel state. My No 1 engine cut on the bomb-burst and I landed off a glide approach, much astonished by the razor's edge of my leader's judgement.

All landings with a jet squadron were challenges. The carefully square landing pattern taught in the Harvard was long forgotten. In its place was the break and the continuously curved fighter approach. In a Spitfire or a Mustang, this was a reasonable way to keep the nose out of the way and the touchdown spot in sight until the last second.

With long noses out of fashion, such approaches were no longer necessary, but they were impressively flashy and went with being a fighter pilot. High wing loading or not, it was good to feel the bank roll off only fractionally before the wheels touched the ground. Since it was also the done thing to keep the formation tight, aircraft were landed like this within seconds of each other. A section of four all had to be rolling down the runway at the same time if they were to look good. Almost invariably, this meant that Nos 3 and 4 would be buffeted by jetwash in the final stages of the approach, and not a few tail-enders suffered major damage as they hit the ground heavily, having been left with no cushion of safety to play with.

Even worse, in many ways, was the formal instruction from on high that all Meteor pilots were required to complete at least five practice single-engine landings every month. This was a classic case of the problem not having been thought through. Engine failures were extremely rare and, when they did occur, a combination of adrenaline and common sense invariably ensured that the ensuing single-engine landing was successful. (The Meteor was not difficult to land on one engine, especially if it was a declared emergency and everyone else got out of the way).

Practice engine failures, however, were common, and for that reason did not attract the attention they deserved. Which was strange, because they were real enough. In a curious hangover from piston engine days, when single-engine landings were practised with one propeller feathered, the rules said that the exercise in a Meteor should be carried out with the high pressure cock closed on one engine, rather than with the engine merely throttled back to idle. The practice, therefore, was made real.

If a pilot made a mistake on finals (much more likely than in an actual emergency, because adrenaline was not flowing as fast) or if he was sent round again by air traffic, the need to cope with a single engine overshoot was genuine, and, at low airspeed on one engine with the wheels down, the Meteor did not always behave like a lady. It was possible to get away with it from as low as 125 knots (although the official single engine safety speed was 155 knots) by using full rudder and up to 10 degrees of bank into the live engine. This was known as the dreaded 'knee trembler'.

To hold the rudder on successfully, it was really necessary to keep the leg straight with the knee locked. The shoulder harness had to be tightened down hard, too, otherwise the rudder merely pushed the pilot back up against the canopy. A successful recovery from low airspeed on one engine left the pilot alive but with harness bruises on the shoulders and a knee given to uncontrollable bouts of trembling for hours afterwards. All of this was probably very good for the character. Unfortunately, as a training exercise, it was unnecessary. Indeed, it is true to say that the RAF induced far more accidents from the practice of asymmetric landings than ever resulted from the real thing.

One fact about flying jets in the decade immediately following WW II is inescapable. The accident rate was appallingly high. Primitive aircraft, low experience levels, loose discipline, 'press-on' attitudes, a lack of understanding of the need for changes which led to the perpetuation of out-dated techniques and practices — all of these elements came together to compile some horrifying statistics.

In the years 1952-53, the RAF fatal accident rate for jets was four times as high as it was for piston-engined aircraft, and there were some 200 fatal accidents each year involving the deaths of more than 300 aircrew. For a peacetime air force, these were shocking figures.

By the late '50s, matters were improving, but even in 1957 (when the RAF flew 1.13 million hours, almost equally divided between jet and piston aircraft) there were 463 major accidents, of which 326 were in jets. Sixty-eight of these were fatal crashes in which 149 aircrew died, and the fatal accident rate for jets remained four times that for pistons.

Bad though this was, it was getting better. In 1953, 405 aircraft were destroyed. By 1957 the figure was down to 157. This merciful decline was sustained thereafter and the RAF's accident rate has been one of the military world's lowest for many years.

Flying first generation jets was exciting and a great deal of fun. The sheer exhilaration of operating high powered machinery to its limits, largely unhindered by the restraining hand of authority, was a memorable experience. Seen in retrospect, there were undoubtedly negative aspects to all this enjoyment.

In an all-round comparison between the air forces of the 1950s and

the 1990s, those of the early jet days perhaps would be seen as having been less professional than their modern counterparts.

It is probably true that first generation jet pilots could fly, formate, navigate and shoot at least as well as any of their successors. Given the difficulties with which they had to cope, it is certainly the case that they could think quickly for themselves in the air better than most. However, there is no denying that their flying discipline was relaxed, and that they were seldom encouraged to develop a really deep knowledge of the many faceted business of being a fighter pilot.

Even in the 1950s, there were those who had their doubts about the effectiveness of a system which purported to be training for war and produced so much uninhibited enthusiasm in its pilots while being so reluctant about turning to face the new realities of the jet age.

Early in 1953, one fighter squadron Flight Commander wrote in his monthly report: 'I am not sure about the squadron's ability to deal with a major attack on the UK by fast, high flying Soviet bombers. However, if anyone dares to approach our shores towing a 30 foot long canvas target at 10 000 feet and 180 knots, we will probably give a good account of ourselves.'

**A CAT AMONG THE PIGEONS:
The RAFVR, Flying Clubs and the Civil Air Guard**

Dr Tony Mansell

Tony Mansell is a Senior Visiting Research Fellow of King's College, London, having retired from its School of Education in 1995. He has published articles on RAF pilot recruitment in the inter-war period and on manpower in the Battle of Britain.

The RAFVR was formed in 1936 at a time when air-mindedness was being promoted in the country. Private flying clubs – the Light Aeroplane Clubs – benefited from this promotion in the shape of the government subsidies they received to encourage them in their activities. Behind the scenes were two bodies which had the interests of flying clubs at heart, the National League of Airmen (NLA) and the Air League of the British Empire (ALBE). RAFVR pilots were to be trained at many of the airfields used by the clubs and also in what were called Town Centres, located, as their name suggests, in nearby towns and cities. Town Centres were to give ground instruction but they were also intended to have another important purpose, namely to provide an attractive venue for social and sporting activities in which the development of an esprit de corps could take place.

At the time Philip Cunliffe-Lister, Lord Swinton, was the Secretary of State for Air and chaired the Air Council. He and his colleagues were keen on the social aspects of Town Centres and the struggles to set up the first London Town Centre are noteworthy here. Swinton thought that some accommodation which was vacant at 13 Carlton House Terrace would be ideal but there was opposition to this from the Ministry of Agriculture, who had oversight, and also from residents who thought that a Town Centre would ruin the amenities of an area which they thought should be reserved for private houses, high class clubs and societies. Carlton House Terrace is currently home to the British Academy, the Royal Society and the Turf Club for example. Swinton tried to use his influence with Lord Gorell the Chairman of the Carlton House Terrace Committee but to no avail.

Meanwhile, the Office of Works came up with an offer of 'a place off Tottenham Court Road which had been used as a women's hostel

by Messrs Bourne and Hollingsworth.’ The contrast between Carlton House Terrace and this plebeian edifice was too extreme for the Air Council and the offer was firmly rejected. However, they eventually had to settle for the lower two floors of Shaftesbury House, a building in Store Street, which is a turning off the Tottenham Court Road. This was not done without some soul-searching. Sir Christopher Bullock, the Secretary to the Air Ministry, asked the Council at one point in the discussion to consider whether it would be ‘beneath our dignity to take a building in this locality.’ The desire for a prestigious site might seem to indicate confusion in the minds of the Air Council between the social requirements of officers of the AAF and the much less pretentious ones of the sergeants of the RAFVR. But what lay behind it was a problem presented by some developments among the flying clubs.

In February 1936 the NLA, with the tacit support of the AAF it should be noted, had approached the Air Ministry with a proposal for what they called Business Houses Flying Clubs. It was quite an impressive idea. A number of centres were to be established with ten clubs in each. Each club would be formed by a Business House which would find up to fifty members per year. The stated aim was to create a supplementary air reserve for service at home; could the Air Ministry get some funding to help? This patriotic rhetoric placed the Air Council in a difficult political position. Swinton commented that the Ministry would ‘undoubtedly be violently attacked’ if it did not give its blessing to the scheme. Of course it had not escaped the Council’s notice that the start of the Business House scheme would pre-date that of the RAFVR. They noted the League’s patriotic motives and asked them to postpone their launch until the RAFVR got off the ground, but the League declined and went ahead.

A similar type of situation arose with the Midland Bank Flying Club in September of the same year. In this case the Air Member for Personnel offered to get a complete Town Centre in London reserved for Midland Bank men if they joined the RAFVR and thought that if he did this for the Midland, firms like ICI might be persuaded to follow suit. In part, the search for high status accommodation for the London Town Centre was driven by the need to attract men from the lower echelons of the City and commerce and divert them from clubs

into the RAFVR. Although London might be thought to be a special case, the general principle of looking for good premises for Town Centres was adhered to throughout the country. It tended to be defeated in practice by a combination of difficulties in finding properties, labyrinthine bureaucratic processes at both national and local levels and a growing sense of urgency as the war approached. As a result, increasing reliance had to be placed on the use of temporary premises, eg local school buildings in the evenings.

Worries about competition from flying clubs proved to be unfounded. When the RAFVR began to appear on their airfields it entered into very serious competition with them. Men found that, far from having to pay to learn to fly, the RAFVR would train them for nothing - and pay them into the bargain! Although this was not the only attraction, many of the volunteers being motivated by patriotism. In the two years following the RAFVR launch a lot of clubs faced extinction, but salvation was at hand for some of them. In 1936 the ALBE had discussed a plan with the Air Ministry for a purely civilian reserve of pilots, based on the flying clubs. Their timing was not opportune. The Ministry were busy with their own plans for the RAFVR and were not willing to take an active part in a scheme which might have competed in any way with these. By 1938, with the RAFVR well established, they were ready to listen and could see positive benefits for themselves in the ALBE plan, which called for co-operation between the Air Ministry and the General Council of Light Aeroplane Clubs in order to create a Civil Air Guard (CAG). Harold Balfour, the Under Secretary of State for Air, threw his weight behind the idea and the CAG was launched in July 1938.

Existing subsidies for flying clubs were to be paid for each pilot trained to A Licence standard, ie about 50 hours on Tiger Moths, which meant that they could provide training at a cost of about £2 per hour, half the normal going rate. The CAG went a lot further than that and called for subsidy at a level which would let clubs train pilots for only ten shillings (50p) per hour at weekends and five shillings on weekdays.¹ On very light categories of aircraft those rates were

¹ To put these figures into perspective, at the time, ten shillings (with a purchasing power of a little in excess of £20 in today's money) was roughly a day's pay for a

halved. The aims of the CAG were to create a body of men and women who would be able to carry out valuable work in wartime, to maintain clubs in existence in the face of competition from the RAFVR and to stimulate air-mindedness. As civilians, CAG members were asked to give 'an honourable undertaking' to accept service in any capacity if called upon in an emergency.

The response was good. By the end of October some 30 000 had applied for membership, which was open to men and women in the age range 18 to 50. For its part the Air Ministry divided CAG membership into three classes. Class 1 consisted of men between the ages of 18 and 30 who might be eligible for RAF service; Class 2 was made up of men and women between 18 and 50 who could act as civilian or ferry pilots in wartime; Class 3 was for men up to the age of 40 who might be suitable for service as observers or air gunners. The CAG was never a serious competitor for the RAFVR but it was a useful adjunct because it drew in men and women who could undertake flying duties in wartime but who may not have been suitable candidates for the RAFVR itself, on grounds of both age and sex. Women, for example, have always made excellent pilots and ex-CAG members who found their way into the Air Transport Auxiliary performed a vital (but currently neglected in the literature) role in support of the RAF during the war. The RAFVR cat had certainly stirred up the pigeons of the flying clubs but at least some of their necks were saved by the CAG.

References: PRO AIR6/24-36, covering meetings of the Air Council between February 1936 and November 1938, and their associated Memoranda in AIR6/44 - EPM14(36); AIR6/46 - EPM81(36); AIR6/48 - EPM16(37) and AIR6/55 - EPM170(38). See also AIR32/15.

sergeant and half a day's pay for a flying officer. It is interesting to observe that the standard commercial instructional rate of £4 per hour in 1938 would equate to £160 today, substantially more than one actually needs to pay for an hour's dual in 2002.

THE GREAT CARRIER CONTROVERSY 1964-65 – A DEFENCE PLANNER’S RECOLLECTIONS

Group Captain H Neubroch

Sir Michael Quinlan’s remarks in his address to the Society on 28 June 2000 (Journal 24) on the second phase of the great carrier battle raging in Whitehall from the autumn of 1964 struck a great many chords. I was, throughout the critical period, the RAF member of the Defence Planning Team responsible for drafting the relevant papers for eventual submission to and approval by the Chiefs of Staff. My account is based almost entirely on memory but has benefited from comments by two former senior MOD civil servants, Mr Peter Hudson, at that time Head of the Air Force Department’s Finance Branch and a member of CAS’s briefing team, and Mr Cecil James, subsequently Assistant Under Secretary of State (Air Staff). Finally, Sir Michael confirmed there was nothing in my account at variance with his recollection. Nevertheless, the opinions expressed and any faults in the paper are entirely mine.

On 1 November 1964 the D (Overall Strategy) Team of the Defence Planning Staff (DPS), a part of the MOD central Defence Staff, was reconstituted, the previous incumbents having been given their marching orders. They had become quite ineffective under the stresses and strains of the carrier controversy: the naval and air force members were no longer on speaking terms, and the army member disdained, presumably for personal reasons, to speak to either. As a result we three new boys had no handover: we had to learn as we went along. True, we had all taken part in a study at the Joint Services Staff College on The UK Higher Organisation for Defence and the Joint Staff System, but we found the practice rather different from what was taught. In its introduction, the Latimer manual proclaimed that ‘the DPS have always jealously guarded their independence as a body entitled to produce unbiased opinions on military subjects’; implicit was the notion that DPS conclusions and recommendations should be in the best interests of national defence, regardless of single-service interests.

The three of us had in fact been selected for what was considered our sound joint background. We were all JSSC graduates: Pat

Thursby, a bluff and experienced operator, had recently commanded 3 Para; Sandy McCarthy — personable and highly articulate — had recently completed the course at Latimer, where it was expected that he would follow in his father's footsteps to flag rank; and I had just finished a three-year stint on the JSSC directing staff. Our main task would be the drafting of the major strategy paper for the Healey Defence Review, which would specify the force requirement to implement future British strategy worldwide. At the core lay the question of the future (if any) of a new generation of fleet carriers.

As a result of our predecessors' experience we were fully sensitive to the delicate nature of our task, for the D Team was at the very epicentre of inter-service ructions. In particular, the requirement for solutions in the best interests of national defence, regardless of single-service interests, was constantly under attack from the service departments: where the line lay between 'regardless of' and 'to the detriment of' single-service interests proved to be a matter of the finest judgement. A former colleague on the DS at Latimer, recently the air member of another DPS team, who was thought not to have pressed the Air Force Department's case with sufficient vigour, was invited by Andrew Humphrey to choose his next, and immediate, posting anywhere in the world, as long as it was in the rank of wing commander — for he certainly would never be promoted!

As defence planners we depended heavily on our single-service opposite numbers for inputs not only of factual data and supporting arguments, but also on the tactics our service would use. To be effective, each team member had to know not only the full facts of each service's case, but also what was in the minds of the protagonists, ie how they intended to fight their corner. Yet there was an abiding question of trust and confidence between the service departments and central staff. Not to put too fine a point on it, defence planners were viewed with some suspicion by their single-service counterparts, who sometimes felt that the chaps on the central staff, whatever the colour of their uniform, were batting for the opposition. How to obtain all the information we needed, yet retain the confidence of our contacts in the service departments? After considerable heart-searching we came up with an answer; it was unconventional, but in the event it served us well. We pledged to

share all the information gleaned from our single-service contacts within the privacy of our office, but would specify what they regarded as privileged; this privileged information would not, under any circumstances, be passed on to single-service departments.

While waiting for the FCO to write the National Interests (or Strategic Assumptions) Section, clearly the basis on which our paper would be developed, we cut our teeth on some relatively minor problems, such as the roles to be played by British forces in suppressing Mr Smith's Rhodesian UDI. (Our answer was 'none'.) On the carrier question we studied the relative merits of the light and dark blue cases. The naval case seemed to rest on a somewhat simplistic syllogism: fleets require capital ships; today's capital ship is the fleet carrier; ergo, the need for a fleet carrier for the naval service. Naval planners failed to mention that a single carrier group (for it was not just the carrier itself but also its escorts which had to be provided) would be insufficient, both for geographic and roulement reasons, to implement any likely future British strategic policy. Beyond that, they directed their broadsides at the capabilities claimed for land-based air.

Meanwhile the Air Force Department concentrated on providing data relating to these capabilities, and developing supporting arguments at regular planning meetings, often chaired by CAS himself. Much time was spent on devising arguments to counter probable naval ploys, the Air Staff often thinking three or more moves ahead. (Significantly, both Sir Sam himself and his Assistant Chief of Air Staff (Policy), Air Vice-Marshal Peter Fletcher, were qualified barristers.) Among these luminaries I had a seat at the table; I rarely felt I had anything useful to contribute, but when I did, I was encouraged to speak up. How different for my naval colleague. At the Navy's planning meetings he would sit at the back, his brief being to listen and to ensure that the dark blue prevailed. The 'or else' was clearly spelt out: 'if you don't succeed, do not expect to remain in the Navy'.

I cannot recall when in 1965 we received the FCO inputs on British strategic interests, or when our Terms of Reference were finalised. It might well have been about the time when, in Sir Michael's words, Denis Healey had essentially made up his mind. But there is no doubt in my mind that the FCO input and our Terms of

Reference, finalised only after protracted inter- and intra-departmental consultation, between them situated the appreciation in such a manner that there could be only one answer to the carrier question which, in the time-honoured language of the DPS Secretariat, the D Team was 'invited to study and report' on. Our Preliminary Draft could come to no other conclusion than that for the foreseeable future, British strategic interests would not require the provision of CVA-01. Anticipating that this would in due course become the official view of the Chiefs of Staff, Sandy observed, 'You may think the RAF has won a great victory, but believe me, the Navy will always have carriers.' He was of course aware of the plans for a new class of warships, which the Navy would euphemistically call through-deck cruisers, the modest concept from which the future light fleet carrier would be developed.

But before our conclusions could become the official view of the Chiefs of Staff, a great deal of further drafting had to take place within the DPS. At Deputy Director level our Preliminary Draft would be converted into a Draft; this would be considered by the Directors and find its way as a Final Draft for the consideration of the Chiefs. Moreover, drafts would be circulated to and within the Service Departments (as well as within the Central Staff), with comments submitted and considered by the drafters at each level. As often as not the senior level of planners would reverse some of the conclusions reached at the junior level. Routinely, each stage would take at least a week to ten days; but this was no routine study. Service departments took longer than normal to provide their comments, which sometimes would be referred down the chain for yet further Revised Drafts. Subsidiary issues also raised their head: what British interests would have to be renounced if we could no longer depend on carrier air? In reviewing the then existing contingency plans, we found there was only one; the Falklands, which it was accepted could not be defended against an invasion mounted under cover of a hostile land-based air force. And what was our view of the Navy's proposals (in the absence of CVA-01) for the future Fleet Air Arm's establishment of some 1100 fixed-wing aircraft? By now the complexities of subject and procedure were such that the entire process was in danger of grinding to a halt.

By the beginning of December someone (probably Mr Healey himself) lost patience and decreed that the COS paper must be finalised before Whitehall broke up for Christmas. The normal DPS procedure of drafting at four successive levels was suspended in favour of a working party at only two levels: the D Team, working directly to the Vice-Chiefs of Staff. On 16 December, members of the Strategic Options Working Party were briefed by the Chiefs at their regular Friday afternoon sessions. The D Team worked through the night to produce their draft, which was taken by the Vice-Chiefs on Saturday. The following day we incorporated their amendments for their Monday session; the resultant Final went to the Chiefs at their regular Tuesday meeting, and was duly approved as COS 66/1.

This then formed the basis of a presentation given to the relevant Cabinet Committee on the afternoon of Wednesday, 21 December. Senior civil servants and service chiefs crowded into the Chiefs' Conference Room. I cannot recall who took the chair; it certainly was not Mr Healey. Nigel Maynard, who by then had taken over from Andrew Humphrey as Director of Defence Plans, gave the main presentation, which went on for some time; one or two people were getting restive, for Whitehall was winding down for the the Christmas recess. The chairman asked for comments. The First Sea Lord, Admiral Luce, launched into an impassioned denunciation of what he saw as betrayal of the Navy's, and hence the nation's, interests, taking us point by point through the familiar naval arguments. When he finished, the chairman turned to CAS. Sir Sam looked round the room, smiled and said: 'There is, of course, another view.' At that, the meeting, greatly relieved at being spared a further philippic, broke up. Immediately thereafter, my army colleague and I left the D Team on promotion. Commander McCarthy resigned from the Royal Navy on the same day as Admiral Luce.

**SUMMARY OF THE MINUTES OF THE FIFTEENTH
ANNUAL GENERAL MEETING HELD IN THE ROYAL AIR
FORCE CLUB ON 5th JUNE 2001**

Before opening the formal proceedings, AVM Baldwin reminded the meeting that Air Mshl Sir Kenneth Hayr had been killed flying a two-seat Vampire at Biggin Hill on 2nd June. Sir Kenneth had been one of the most distinguished and talented leaders of the modern Royal Air Force and a strong supporter of the Society. As a gesture of respect, the Chairman invited the meeting to stand in silence.

Chairman's Report.

The Chairman noted that the autumn 2000 and spring 2001 seminars on, respectively, helicopters and nuclear weapons had both been held at the RAF Museum and that both had been well attended. A broad spectrum of experience, responsibility and interest had been assembled on each occasion and the proceedings of these events would be reported in forthcoming Journals. The next, autumn 2001, seminar, which was being co-ordinated by Gp Capt Heron, would cover the Birth of Tornado and would be held on 24th October at the BAWA facility at Filton. The spring 2002 seminar was expected to deal with electronic warfare and contributors were being sought. Later events were expected to cover the Falklands campaign of 1982 and a study of reserve and auxiliary forces in the RAF. The Chairman also invited members to continue to submit stand-alone papers for possible publication in the Journal.

The Chairman was pleased to report that membership had continued to increase and that there was again no need to increase subscriptions which had remained unchanged since 1990. Although this meant that the Society was well-founded, AVM Baldwin stressed that its seminars were central to the achievement of its aims and urged members to continue to support these events. In this context, a great debt of gratitude was owed to the Director of the RAF Museum and his staff who always made the Society most welcome and provided excellent support without charge. Nevertheless, in an effort to provide an opportunity for members who could not easily attend seminars at Hendon, where practicable, occasional events would be held at other venues, as at Filton in the autumn.

In conclusion, AVM Baldwin thanked the Committee for its efforts on behalf of the Society and expressed his appreciation of the helpful advice, encouragement and continuing interest of the President, MRAF Sir Michael Beetham, and Vice-President, Air Mshl Sir Frederick Sowrey.

Secretary's Report.

Gp Capt Dearman noted that seventy-four new members had joined during the year, while, for a variety of reasons, thirty-one memberships had lapsed; total membership stood at a record 836. He was also able to report that sale of journals had realised £701 since the last AGM and that the steady flow of correspondence, much of it by e-mail, indicated a continuing interest in the Society.

Treasurer's Report.

Mr Goch tabled the annual accounts for the year ending December 2000. As forecast at the previous AGM, as a result of publishing three Journals, there had been a deficit on the year which, at £2386, had actually been £1000 less than anticipated; this shortfall was easily covered by reserves. This had been a transitory problem, however, and, despite planning to publish three Journals in 2001, the current year was expected to show a surplus of some £3000. The Treasurer was, therefore, content that the current £15 subscription was adequate.

It was proposed by Roy Walker, seconded by Charles Swain, that the accounts be accepted and that Messrs Pridie-Brewster of 29/39 London Road, Twickenham be reappointed as independent examiners. The motion was carried without dissent.

Appointment of Executive Committee.

The Chairman reported that Mr Derek Wood had asked to be relieved of his post as Editor of the Journal. The Chairman undertook to write to Mr Wood to express the Society's appreciation of his conscientious work over so many years and Wg Cdr Jefford had offered to absorb the editorial function within his responsibilities as Publications Manager. Mr John Boyes had offered to become Treasurer on the retirement of Mr Desmond Goch in the autumn of 2001. Additionally, the chairman had co-opted Wg Cdr Colin Cummings to the Committee. Thanks were also due to Wg Cdr Angus Deas who had

served the Committee well as an ex-officio member, but who was about to take up a new appointment as OC No 10 Sqn. The Chairman noted that his successor at JSCSC was expected to be Wg Cdr Q N P D'Arcy.¹ All other members of the Committee offered themselves for re-election. It was proposed by Sir Michael Beetham, seconded by Gp Capt Madelin, that those standing for election should be accepted. There being no objections, and no alternative candidates, the Committee listed below, was duly elected to serve to the next AGM:

AVM N B Baldwin	Chairman
Gp Capt J D Heron	Vice-Chairman
Gp Capt K J Dearman	Secretary
Dr J Dunham	Membership Secretary
D Goch Esq	Treasurer
J Boyes	Treasurer-elect
Wg Cdr C G Jefford	Editor & Pub's Manager
Air Cdre H A Probert	
Wg Cdr C J Cummings	

The ex-officio members of the committee were:

J S Cox	Head of AHB
Dr M Fopp	Director, RAF Museum
Gp Capt P W Gray	DefS(RAF)
Wg Cdr Q N P D'Arcy ¹	JSCSC

Any Other Business

Al Pollock described the work underway at Bruntingthorpe to restore Vulcan XH558 to flying condition. Although sufficient funding had been raised to keep the aircraft in the UK, additional funds were needed for completion and members were urged to support the project.

Gp Capt Gray noted that an Air Power Conference was to be held at Hendon on 10th and 11th July 2001 and recommended that members should attend.

Inviting Sir Michael Beetham to make the presentation, the Chairman announced that Sqn Ldr Alan Riches had won the Two Air

¹ Owing to one of the exigencies to which the Service is so prone, Wg Cdr Deas' successor at Watchfield eventually turned out to be Wg Cdr Colin McDermott. **Ed**

Forces Award sponsored jointly by the Society and its counterpart, the (US) Air Force Historical Foundation. His paper, in which he discusses the contribution of the balloon to the history of air power, would be published in (this edition of) the Journal.

IN MEMORIAM
AIR MARSHAL SIR KENNETH HAYR

Kenneth Hayr, who died at the controls of a vintage Vampire jet at Biggin Hill, was probably the most operational commander the Royal Air Force has seen since the Second World War

Born in New Zealand in 1935, he won a cadetship to the RAF College Cranwell, and although his career thereafter was based in the UK he remained at heart a New Zealander and continued to spend six months of each year at his home on the coast north of Auckland.

The first part of his RAF career had been in the deep freeze years of the Cold War; the second - in total contrast - saw Britain involved in two wars, the first in the Falklands and the second in the Gulf. Kenneth Hayr held high command in both. As Assistant Chief of Air Staff (Operations) during the Falklands campaign, he played a key role in managing the formidable air operations in the South Atlantic. Eight years later he was Deputy Chief of the Defence Staff at the time of the outbreak of the Gulf War in 1990-91 and once again found himself at the centre of things, but this time with a difference.

The Falklands War had been a purely national contingency and Hayr, as an airman, was concerned with his own field of air operations. In the Gulf War he was at the top level of the Central Staffs in the Ministry of Defence, but this time with a tri-service responsibility in an international operation planned and conducted in concert with allies.

His character and his experience matched him to the moment. He had previously been Deputy Commander-in-Chief, RAF Strike Command, the command which now embraces all the operational roles of the Royal Air Force. Before that he had been Commander, British Forces Cyprus, and Administrator of the Sovereign Base Areas, an appointment which combined tri-service and diplomatic roles.

Yet although he excelled in these posts it was as a fighter pilot that he would be proudest to be remembered. It is a world in which he was thoroughly at home and he remained a part of it until the tragedy that ended his life. Even in staff appointments he sought to stay in flying practice, which is not easy to do in today's air force. He was never

content to be a passenger with someone else doing the flying. It only counted if he was doing the flying himself.

In his earlier days he had seen squadron service on the Hawker Hunter, the Lightning and the Phantom as well as serving with the Fighter Command Trials Unit in 1964-67. By this time he must have been one of the most highly qualified fighter pilots in the RAF, and the Personnel Staffs, with a ground job already lined-up for him, were about to declaim: 'Come in Hayr your time is up.' But a last-minute twist of fate intervened and instead of heading for the Staff College, in 1970 he took command of the RAF's first squadron of the 'jump-jet' Harrier, then only just coming into service.

Of this period he later wrote:

'This was the most exhilarating, interesting and fantastic period of my life. It was totally new and nobody could tell us what to do because nobody knew. We were breaking new ground, both literally and figuratively. We wrote our own book.'

The subsequent success story of the Harrier is testimony to the validity of the 'book' which these pioneers, under Hayr's leadership, put together.

He had a strong sense of the history of aviation and the one other job which he remembered with particular affection was as Commander of the RAF's air-defence formation, No 11 Group, which had previously been Fighter Command with headquarters at Bentley Priory. He was proud to be occupying the office once held by Hugh Dowding, the Commander during the Battle of Britain.

Beside all this he was an accomplished sportsman: an excellent skier, fine tennis player, golfer and paraglider pilot. He had played polo, climbed on Everest, and been a parachutist. When he retired from the Royal Air Force as Air Marshal in 1993 he could have taken his choice from any number of highly paid jobs but he decided that above all else he wanted to keep flying.

To him that entailed more than simply being airborne; to be satisfying it had to be demanding and challenging. He bought one of the highly aerobatic and manoeuvrable Russian-built Yak-52 aircraft and shipped it to New Zealand. While he hardly needed instruction in the arts of flying, he was never one to do things by halves. He went

out to Russia and placed himself under the tutelage of one of Russia's top aerobatic pilots.

His masterly flying displays spread the popularity of the Yak in New Zealand and within a couple of seasons Hayr had gathered around him and trained a full display team which, in addition to appearing at air displays, was called on to perform on national occasions like the culmination of the America's Cup yacht races off Auckland.

Hayr was a most remarkable person to know and to work with. One simply could not see how he got things done. Even when faced with seemingly insurmountable problems he somehow overcame them, yet with the minimum of fuss and without raising his voice. The secret was his absolute integrity. Once he perceived what had to be done he never wavered. He was not deterred by difficulties or by doubters. He made things happen.

The same code applied in his personal dealings, where his consideration for others was unstinting. A modest and private man, he was endowed with an old-world courtesy. Nothing was too much trouble for him.

Gp Capt IAN MADELIN

This obituary was first published in the Independent Tuesday Review on 12th June 2001.

Kenneth William Hayr: born Auckland, New Zealand 13 April 1935; AFC 1963, and bar 1972; CBE 1976, KBE 1991; Assistant Chief of Air Staff (Operations) 1980-82; CB 1982, KCB 1988; Air Officer Commanding No 11 Group, RAF 1982-85; Commander, British Forces Cyprus and Administrator Sovereign Base Areas 1985-88; Chief of Staff UK Air Forces and Deputy Commander-in-Chief, Strike Command 1988-89; Deputy Chief of Defence Staff (Commitments), Ministry of Defence 1989-92; married 1961 Joyce Gardner (died 1987; three sons); died Biggin Hill, Kent 2 June 2001.

BOOK REVIEWS

Observers and Navigators, and other non-pilot aircrew in the RFC, RNAS and RAF by C G Jefford. AirLife; 2001; £35.

This is an excellent and long-overdue study. Air power scholarship and more popular accounts of air combat during the 20th Century reflected the classic prejudice against the non-pilot aircrew trades, and we should all be very grateful to Jeff Jefford for producing such a comprehensive work. Indeed, such is its coverage that it can be described as a reference book, but, unlike many reference books, it is well written.

Jefford's book begins with an examination of the very early non-pilot aircrew in the Royal Flying Corps, and how these other trades developed during the First World War under the auspices of the RFC and the Royal Naval Air Service. This is an important subject. Unfortunately, Jefford is overly harsh on the RNAS, and presents the RFC as the more dynamic of the two Services in its attitudes towards aircrew roles. As a number of scholars have already demonstrated, the RNAS was at the forefront of research and development into aids to navigation and bomb-aiming throughout the war, and when the RFC undertook long-range bombing operation in earnest from 1916, it looked to the RNAS for advice and kit. The Naval Air Service also had a greater understanding of the stresses placed on aircrew during long-range operations. Again, as others have demonstrated, all this important work was largely forgotten after the creation of the RAF in April 1918.

By far the best part of this book is the treatment of the years leading up to World War II and the war years. What Jefford does very well is to show to what extent the non-pilot aircrew training lagged behind pilot training. The material expansion of the RAF during the 1930s was not matched by an expansion of the training organisation, and the training of non-pilot trades was not seriously addressed until the last years of peace. But nor were hordes lining up for Observer, Air Gunner or Wireless Operator duty. To be a pilot was glamorous; to be an Observer, Air Gunner or Wireless Operator was not. Therefore, the RAF had an added problem when it came to recruiting these other trades.

Jefford gives very valuable insights into the evolving aircrew roles and training syllabi. What the reviewer wanted to see more of, however, was a discussion of the way in which supply and demand affected aircrew candidates. There were a number of critical points in the war when there were very serious shortages of certain aircrew trades. In 1941, for example, there was a desperate shortage of Navigators, and it was not uncommon to find 'above average' pilots being retrained as Navigators. But Jefford's work is a salutary reminder to current recruiters and those engaged in force structure decision making that you cannot create an effective force overnight. The Empire Air Training Scheme, initiated in December 1939, enabled the RAF to meet its manpower needs, but it took the best part of two years before its products reached front-line service.

The reviewer was delighted to see that Jefford took his study beyond 1945, and he provides us with a very interesting discussion of the problems associated with re-structuring a force after such a large-scale war. The proliferation of sub-categories of aircrew trades, which had been demanded by war, were streamlined after 1945. But, not surprisingly, the readjustments caused rancour within the air force. The re-designation of 'earned in action' badges became a highly sensitive issue, as did the question of the commissioning policy for aircrew.

In short, this is an obligatory purchase for anyone interested in Service flying. It should certainly be obligatory reading for members of the two-winged 'master-race'! The reviewer hopes that Jeff Jefford will now go on to produce a sequel, which investigates aircrew experience (the aircrew building process, whether aircrews felt that their training prepared them adequately for operations, how they coped with the stress and fatigue associated with long sorties, etc). But, in the meantime, Jeff Jefford has performed a tremendous service, not only in the way he has honoured the non-pilot trades, but also by explaining the complexities of these other trades and why they were so critical to mission success.

Dr Christina J M Goulter

The Remorseless Road by James McEwan. Airlife; 2001. £9.99.

James McEwan was commissioned into the RAFVR in 1941 as an

Intelligence Officer. After a spell of on-the-job training at Leuchars he was sent to the Far East, presumably to capitalise on a familiarity with Mandarin which he had acquired during three years spent living in China. He arrived at Seletar in January 1942 and worked (mostly) with Nos 36 and 100 Sqns until they ran out of aeroplanes. Taken prisoner on Java in March, McEwan and his colleagues were eventually transferred to Japan at the end of 1942 to spend the rest of the war working a coal mine at Ohama on the south coast of Honshu.

This softback edition, of a book which was first published as recently as 1997, falls into two roughly equal parts. While the first of these makes frequent reference to the operations of the dwindling force of Vildebeests, it is primarily an account of the author's extensive travels and personal adventures during the fall of Singapore and the East Indies. The second half tells of the relentless hardship of life in the labour camp, of the hazards of working in the primitive mine, of the brutality of the guards, of witnessing a sinister mushroom-shaped cloud rising above the city of Nagasaki and of the survivors' subsequent repatriation as far as San Francisco courtesy of the US Navy.

The episode that made the greatest impression on this reviewer was the quite appalling circumstances of the sea passage to Japan. Of the 1,080 prisoners on board, sixty-two died en route. When they reached their destination, although there were thirty men whose condition was critical, the Japanese announced that only eighteen of them could be admitted to hospital. It fell to McEwan to decide who might live and who would almost certainly die. Of a further 280 men who were too sick to disembark from the wretched vessel by themselves, 127 had died within six weeks.

So much for the content, what of the style? The author clearly had a classical education and his grammar is faultless but he is given to lengthy descriptive passages which, because of the density of his prose and his extensive vocabulary, can make for heavy going. Can you, for instance, construct sentences using words such as: diapason, palimpsest, peristyle, cerements, crepuscular, tocsin, nacreous, tetter or caltrop? McEwan can, and does; I doubt that many members will cope with this book without occasional recourse to a dictionary.

That aside, the author's memory clearly being quite unclouded by

the passage of time, both halves of the story are recounted in remarkable detail. There are occasional flashes of a dry sense of humour but, despite the vividness of some of his imagery, the tale is told with a curious air of detachment. For instance, while the treatment meted out by the Japanese is recorded, these incidents are noted quite dispassionately and there is little sense of anger or resentment. Perhaps it was his evident stoicism that enabled McEwan to survive.

I did not find this book easy to read but it does justify the effort. One last thought; one wonders why Airline has chosen to reprint *The Remorseless Road* only four years after it first appeared because, at the time of writing, copies of the original hardback edition were still available at the remaindered price of £6.95.

CGJ

On Great White Wings by Fred E C Culick and Spencer Dunmore. Airline; 2001. £30.00.

I am no expert on early aviation but I doubt that there is much, if anything, really new in this book. On the other hand, I also doubt whether it could be bettered as an accessible appreciation of the fundamental importance of Wilbur and Orville Wright's contribution to a field of endeavour that, perhaps more than any other, became the hallmark of the 20th Century.

There was an inevitability about flight by 1900. So many pioneers were working on the problem that it was no longer a question of whether man would fly, but of who would be the first to do it, when and how well? That it was the Wrights is no longer disputed (it was at one time) and the authors explain precisely why it was that they succeeded. While others had concentrated solely on achieving 'lift', the Wrights had been equally concerned with propulsion and control and they had applied empirical scientific method to solving these problems. By 1909 the technical superiority of the Wright Flyer was unquestioned and the brothers' grasp of aerodynamic theory and practice was unrivalled. Sadly, however, others would be more successful in exploiting these principles.

While the Wrights had some success in teaching people to fly and in building and selling aeroplanes, they were more drawn to the

developmental aspects of aviation than to its commercial side. Unfortunately, they were constantly diverted from pursuing their engineering work by the demands created by recurrent litigation over the infringement of their patents. All of this led to a sense of frustration, bitter disputes with rivals, especially Glenn Curtiss, and a lengthy feud with the Smithsonian Institution who maintained that Langley's Aerodrome had been the first aeroplane capable of powered flight – which is why the original 1903 Flyer was lodged in London's Science Museum until, following a retraction by the Smithsonian in 1942, it was eventually returned to the USA five years later.

On Great White Wings is another of Airlife's recent transatlantic co-operative ventures and, like others that have originated on the far side of the pond, it contains North American-style spelling. Nevertheless, the narrative is fluent, unfussy and easily assimilated. The book has a rather odd square (26cm × 26cm) format but its large pages do justice to more than 200 very well presented illustrations, even if some of them are printed across two-pages, creating a staple-in-the-navel effect. A few are reproductions of contemporary advertisements, souvenir postcards and the like, some of them in colour, but the majority are black and white photographs. I understand that one or two of these pictures have been imprecisely captioned and many, especially those taken at Kill Devil Hills in 1901-03, are certainly very familiar, but the significance of the latter is generally enhanced by the informative text which explains the incremental technical advances that each of these images represented. These explanations are amplified by diagrams which, based on the analysis of recent wind tunnel experiments and flights in a control-configured Learjet adapted to handle like a Flyer (a concept that I have some problem grasping) show how the Wright's solutions to the problems of flight actually worked.

The book is far from being a technical treatise, however, and we are provided with background information on the Wright family, especially Wilbur and Orville and one is left with a very clear impression of them as a pair of confirmed bachelors, perhaps middle-aged before their time, who never worked on a Sunday and always wore starched collars and business suits, even when flying. These mild eccentricities aside, it is also apparent that they really were two

halves of a whole, each of them having a deep mutual respect and affection for the other, and that their habit of seamlessly changing sides in a discussion often facilitated the identification of solutions to apparently intractable problems. The setting for these personal details is the increasingly flamboyant era of pre-1914 aviation and we are provided with ample detail on, for instance, Wilbur's expedition to Europe and Orville's demonstrations to the US military. Along the way, we are introduced to many of the personalities who played their part in the story, ranging from the faithful Charlie Taylor to the distinctly unreliable Augustus Herring.

Fred Culick is involved in a project which should see an (almost) exact replica of the original Flyer take to the air on 17th December 2003, to commemorate the 100th anniversary of Orville's first successful powered flight (the first of four that he and Wilbur made that day). One suspects that other publishers may well feel the need to mark this event; they will have their work cut out to improve on this very readable and handsomely presented volume.

CGJ

The Years Flew Past by Roland 'Bee' Beamont. Airline; 2001. £19.99.

There are fewer and fewer 'characters' left in aviation, and the recent demise of Wing Commander Roly Beamont at the age of 81 reduces the list still further. Following dazzling wartime service as a fighter pilot and wing leader, Bee went on to oversee the English Electric Canberra - the RAF's first jet bomber - and Lightning flight test programmes. Subsequently, he was chief test pilot for the ill-fated TSR2 supersonic bomber-reconnaissance programme, and he directed BAE and Panavia Tornado flight operations up to the point at which the multi-role aircraft entered military service. He was then unceremoniously put out to pasture.

What of this book, which aims to describe Bee's '40 years at the leading edge of aviation'? Bee had written ten previous works on his experiences on Typhoons, Tempests and jet test flying, and I suspect that if you have all ten there will not be much new material here. The *Years Flew Past* shows wearying signs of 'cutting and pasting'; any diligent editor would have cut out repetitious material such as the two

backgrounds on Sir Roderick Hill (CinC ADGB) on pages 42 and 49. Bee is not at his best when he comments on politics. His belief that English Electric was disadvantaged because RAF OR staffs and Ministry of Aircraft Production types 'did not relish their necessarily frequent rail safaris 'up North'' is plain daft. They might not have relished a long haul if English Electric had been a gash outfit, but being way beyond Watford did not hinder Northerners like Avro who were on top of the job.

The tired old mantra that TSR2 was only cancelled because 'politicians clearly did not understand what they were meddling with' is also brought out of the crypt. I would have hoped that Bee, who set the scene for the Society's excellent TSR2 With Hindsight symposium in 1998, had recognized the other factors that came into play, not least Sir Frank Cooper's statement that 'the cost history of the TSR2 was horrific.'

Chapter Twelve is a sad tale of an innocent in international boardroom diplomacy being ejected from the 'The Company' after thirty-one years. But if Bee was out of his depth when it came to politics, he is a rattling good read when he sticks to what he did best - recount tales of flying aircraft and aviation people. There are some very good vignettes in this book, and I found it both effortless and illuminating to savour it from cover to cover over the Christmas break.

Last September, I was at the Guildhall when the Guild of Air Pilots and Air Navigators assembled to present Bee with its Award of Honour. Unfortunately, he was too ill to attend and he died shortly afterwards. If you don't have his previous works, *The Years Flew Past* is a great tribute to the memory of a great aviator.

Wg Cdr Andrew Brookes

At The Controls, photography by Eric F Long and Mark A Avino. Airlife; 2001. £25

Those of us who have wandered open-mouthed round the Smithsonian National Air and Space Museum in Washington know that it has a marvellous collection of historic aircraft and space vehicles. What you can rarely see is the insides of the cockpits, but the museum has tried to remedy that by producing this sumptuous

book designed to give readers the feel and sensation of actually being at the controls of forty legendary aircraft and five spacecraft.

This rather spectacular, large format photo essay on cockpits from the Wright Flyer to the Space Shuttle Columbia via SPAD, Lindbergh's Spirit of St Louis, P-26, Spitfire, FW190, Il-2M3 Shturmovik, P-51, Me262, B-29, DC-7, F-86, SR-71, F-16, Apollo Lunar Module et al works very well. The creative lighting techniques and special cameras and lenses get rid of any apparent distortion, and alongside each panoramic view is a punchy accompanying insight written by Dana Bell and Tom Alison, who are in sympathy with each cockpit and obviously know what it is like to fly. As someone who has flown many types since the Tiger Moth, I found this book to be the nearest thing to being strapped in there.

The book does not come cheap. But if you want to get the 'feel' of what it must have been like to sit in these cockpits, plus a pen picture of virtually every significant aircraft over the past century, I recommend this book for your coffee table.

Wg Cdr Andrew Brookes

RAF Gibraltar by Tony Fairbairn. Tempus; 2002. £12.

This 128-page, softback provides a concise history of aviation on 'the Rock' followed by 227 photographs of aeroplanes, practically all of them taken in situ either on the ground or in the air. Many of the photographs were actually taken by the author (and if you still have your *Air Pictorials* for 1982-83 you may even have seen a handful of them before). Each picture is accompanied by a brief but informative caption providing, where known, the identity of the airframe, its unit, the date of the picture and, where appropriate, some indication of the occasion. The coverage is not confined to the RAF and there are many photographs of interesting military visitors, including examples of a French SO 94 Corse I, a Dutch Sea Fury, a US Navy Martin P4M and a USAF F-86E. Commercial aviation is also covered with photographs of visiting executive types and scheduled airliners plus the locally based aeroplanes of Gibair. Beware the conflicting dates for No 224 Sqn's arrival at 'Gib', April 1951 on page 12 and October 1948 on page 21; 1948 is the correct one. Beyond this, however, I found little to criticise. This is a straightforward little book which

achieves exactly what it sets out to do and, at less than 6p per picture, it provides excellent value for money.

CGJ

The Bristol Aeroplane Company by Derek N James. Tempus; 2001. £15.99.

Despite its very specific title this 223-page paperback disregards successive changes in the firm's corporate identity and deals with all of Filton's designs from the Boxkites built by the British and Colonial Aeroplane Company of 1910 to the products of today's BAE Systems Airbus UK. While concerned primarily with aeroplanes, reference is also made to the parallel line of locally designed aero-engines sponsored in succession by Cosmos, Bristol, Bristol-Siddeley and Rolls-Royce, and to missiles, sounding rockets, satellites and the like. It is a long and complex story and this book is simply too small to do it real justice. Furthermore, any attempt to chronicle the history of an aeroplane manufacturer must be measured against the yardstick provided by the Putnam series, in this case C H Barnes' *Bristol Aircraft since 1910*, which is almost twice the size and deals only with aeroplanes. Inevitably, James' book falls short (as he must have known that it would, as he has contributed the Putnams on both Glosters and Westlands and, moreover, was responsible for the updated later editions of Barnes' original Bristol book).

It is probably symptomatic of the attempt to squeeze a quart into a pint pot that the thirty-plus-year career of the Bloodhound missile is dealt with in a single paragraph and (perhaps because of draconian editing?) a particularly inadequate one at that. Bloodhound actually entered service with the RAF in 1958 (not 1963) and we are given the impression that it served with only two numbered squadrons whereas eleven operated Mk 1s and six had Mk 2s; there is no reference whatsoever to the system's use by other air arms, eg those of Sweden and Switzerland.

If one already has a copy of Barnes' book, apart from making reference to some of the company's more recent activities, this one is not going to tell you much that you did not already know and some of the new things that it does tell us are of questionable accuracy. For instance: the picture of a Bristol M.1C on page 46 was taken in

Ayrshire, not the Middle East; there were two, not three, Brigand squadrons in the Far East (the third was at Khormaksar); and No 194 Sqn received its first Sycamore in 1953, not 1949. I also have some reservations over the proffered explanation for the extended dorsal fin fitted to late-mark Beaufighters which the author tells us was introduced to counter longitudinal instability. The more conventional (and convincing) explanation is to do with directional instability, not least, the type's reputation for swinging on take off. The Beaufighter did have a longitudinal problem (a tendency to porpoise in the climb) but the palliative in that case was to give the tailplane a considerable amount of dihedral. Then again, we are told that, having lifted the Brabazon off the runway on its maiden flight, 'Bill' Pegg said to his co-pilot, 'Well, my side's airborne, what about yours?' Not so. This gem is generally attributed to 'Tim' Wood and the first flight of Blackburn's Universal Freighter, Pegg specifically recording his far more mundane intercom exchanges in his autobiography *Sent Flying*.

All of that having been said, there are more than 200 pictures plus a handful of general arrangement drawings and the book is easy enough to read, although it would have benefited from the inclusion of an index and one last proof-read to weed out a few typos that got through the net. By contrast, Barnes gave us a hardback with more than 300 photographs and more than fifty drawings so one has to ask what this new book is for. It is plainly a 'sub-Putnam' and must, therefore, be regarded as a primer. As such, it does serve its purpose and the price is not unreasonable.

CGJ

From Dusk Till Dawn by T W Kitching. FPD Services Ltd (of Pickwick House, Chosen View Rd, Cheltenham, GL51 9LT); 2001. £12.40 (inc p&p) via the publisher.

Sponsored by its Reunion Association, this slightly larger than A5-sized, 138-page softback is a concise and very readable history of No 219 Sqn printed on coated paper. The squadron was a notably successful night fighter unit during WW II, operating Blenheims, Beaufighters and Mosquitos from bases in the UK, north-west Africa, France and Holland. Disbanded in 1946, the squadron had two further leases of life in the 1950s, both in the night-fighter role, the first in

the Canal Zone with Mosquitos and Meteors, the second at Driffield with Venoms. The book includes twenty-five well-produced photographs and numerous anecdotes culled from ex-members of the squadron, the most remarkable of these being a two-page contribution from the 100-year old Philip Bristow who had flown Short seaplanes with the squadron during its brief existence in WW I. Unfortunately, because memory is fallible, there is a risk in reproducing such recollections verbatim and, since some 80% of this book consists of personal contributions, it was almost inevitable that it would contain some inaccuracies. There are, for instance two eye-witness accounts attesting to the fact that Mr Churchill's personal York landed, apparently in error, at Sidi Amor when No 219 Sqn was resident there in December 1943. I would not dispute that the incident occurred but the PM was actually on his way home from the Teheran (not the Yalta) Conference and his aeroplane was named *Ascalon* (not *Excalibur*).

Four appendices provide a Roll of Honour, biographical notes on COs, the serial numbers of aeroplanes known to have been on the squadron's charge and a list of 128 victories claimed during WW II. My only significant criticism is that the latter is incomplete in that in thirty-four cases only one member of the crew has been identified (guess which one). This is a shame, as the squadron's ORBs are preserved at the PRO as are its WW II Combat Reports. I have not done a 100% check, but a cursory examination indicates that it would certainly have been possible to fill most, if not all, of the gaps. Nevertheless, despite this unfortunate omission, and the book's comparative brevity, the author has succeeded in conveying a very vivid impression of life on No 219 Sqn. In particular he is to be congratulated on his sense of proportion, in that (unlike some chroniclers) he has paid just as much attention to the squadron's relatively mundane activities during the post-war era as he has to its more spectacular exploits in combat. This even-handedness is also reflected in the many anecdotes which include substantial contributions from back-seaters, airmen of various trades (fitter, mechanic, medical orderly, armourer and so on) and a signals officer, these serving to balance the many tales told by pilots.

A sound contribution to the all too slow accumulation of published

squadron histories. Recommended.

CGJ

Fly No More by Lt-Cdr Brian Davies AFC, RN. Airline; 2001. £19.99.

The author joined the Royal Navy as an 18 year-old aviation cadet in 1952 and enjoyed a successful and distinguished flying career with the Service for twenty years; all related crisply, professionally, but not immodestly. In the face of the defence cuts at the end of the 1960s and the envisaged changing role of aircraft carriers he opted for voluntary redundancy and a switch to civil aviation.

So why the title *Fly No More*? Well that relates to the some fifty aircraft types that he flew, including all the fixed-wing RN aircraft of the 1950s and 60s. Seven years of his naval career were engaged in test flying, both at home and in the USA, much of it involving the protracted testing of the Rolls-Royce Phantom. It was as OC No 892 Sqn (Phantoms) that he won the *Daily Mail* Transatlantic Air Race in 1969.

Brian Davies has produced a good, well-organised book on the early/middle post-war years which, with some light touches of humour, should be a very useful addition to the history of the Fleet Air Arm of the period. It is those with an interest in or experience of naval flying to whom this book will most appeal.

Roy Walker

To Travel Hopefully by Don Snuggs. Pentland; 2001. £14.95.

Since he was already a qualified SRN when he was drafted for National Service in 1954, it did not stretch the air force's imagination too far for it to decide to employ Don Snuggs as a nurse. It also had little difficulty in persuading him to sign on for three years in order to realise a substantially higher rate of pay. After eighteen, rather difficult, months back in civvy street, Snuggs re-enlisted for a further engagement which lasted until 1977 by which time he was a chief technician. This book is a record of his twenty-two years of service in the Medical Branch. There is the odd niggling error, eg there is no 'e' in Bridgnorth, an isolated instance of a 'Vice Air Marshall' and a photograph captioned as being of an Avro (*sic*) Hastings, but there are not enough of these to disrupt the flow.

I found the book a little difficult to assess. Its weakness lies in the fact that some of the story is rather mundane. Indeed, much of it reads as if it had been written for the benefit of the family archives, rather than for general consumption. Thus, for instance, while descriptions of the succession of motor cars owned by the author do provide evidence of the steady improvement in the family's material circumstances, such details are of very parochial interest. On the other hand, the book does have significant value in that it was written by an NCO and therefore provides us with a relatively unusual perspective on Service life within a particularly unusual context. It was interesting to read, therefore, of the day-to-day problems of managing medical establishments both large (at various time Snuggs served on the staffs of the RAF Hospitals at Halton, Uxbridge, Ely and Nocton Hall) and small (eg at Gan), of inter-Service friction while running a clinic in Tobruk, and of the ploys involved in influencing day-to-day matters ranging from overseas postings to the duty roster in the Sergeants Mess.

Knowing little of the goings-on within the Medical Branch myself, I was impressed by the way in which the author's career exposed him to different aspects of his profession, thus progressively broadening the base of his expertise, the award of a BEM suggesting that Snuggs clearly made good use of the opportunities he was offered and of the experience he had acquired. I was also impressed by his honest registering of object lessons as they occurred, by his evident compassion and by the way in which he records his realistic appreciation of what medicine can and cannot do. While describing working on a cancer ward in 1964, for instance, he reflects on whether the available treatments were prolonging life or merely extending death.

To Travel Hopefully probably has limited appeal to the general reader. Nevertheless, it should be of considerable interest to members of the medical profession and, for the Service sociologist, it provides valuable domestic insights into aspects of the way in which life was lived by an airmen in the 1960s and '70s.

CGJ

The Other Battle by Peter Hinchliffe. Airlife; 2001. £12.99.

This 352-page paperback edition of a book which first appeared in 1996 is accurately subtitled *Luftwaffe* Night Aces Versus Bomber Command. The facts of the battle for control of the night skies over Germany have long been established and, although he did do some archival work, the author makes no substantial claim to having introduced any new information. Indeed, he lists no primary sources among his references, his selective bibliography being confined to a couple of dozen well-established publications.

So, if the facts are already a matter of public record, does this book add anything? Yes; most certainly. While we may know the facts, they can be presented in many ways and Hinchliffe has arranged them to produce a lucid, coherent and easily assimilated chronicle of the ebb and flow of the campaign. That having been said, while the account is well-balanced, and we are provided with ample information on the fluctuating fortunes of the bomber force, the focus tends to concentrate on the struggle as seen from the defender's point of view. Thus we have the paradox of the action's being described, primarily from the perspective of the *Luftwaffe*, but written by a British veteran – the author was a wartime Lancaster navigator. Despite, or perhaps because of, this juxtaposition there is no loss of objectivity.

I did spot the occasional slip of the pen, eg a one-off reference to the Vickers Armstrong (*sic*) Whitley, and the odd factual error, eg Bomber Command's last combat casualties were sustained on 2/3 (not 3/4) May 1945 and all sixteen men aboard the two Halifaxes involved did not die; there were three survivors. Examples such as these are few and far between, however, and there are certainly not enough of them to undermine one's confidence in the overall accuracy of the story. The only presentational anomaly which does distract the reader is a map on page 129 to which no reference appears to be made; the mystery is eventually solved when you read the caption to a photograph but one has to wait a long time for this enlightenment because the picture is sandwiched between pages 315 and 316. On the plus side there is an index to personalities and a very useful glossary to explain the many German words and phrases which the author has elected to use throughout, rather than risk distorting the picture by substituting English translations which do not always accurately reflect the meanings of the original terms as applied to specific

aspects of night operations.

Having said that the author introduces no significant new information, what he does do is to leaven his tale with the first hand recollections of participants. A few of these have been drawn from RAF men but most have been contributed by Germans. The latter are particularly illuminating, particularly to British readers, and are remarkable for the breadth of experience that they reflect. Some of the names are of figures who achieved a measure of success within the night-fighting community, eg Falck, Kümmitz, Knickmeier, Herrmann, Zorner, Ostheimer and Krause, these examples alone covering ranks from colonel to sergeant and represent pilots, back-seaters and a ground-based intercept controller. There are many more personal accounts from less prominent members of the organisation, and these probably do even more to flesh out the grim reality behind the dry statistical bones of the profit and loss figures which reflected the outcome of each night's confrontation.

It is some indication of the quality of Hinchliffe's work that it boasts two Forewords, one contributed by Sir Michael Beetham, the other by Wolfgang Falck, the founder of the *Nachtjagd*. This endorsement was amply justified. Strongly recommended.

CGJ

Sharks Among Minnows by Norman Franks. Grub Street; 2001. £17.99.

Norman Franks is a prolific writer on aviation history and an acknowledged expert on the First War in the Air who has, in collaboration with others, written a number of books dealing with German fighter pilots. This, largely tabulated, database provides a register of practically every pilot who flew with a *Jagdstaffel*, ie from the summer of 1916 onwards, and records their victory claims (if any – the entries are not confined to 'aces'), their units, their more significant decorations and, where applicable, their fate. The book under review here fills a gap in this coverage by providing details of the pre-*Jasta* era, July 1915-October 1916, which includes the period during which the Fokker Monoplane had been indisputably the most efficient fighting machine available to either side.

This book differs from the others in, what may reasonably be

regarded as, a series in that it is a solo effort and is presented as a narrative. The latter was, I think, a mistake. It would have been better to stick to a tabulated format, amplified by a suitable introductory essay to highlight the characteristics of this early phase of aerial fighting. This would have resulted in a much more user-friendly volume, albeit, because relatively few individuals were involved, a rather slim one. As it is, when tracing an individual's career, the narrative approach obliges one to resort to the index which is a rather tedious process as there are, for instance, forty-three separate references to Boelcke, forty to Immelmann, twenty-one to Wintgens, fifteen to Leffers and so on. It is also apparent that the narrative approach has led to a degree of duplication. For instance, Buddecke's many decorations are listed on page 105 and again on page 157; similarly, on page 83 we are told that Berthold's sobriquet of 'The Iron Knight' was probably bestowed after, rather than during, the war and we are told this again on page 148.

There are several other examples of unnecessary repetition where the narrative describes an engagement from the point of view of the British victim followed by a verbatim reproduction of the text of the report submitted by that individual when he was eventually released from captivity. Since this document was clearly the source of the account which one has just read, having to read it again creates an annoying sense of *déjà vu*; examples of this occur on pages 9, 29, 81, 88, etc. In a similar vein, anyone who is familiar with the other books in the series will find that much of the detail relating to the later careers of the more prominent German pilots has been recycled from earlier volumes. It is, of course, difficult to know where to draw the line in this context but the fact remains that a substantial amount of the information in *Sharks Among Minnows* has already been published elsewhere.

So what of the writing itself? 'Invinceibility' managed to get past Grub Street's Spellchecker and, while I would reluctantly concede the point if I had to, mine is not very happy with 'supercede', and neither am I. More significantly, however, the syntax is often clumsy and sometimes seriously flawed. Some sentences have so many subordinate clauses that the subject and object of the main verb simply become dissociated. For example, when a sentence on page

118 is reduced to its essentials it turns out to be about a 'DH2 (which) died on the 22nd'. Then again, there are instances of confusion between 'who' and 'whom' and a lack of sensitivity regarding the use of collective nouns. It may be possible, for example, to construct a defence for writing that 'a crew were attacked', but it is still uncomfortable to read and there is no way that 'Two other victories claimed....was a balloon....' will pass muster.

The upshot of all this is that the book provides a rather bumpy ride, as one is too frequently obliged to re-read a sentence to confirm that it really did say what you thought it said and/or to decide what it ought to have said. All of these grammatical problems could, and should, have been sorted out at the proof-reading stage. The fact that so many of them eventually appeared in print suggests that there was no independent editorial process and that the original manuscript was simply published as submitted.

So, how does the book rate overall? It is not easy to read and not particularly easy to use; the index to personalities is excellent but there should have been a glossary to help decipher the many unfamiliar German abbreviations and acronyms which crop up repeatedly within the text, Kek, AOK, FEA, AKN, etc. That having been said, however, if you want an authoritative and objective account of early air combat this book does provide one, albeit from a predominantly Germanic perspective. Similarly, if you want to know which early British (and French) aviators were shot down by which Germans, to the extent that it has been possible to disentangle the inadequately compiled, sometimes fragmentary and often conflicting claims and reports submitted by both sides, this book will answer your questions. While I plainly have some reservations over the author's style, I should make it very clear that I would hesitate to take issue with him where his facts are concerned. Despite its drawbacks, when it comes to providing an accessible record of the early days of aerial combat *Sharks Among Minnows* is the only show in town.

CGJ

Avro Lancaster – The Definitive Record by Harry Holmes. Airline; 2001. £35.00.

When I first flicked through the pages of this handsomely

presented, 255-page, A4 hardback I was very impressed. But the more closely I examined it, the more disillusioned I became. My first reservation lay with the title. For any author to claim that his book is definitive smacks of *hubris*; better, surely, not to tempt fate and to allow others to accord such accolades. Technically, it means ‘most authoritative’ but when, as in this case, a revised edition with over 1,000 amendments appears only four years after publication of the original, one does have to wonder whether it had been wise to describe the first version as definitive and whether the second will be any better at living up to its ambitious title.

The Lancaster must be one of the most well-documented aeroplanes of all time. Since so much has already been written about it, we have to ask whether we need another Lancaster book and assess just how definitive this one really is. It opens with a brief but adequate narrative account of the Lancaster’s development and operational career but the bulk of the book consists of tabulated facts and figures. There are thumbnail sketches of each variant; a breakdown of production; details of Lancaster units (including statistical data on their operations, eg numbers of raids and sorties and of operational and accidental losses); a day-by-day listing of Lancaster operations (targets, sorties, losses); losses tabulated by squadron (serial number, date, target – or location if an accidental loss); correlations between code letters and serial numbers; brief histories of each airframe; key details of Lancaster VC winners and so on. Clearly, this is fundamentally a reference book and it is, therefore, essential that it be accurate.

In many ways the presentation resembles that adopted by Bruce Robertson in the very first comprehensive treatment of the Lancaster (for Harleyford in 1964), especially the section dealing with individual airframes. Indeed Holmes acknowledges that Robertson’s ground-breaking work ‘forms the basis for this section’, which I took to mean that it had been updated and/or corrected; after all there would be little point in reproducing sixty-seven pages (more than a quarter of the book) of dated material. Sadly, there seems to have been little attempt to remove even the more obvious errors in Robertson’s tabulations, eg DS723 and DS725 are still recorded as having been operated by (the non-existent) Nos 498 and 1158 Sqns,

respectively, and I am very suspicious of the 1,131 hrs that ED313 is supposed to have flown in just four winter months. Indeed the problem of 'duff gen' has been exacerbated because some of the original data has been corrupted in transposition, eg NE173's total of 38 flying hours appears as ?8hrs while the 260hrs flown by ED475 have disappeared altogether and ME796 has been allocated to No 603 Sqn (vice 630). Then again, while Robertson noted (correctly) that ME744 was lost during a raid on Wiesbaden flown by No 300 Sqn on 3rd February 1945, Holmes gets the date right but omits the target and identifies the unit as No 30 Sqn.

These are merely isolated examples found from a very casual attempt to cross refer between the two books; there are many more. Some of these errors may be excused as typos, but just how many of those are you allowed in a 'definitive' book? Since Holmes (and others) have done such a lot of recent work linking code letters to serials, it is a pity that he did not see fit to incorporate this new information into Robertson's tables. As a result, if your entering argument is a squadron code, this book will tell you (where known) which airframe(s) wore it, but if you go in with a serial number, it will tell you only the codes that Robertson had been able to establish some forty years ago. How 'definitive' is that? Furthermore, there are far too many inconsistencies between the various tables within the new book. For instance, on page 135 ME857 is noted as having been lost on 26th August 1944 but on page 216 it is the 20th, and ME727 is noted on page 148 as having crashed on take off on 9th April 1944 but on the 7th on page 215. It is the second date, ie that provided by Robertson, which is incorrect in both cases, but such inconsistencies should surely not appear in a 'definitive' book. There are lots more; the entry for LL683 on page 206, for instance, is a faithful copy of Robertson's data which shows the aeroplane as having been lost while flying with No 115 Sqn whereas on page 150 Holmes has it with No 514 Sqn. Holmes is right, but should he not have corrected the other entry?

I should stress that I did not have to look very hard to find these anomalies which rather undermines one's confidence in the entire book. So, reverting to my first question, do we need it? I think that I would have to say, only if you are new to the game, in which case it

would be a convenient place to start, because it does present a great deal of attractively packaged information between one set of covers. It has to be said, however, that much of this data is available between other sets of covers. For instance, the thumbnail sketches of Lancaster variants can be found in a number of other books, going right back to Robertson's original effort; the data on squadron ops appears in *The Bomber Command War Diaries* by Middlebrook and Everitt; the day-to-day listing of Lancaster operations is in Jim Halley's *Lancaster File*; and Bill Chorley's *RAF Bomber Command Losses* is another obvious, and authoritative, reference. If you have access to books such as these, and to Francis Mason's comprehensive 435-page work on the Lancaster (for Aston in 1989), this new book will not tell you much that you did not already know.

For all that, it is a very attractive volume and it does provide us with the latest state of play with respect to code letter/serial number links and the book does have masses of photographs; I counted more than 220. Many of these have been seen before and some of the less familiar pictures that have been drawn from private sources are, inevitably, of indifferent quality but their freshness does compensate for this and all have been printed on glossy paper so that the standard of reproduction could hardly have been improved. This book is probably a 'must have' if you are a Lancaster fan but, sadly, appearances can be deceptive and it is not really as good as it looks, or as good as its title proclaims.

CGJ

Kiwi Spitfire Ace by Jack Rae. Grub Street; 2001. £17.99.

A New Zealander, Jack Rae was trained at home before being shipped via Canada to the UK where, in July 1941, he joined No 485 Sqn as a sergeant pilot. He was subsequently transferred to Malta, courtesy of the USS *Wasp*. Four months later he returned to the UK and, following a stint as an instructor, he eventually found his way back to No 485 Sqn only to be shot down in August 1943 by which time he had been credited with eleven confirmed victories. At this point, and as is well described in the book, Rae's life changed gear markedly after he had found himself in *Stalag Luft III* at Sagan. Fortunately, as it turned out, when the famous mass break out took

place in March 1944 he was in the middle of a three-month spell in 'the cooler' as a result of a failed escape attempt. Had he not been he might well have been among the fifty men who were summarily executed following their recapture. His last three months in captivity were particularly difficult with the sick and undernourished '*Kriegies*' being obliged to march to the west as their German captors retreated in the face of the advancing Red Army. Eventually liberated in April 1945 Rae's book ends with his return to his homeland, by now a flight lieutenant with a DFC and Bar.

I had a problem with some of the 'facts' presented in the book because they actually give a new lease of life to a number of hoary old chestnuts. For instance, we are told that the *Wasp* launched forty-seven Spitfires in only twenty minutes. This remarkable figure may well have been put about by wartime propagandists, but it actually took just over an hour which was, I would have thought, sufficient of an achievement to have been in no need of exaggeration. Then again, Rae provides us with a description of a particularly significant, and therefore well-documented, engagement over Malta in which he participated. He reiterates the wartime version of this event which had all three Cant Z.1007s being shot down while being escorted by Reggiane 2001s. The three bombers were actually Savoia S.84s, only two of which were destroyed, and the escorts were Macchi C.202s. Rae also tells us that he was the thirteenth victory of a German pilot who shot him down, whereas we now know that Ltn Herbert Soukop's actual wartime tally was only five.

There is a curious passage on page 41, where the author is credited with a 'probable' FW190 in March 1942, his failure to destroy it being explained by his misjudgement of the range because 'we later learned that the FW190 had a much smaller wing span than the Me109.' In point of fact the span of the new Focke Wulf was about two feet greater than that of the Messerschmitt (at the time it was thought to be as much as five feet greater) so Rae's rationale would appear to be a trifle flawed; perhaps he just missed. In passing, there is a miscredited quotation on the previous page; '*C'est magnifique, mais ce n'est pas la guerre*', was not said by a French general of British troops going over the top in WW I but by a French marshal (Bosquet) observing the charge of the Light Brigade.

Does this sort of thing really matter? Well, yes (apart from the quotation), I think that it does. Recounting one's wartime experiences in the light of contemporary knowledge, certainly imbues the tale with an authentic period flavour and, so long as readers can spot the flaws, no harm is done. On the other hand, those who are less familiar with the subject matter are bound to gain a false impression and even those who (think they) know their stuff can have their confidence undermined. Under the circumstances, however, an autobiographer can probably be forgiven for perpetuating a few myths, after all, he has believed in his facts for half-a-century or more; why should he feel the need to check them now? Perhaps the answer is for such books to be given the once-over by a competent editor who can correct the more obvious howlers via footnotes or an appendix.

That having been said, Jack Rae is well aware of the significance of hindsight and of the pitfalls represented by clichés. In fact, on several occasions (eg pages 91 and 97) he deliberately teases us by launching into hackneyed descriptions of a fighter pilot's starry-eyed outlook before jerking the rug from under our feet with a more mature assessment of what they really thought. As often as not, this was not much at all. They were young men fighting a war, and that was enough; only later were their activities illuminated by poetic reflections. Clearly, Rae can tell BS from reality – and he has a sense of humour.

I confess that my heart tends to sink a little when I am confronted with the memoirs of yet another WW II fighter pilot. It is not quite true to say that if you have read one, you have read them all, but there is an inevitable sense of *déjà vu* as you read (again) of the lasting impression made by the sight of a majestic cloudscape at dawn, of impatience with red tape, of pre-take off nerves, of the way in which a sky full of whirling aeroplanes can suddenly be empty and so on. It was probably unavoidable that passages of this nature would crop up in this book and they do. That having been said, however, *Kiwi Spitfire Ace* is very good of its kind. Jack Rae had an interesting story to tell and he has told it well.

CGJ

Buck McNair DSO DFC RCAF** by Norman Franks. Grub Street;

2001. £17.99.

This book reveals the full life of a highly decorated but relatively unknown fighter pilot who continued to serve post-war with distinction. Many books have been written about such men, each of whom had their own brand of individual talent and leadership; McNair is no exception.

The author has gone to considerable lengths to learn about his subject, amplifying McNair's personal memoirs through contacts with his family and many of his wartime comrades. The story reveals a man full of energy, intolerant of higher authority but possessed of immense courage both in combat and in the later trials of his personal life.

Born in Nova Scotia, Bob McNair had his initial exposure to flying though joy-rides on floatplanes. He joined the RCAF when war broke out and, having qualified as a pilot, he sailed for England where he joined the newly formed No 411 Sqn in the summer of 1941. In between fighter sweeps over France, his natural exuberance led him into a number of scrapes with authority, including bailing out of a Magister in the mistaken belief that this would entitle him to wear a caterpillar badge. Nevertheless, his natural ability as a pilot and his aggressive approach led to his being selected to accompany his CO to Malta in early 1942.

Shortly after arriving on the besieged island McNair narrowly escaped being killed in an air raid. The resulting carnage left an impression which lasted for the rest of his life. Thrown into the savage aerial fighting he flew with distinction, gaining several victories and a DFC. The author paints a vivid picture of life on the island and the Spartan conditions that had to be endured by groundcrew and aircrew alike. McNair matured into a more serious and sympathetic leader as a result of his Malta experience, although he lost none of his aggressiveness.

Returning to England in mid-July he rejoined No 411 Sqn, now as a Flight Commander. After seeing action over Dieppe he was ordered to rest and returned to Canada. Back in England in April 1943 he was posted to No 403 Sqn and after refreshing his combat expertise he was appointed to command No 416 Sqn. His leadership in the air and his further success in air combat earned him two bars to his DFC, his

contribution as a Wing Leader also being recognised by a DSO. Unfortunately, his sight had been damaged while bailing out of a burning Spitfire and he was taken off flying just before D-Day by which time he had been credited with sixteen confirmed victories.

He subsequently remained in the Service, filling a variety of staff appointments in Canada and Europe, eventually commanding the RCAF's No 4 Fighter Wing in Germany which saw him regularly flying Sabres in 1957. After a further staff tour in Canada he returned to London, where his back began seriously to trouble him, a result of his wartime bail out, this problem being exacerbated by a crash landing in a North Star in 1953 (an incident for which he had gained the Queen's Award for Brave Conduct for his courage in rescuing fellow passengers). McNair underwent a course of radiation therapy which ultimately led to leukaemia which was diagnosed in 1966, a consequence which he accepted with typical courage. Despite his having only limited time left he accepted an appointment with the Canadian High Commission in London. Sadly, his condition worsened and he died in 1971. He was admitted to Canada's Aviation Hall of Fame in 1990.

Throughout Franks' book the style flows freely, with numerous personal reminiscences culled from many sources; the passages describing air operations, particularly those over Malta, are both energetic and atmospheric. Appendices record McNair's service history, his decorations and citations, his air combat claims and list the Spitfires he flew; there is also an index of personalities mentioned. Overall the book provides the reader with a clear picture of a man who possessed a distinctively Canadian flair, who developed fine leadership qualities and, above all, who reflected a degree of courage that earned him the respect of all who served with and under him. This remarkable man was the equal of many who have already had their stories told and it is entirely appropriate that McNair's exploits should be made available to a wider public. It is also a thoroughly good read.

Sqn Ldr David Haller

Abrupt Sierras by A J M Smyth. Available from the author at Glen House, 19 Quaperlake St, Bruton, BA10 at £17 (inc p&p)

The life of Gp Capt Tony Smyth OBE DFC reflects three passions, flying, mountaineering and travel, all of which were well-catered for during his RAF career. *Abrupt Sierras* is a part-autobiography which tells his story up to 1945.

As part of the January 1937 cohort, Smyth was one of the very first recruits into the newly established RAFVR. On the strength of his degree he subsequently applied for and was granted a Permanent Commission in the RAF and by January 1939 he was a fully-fledged pilot officer. His initial operational flying experience was as a second pilot on Wellingtons but by the spring of 1940 he was flying Blenheims with No 101 Sqn. In September he led six Blenheims out to Egypt where he spent much of 1941 with Nos 55 and 14 Sqn in various capacities, including stints as CO (not least during the helter skelter confusion of Rommel's first advance into Cyrenaica in April 1941). In December, shortly after the start of Operation CRUSADER, he took over No 11 Sqn which he commanded until June 1942, by which time it was in Ceylon. Following a stint with AHQ Bengal he moved to the Arakan in December where he remained, on and off, until mid-1944. Thereafter he set up the Aircrew Mountain Centre in Kashmir which he commanded from August 1944 until his return to the UK in April 1945.

While Smyth flew his fair share of bombing sorties, his greatest contribution to the war effort was surely the time he spent commanding No 22 Army Air Support Control (AASC aka 224 Gp Advanced HQ) in 1942-44, a period during which he was 'the father and mother of every air interest in the forward areas including such matters as Observer Posts, Radar Stations with their defence and rationing, Airfield Construction, burials and the rest,' the rest including the operation of a tasking system so responsive that Hurricanes or Vengeances could be attacking a target within half-an-hour of its being nominated. Quite a stretch for a 27-year old, even if he was wearing wing commander's rings. He took it all in his stride, however, and one of the definite pluses was that a personal Tiger Moth went with the job – or, to be precise, a succession of Tigers because, one way or another, he broke five of them.

Not being a climber, I confess that I rather skipped over the mountainy interludes, but I found the passages to do with flying and

air operations enormously entertaining. The book, which includes some hand drawn maps and some rather 'muddy' photographs, is a 394-page A5 paperback which, being privately published, almost inevitably includes a few typos, oddities and omissions which could have been sorted out by an independent proof-reader. The best of those which escaped the net is on page 252 where we are told that 'Elephants are very thick in northern Arakan'; well, you wouldn't want a thin one, would you? That having been said, there is much intentional humour in this book and some of the anecdotes really are very amusing. There is the incident in which a stark naked Smyth climbed out of a Tiger Moth to be confronted by General Slim, the story of the entirely fictitious (but rationed) 57th Light Utensil Changing Company and the court martial of an air commodore on a charge of being drunk on duty. I am quite convinced that all of these, and others, are absolutely true but if you want to know more you will have to read the book.

I suspect that the main source of reference used will have been a flying log book because there are some rather vague dates and one or two incorrect 'facts', eg it was No 258, not 261, Sqn which was licking its wounds in Ceylon following the loss of Singapore and Java in 1942. Such errors are incidental in a book of this nature, however, because *Abrupt Sierras* is a personal story, not an historical treatise. That having been said, it is precisely the sort of personal story of which RAF history is made. I do recommend that you read this one; I am sure that you will enjoy it.

CGJ

Consolidated Contents List

What follows is a reference aid ('index' would be too grandiose a term) to the papers and sundry other contributions published in Vols 1-25 of what were originally referred to as the 'Proceedings' of the Society and later became its 'Journals'. Also included are the seven volumes of Bracknell Papers (BP 1-7), four stand-alone hardbacks: *A History of Air Navigation in the RAF* (AN); *TSR2 With Hindsight* (TSR2); *Defending Northern Skies* (DNS); *Royal Air Force in Germany 1945-1993* (RAFG) plus the American-published joint enterprise *Seeing Off the Bear* (SotB). Some discretion has been exercised in presenting the titles of articles and, where appropriate, these have been adapted and/or amplified to provide a better indication of the subject matter. In the interests of simplicity, ranks and other 'handles' have been omitted. The listing is presented twice, keyed alphabetically by topic/title and then alphabetically by contributor.

We are indebted to Talbot Green whose industry and application is reflected below.

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Howard, Michael	Ethics, Deterrence and Strategic Bombing (1994 AGM address)	14	12
Howard, Michael	Sir John Slessor and the Prevention of War	19	137
Hurst, Norman	Letter ref 6 not 63 U-boats sunk in D-Day landings D1-D3	14	36
Jackson, Robert	Air Defence against the Zeppelin 1915-17	DNS	11
Jackson, Robert	Defence against the Intruders 1940-45	DNS	47
Jackson, Robert	Letter responding to Sqn Ldr Crampton	24	64
Jackson, Robert	RAF Aircraft Procurement 1950-1965: the American Involvement	SotB	91
Jackson, Robert	Strategic Air Intelligence Post-War	BP 7	111
James, Cecil	The Role of Missiles in British Concepts of Defence	SotB	25
James, T Cecil G	The Impact of the Sandys Defence Policy on the RAF (1988 AGM address)	4	9
James, T Cecil G	The Singapore Base (in the Indonesian Confrontation)	13	41
Jefford, C G	The Bomber Transport and the Baghdad Air Mail	22	17
Jefford, C G	The Epic Flights (between the Wars)	AN	34
Jefford, C G	The RAF Heraldry Trust	24	56
Jefford, C G	Vulcan Operations in the Falklands campaign	20	34
Jennings, J T	Strike/Air Defence/Recce and Maritime (operations in South Arabia)	18	51
Johns, Richard	The Future of Warfare (1998 AGM address)	19	4
Jones, R V	The Intelligence War and the Royal Air Force (RAFHS Inaugural Lecture, 1986)	1	9
Jones, R V	Photo Reconnaissance in World War II	10	6
Jones, R V	RAF Scientific Intelligence	BP 7	13
Kemball, John	Air - the Essential Element (in South Arabia)	18	47
Kendall, Douglas	The Early Days of (Photo Reconnaissance) Interpreting	10	48
Killick, Michael	Special Operations - Intelligence (by RAF in Germany/BRIXMIS)	RAFG	97
Kirtland, Michael A	Deployment of Cruise Missiles to Greenham Common	SotB	47
Knight, Michael	Kuwait 1961- Summary and Closing remarks	21	148
Knight, Michael	Lessons for Today (from the Battle of Britain)	BP 1	86
Knight, Michael	Reconnaissance (in Malayan Emergency)	21	41
Kyle, Keith	Setting the Scene (Suez Campaign)	3	10
Lamb, G C	Indonesian Confrontation - from the perspective of the Deputy Air Commander	16	48
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Lamb, G C ('Larry')	RAF Operations in Borneo (in the Indonesian Confrontation)	13	45
Landa, Ronald D	Origins of the Skybolt Controversy	SotB	117
Lee, David	An Appraisal of the (Suez) Air Campaign	3	55
Lee, David	The RAF contribution (to the Indonesian Confrontation)	13	31
Lee, David	The Unified Command in Aden	18	34
Lee, David	The View from Whitehall (Suez Campaign)	3	16
Lord Mackie	A Reflection (on the bombing campaign against Germany)	BP 4	32
Lovell, R and Campbell, H	The Unsung <i>Tung Song</i>	16	107
Lucas, P B 'Laddie'	In Memoriam Lord Balfour of Inchrye	5	59
Lucas, P B 'Laddie'	The Royal Air Force and the Battle of Malta (1991 AGM address)	9	81
Lyall, Grant Ian	Burma: the Land Campaign	BP 6	16
Lyne, M	The Merchant Ship Fighter Unit	BP 2	112
MacFadyen, Ian	Defensive (Air) Operations (in Germany)	RAFG	44
MacFadyen, Ian D	Gulf War - from the perspective of the Chief of Staff British Forces Middle East	16	56
Madelin, Ian	Command and Control of British Nuclear Forces during the Cuban Missile Crisis	SotB	223
Madelin, Ian	The Origins of the Malayan Emergency	21	6
Mallorie, Paul	A Squadron Commander's Viewpoint (Suez)	3	46
Mansell, Tony	Dowding and his Manpower	22	126
Mansell, Tony	Professionals, Amateurs and Private Armies (entry portals for RAF pilots, 1934-39)	11	55
Martin, John	The Last Year in Aden - the Royal Navy	18	104
McBride, Ian	From Lightning to F-4	DNS	108
McCallum, Donald	Ferranti and TSR2	TSR2	139
McCarthy, Donal	The Political Imperatives (in the withdrawal from Aden)	18	30
McLuskie, Ian	Search and Rescue in the RAF	25	65
Mears, Wally A	History of the TRS2 Project and the Operational Requirement	TSR2	12
Merlyn-Rees, Lord	Some Reflections (1997 AGM address)	18	6
Mitchell, John L	Air Observer Training, 1939-40	22	132
Morris, Alec	UK CandR System from WW II to ROTOR and Beyond	DNS	94
Morrison, John N L	BRIXMIS - The View from Whitehall	23	39
Murden, Michael	Experiences of a Squadron Engineer (in Southern Arabia)	21	107
Murden, Michael	The Technicians' Burden (in South Arabia)	18	62

Murray, Patrick E	An Initial Response to the Cold War	SotB	15
Neubroch, Hans	RAF Element, BRIXMIS, 1956-59: Organisation and Ops	23	20
Neubroch, Hans	RAF Element, BRIXMIS: further reflections	23	105
Neubroch, Hans	Wg Cdr Allen and Flying Training in North America 1917-18	11	43
Newton, Barry	Airmen's Cross	16	99
Newton, Barry	Airman's Cross - Postscript	18	108
Niven, David	Air Manoeuvre Development (helicopters)	25	53
O'Brien, Terence	A Personal Memoir (of the Far East War)	BP 6	63
Oborn, Paul	Hercules - Thirty-Three Years of RAF Service	22	87
Oliver, Kingsley	The Ground War in Malaya 1948-60	21	14
Oliver, Kingsley M	The RAF's Locally-Raised Forces 1922-1960	15	29
Orange, Vincent	The British Commanders (in the Battle of Britain)	BP 1	33
Orange, Vincent	A Broad Margin - The Battle of Britain North of Watford	DNS	56
Orange, Vincent	The Commanders and the Command System (in the Mediterranean)	BP 3	34
Orange, Vincent	Coningham: a Biographer's Lament and Declaration	8	25
Orange, Vincent	MRAF Lord Tedder, 1946-1949 (1999 AGM Address)	21	151
Orange, Vincent	World War II - Allied and National Command	16	12
Oulton, Wilfred	The GRAPPLE weapons trials	7	18
Oulton, Wilfred	Organisation, Structure and Tasks of Coastal Command (in WW II)	BP 2	13
Overy, Richard	An Assessment (of the bombing campaign against Germany)	BP 4	27
Overy, Richard	RAF/USAAF co-operation in the Strategic Air Offensive	9	35
Owen-King, Joe	The Working-Up Trip	20	105
Oxlee, Geoffrey and David	Airborne Sensors and Technical Developments in Imagery Analysis	23	77
Packman, David	Deployed Operations in the Cold War	19	84
Page, David	The Early Years (of Air Navigation)	AN	6
Page, Frederick	A Project Overview (of TSR2)	TSR2	70
Paget, Julian	The Radfan Campaigns and internal security in Aden	18	39
Palin, Roger	The Principles of Air Defence (on Germany)	RAFG	34
Paris, Michael	Flying Training in the RFC 1912-1915. A failure to prepare?	11	29
Parkhouse, Rupert	Taking the (Fairey) Battle into Battle	20	16
Parry, George	The Wartime (Photo Reconnaissance) Cameras	10	42

Paton, D and Oliver D	Airborne Electronic Reconnaissance, 1948 to 1989 (No 51 Sqn)	23	58
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Phipps, L W	The De Havilland Venom with No 8 Sqn in the Middle East	24	36
Pitchfork, Graham	Low Level Operational Training - the Impact of Red Flag	20	62
Pitchfork, Graham	Reconnaissance (Operations by RAF Germany)	RAFG	90
Pocock, Donald A	The RAF Regiment: the Formative Years to 1946	15	13
Porteous, Tom	Support Helicopter Ops in Northern Ireland, Sep 71-Dec 73	25	47
Postgate, Malcolm	Operation FIREDOG: Air Support in the Malayan Emergency	SotB	181
Price, Alfred	Development of Equipment and Techniques (in Battle of Atlantic)	BP 2	48
Price, John	Helicopter Support (in the Indonesian Confrontation)	13	59
Price, John	With the RAAF in Korea	21	69
Price, John L	Test Flying and RAF Helicopter Operations, 1954-79	25	19
Prickett, Thomas	Command of the (Suez) Operation	3	43
Prickett, Thomas	In Memoriam Air Chf Mshl Sir Denis Smallwood	18	111
Probert, Henry	Air Transport and Supply in the Burma War	22	42
Probert, Henry	MRAF Sir John Slessor (a short biography)	19	154
Probert, Henry	The Royal Air Force and the Korean War	21	64
Probert, Henry	Setting the Scene (the Far East War 1941-1945)	BP 6	3
Probert, Henry	The Start of the (Malayan) Emergency	21	9
Probert, Henry A	RAF Historical Research	7	62
Probert, Henry A	RAF/USAAF Higher Command Structure and Relationships	9	16
Probert, Henry A	Suez Campaign seminar - Conclusion of	3	64
Probert, Henry A	The Work of the Air Historical Branch (1987 AGM address I)	2	42
Putney, Diane	USAAF Intelligence and the European War	BP 7	20
Quinlan, Michael	The Royal Air Force in Transition 1962-1965 (2000 AGM address)	24	5
Rainsford, Freddie	Berlin Airlift - the view from the Air Ministry	6	55
Ray, John	Letter responding to Jack Dixon's criticism of John Ray's book	20	117
Richards, Denis	The Writing of Air Force History (1995 AGM address)	15	76
Richards, Dennis and Probert, Henry	Portal, Harris and the Bomber Offensive (1989 AGM address)	6	10
Richardson, Tony	The Killing of Admiral Isoroku Yamamoto	17	48

Ritchie, Sebastian	The Decline of Mobility since 1945	19	72
Rivett, L S	Lawrence of Arabia: Ross and Shaw of the RAF	17	36
Rivett, L S	Tom Warner, Chaplain and WOP/AG	17	65
Roberts, Frank	Berlin Airlift - political background	6	38
Robinson, Michael	Beaufighter/Brigand (operations in Malayan Emergency)	21	21
Robinson, Michael	Training the Bomber Force for WW II	20	8
Rodgers, Philip	Photographic Reconnaissance Operations	23	68
Rogers, Maurice	Air Transport Ops - Valettas (in Malayan Emergency)	21	42
Rogers, Maurice	The Far East Transport Wing in the 1950s	22	104
Rohwer, Jurgen	A German Perspective (on the Battle of the Atlantic)	BP 2	55
Rosier, Frederick	How the Joint (RAF/Army) System Worked (1) (Mediterranean War 1940-43)	BP 3	26
Rosier, Frederick	In Memoriam Air Chf Mshl Sir Edmund Hudleston	15	91
Rowlands, John	The Development of the (British) Atomic Bomb	7	13
Saxon, Philip	Air Navigation in the Second World War	AN	52
Saxon, Philip	Letter commenting on Terraine's 'WW 1 and the RAF'	12	25
Schroeder, Jerome E	EL DORADO CANYON: The Political and Public Affairs Aftermath	SotB	227
Shaw, John	The Influence of Space Power on History (1944-1998)	24	21
Simmons, Anthony T F	TSR2 - A Worm's Eye View of Events	TSR2	104
Simmons, Michael	Letter ref Canberras in Indonesian Confrontation	14	36
Simons, C A E	Helicopter Operations (in South Arabia)	18	56
Smallwood, Denis	Co-operation at the Top (USAF/RAF)	SotB	39
Smallwood, Dennis	The Planners' Perspective (of the Suez Campaign)	3	24
Smith, E D	The Borneo Rebellion and Indonesian Military Confrontation	13	21
Sowrey, Frederick	Planning and Implementing the Withdrawal (from Aden)	18	77
Spotswood, Denis	In Memoriam MRAF Sir Dermot Boyle	12	40
Spridgeon, Edgar L	Overseas Flying Training in World War Two	11	63
Springett, Robin	Logistics in the Post Cold War Era	19	105
Squire, P T	A Squadron Commander's Viewpoint (Falklands)	16	69
Stanbridge, Brian	Berlin Airlift - the experience of a Hastings pilot	6	60
Stephens, Tony	<i>Ferio Ferendo</i> - The Arrival of Transport Command	22	29
Stephenson, Alfred	The Central (Photographic) Interpretation Unit	10	52

Sternfeld, Albert	Letter ref reunion of former 'Palestinian' Volunteers in RAF	17	63
Stewart, C M 'Greg'	Avionic Systems for TSR2	TSR2	130
Strawson, John	The Shape and Course of the Mediterranean War 1940-43	BP 3	14
Strickland, Philip	Politics over Strategy - Australia's Rejection of TSR2	TSR2	43
Suit, William W	Transfer of B-29s to the RAF under MDAP	SotB	101
Tanner, John	The Royal Air Force Museum (1987 AGM address II)	2	47
Taylor, John	CFS and Flying Training 1915-1935	11	35
Taylor, William J	Historical Background (to the RAF in Germany)	RAFG	10
<i>Tee Emm</i> , June 1941	'Without Comment' - observations on Flight Safety	24	92
Terraine, John	The Battle of France	BP 1	11
Terraine, John	Land/Air Co-operation (in the Mediterranean War 1940-43)	BP 3	3
Terraine, John	Land/Air Operations in the Mediterranean and NW Europe	9	55
Terraine, John	OVERLORD - the Broad Context	BP 5	4
Terraine, John	Setting the Scene (Battle of the Atlantic)	BP 2	5
Terraine, John	World War I and the Royal Air Force (1993 AGM address)	12	10
Terraine, John	World War II - The Balance Sheet	2	10
Thomas, Edward	The Achievements of Air Intelligence	BP 7	59
Thomas, Edward	Intelligence (in the Battle of the Atlantic)	BP 2	38
Thomas, Edward	The Intelligence Aspect (in the Battle of Britain)	BP 1	42
Torpy, G L	A Squadron Commander's Viewpoint (Gulf War)	16	76
Towle, Philip	Political Overview to the Indonesian Confrontation	13	15
Towle, Philip	The RAF and Air Control between the Wars (1990 AGM address)	8	7
Trigg, Noel	Helicopter Vibration Engineering in the RAF 1963-92	25	97
Tusa, John	Berlin Airlift - introductory remarks	6	35
Tusa, John	Berlin Airlift - summary	6	89
Twigge, Stephen	Anglo-American Air Force Collaboration and the Cuban Missile Crisis: a British Perspective	209	SotB
Tyack, Bill	Air Navigation in the Present and the Future	AN	106
Verity, Hugh	Flying into France for Clandestine Operations	5	25
Walpole, Nigel	Battle Management in Operational Training	20	55
Ward, Alex	The Army's Part in Operation VANTAGE	21	128

Weaver, John	The Work of the (Photo) Intelligence Officer	10	59
Welzenbach, Donald E	Anglo-American Origins of Overflying the Soviet Union	SotB	191
Wheeler, Neil	Early Photo Reconnaissance Operations	10	7
White, Malcolm	Offensive Attack Operations (by RAF Germany)	RAFG	83
Widdowson, Martin	Tornado F3 and Beyond	DNS	133
Wilkinson, Philip	Offensive Strike Operations (by RAF Germany)	RAFG	68
Wills, Marcus	VIP (Transport) Operations	22	77
Wilson, Andrew	An Operations Overview (for RAF Germany)	RAFG	63
Wilson, Eunice	Letter ref Criticisms of WW2 aircrew, citing ORBs	12	37
Wilson, George	If it ain't broke, don't fix it. Don't even look at it!	23	115
Wilson, George B	A System Study of TSR2	TSR2	16
Wilson, Peter	Later Support Helicopter Operations	25	41
Witherow, Marcus S	The RAF Regiment 1967 to the present	15	49
Witts, Jeremy	Training and Tactics for the Tornado GR1 in the Gulf War	20	72
Wood, Derek	Air Defence in the North - The Air Defence System	DNS	19
Wood, Derek	The Dowding System (in the Battle of Britain)	BP 1	3
Wood, Paul	Berlin Airlift - the operational achievement - statistics	6	43
Wragg, John D	The Engine for TSR2	TSR2	111
Wrigley, Steven A	BRIXMIS - Op Planning and Touring in the 1970s and 1980s	23	28
Wylie, M	Pilot Training 1945-92	11	95
Wynn, Humphrey	Deterrence: the Bomber Contribution (Indonesian Confrontation)	13	69
Wynn, Humphrey	Dickie Richardson's Contribution to RAF Navigation	AN	140
Wynn, Humphrey	Historical Background to the British Nuclear Deterrent	7	8
Wynn, Humphrey	Logistics of Support for the WW II Land-Air Campaign	19	57
Wynn, Humphrey	The RAF in the Mediterranean Theatre	BP 3	21

Consolidated List of Books Reviewed

The following is a list of all books that have been reviewed in Proceedings/Journals 1-25. The list is presented twice, keyed alphabetically by title and then alphabetically by author.

Title	Publisher	Author	Vol	Page
194 Squadron ; the 'Friendly Firm'	Merlin Books	Douglas, Williams	3	66
Action Stations Overseas	Patrick Stephens	Fairbairn, Tony	9	100
Aerial Refuelling at Farnborough	Air Britain	Gardner, Brian	22	138
Air Battle Dunkirk	Grub Street	Franks, Norman	24	67
Air Battle for Malta, The	Airlife	Douglas-Hamilton, James	22	137
Air Battle of the Ruhr	Airlife	Cooper, Alan	25	115
Air Force Memorials of Lincolnshire, The	Beckside Design	Ingham, M J	8	47
Air Power - a Centennial Appraisal	Brassey's	Mason, Tony	14	31
Air Power and Colonial Control	Manchester Univ.	Omissi, David E	10	83
Air VCs - VCs of the First World War, The	Sutton Publishing	Cooksley, Peter G	18	114
Air War over Italy	Ian Allen	Brookes, Andrew	22	137
Aircraft of the Spanish Civil War	Putnam	Howson, George	10	87
And We Thought the War was Over	Thomas Harmsworth	Lee, David	12	35
Angel Visits: from Biplane to Jets	Thomas Harmsworth	Griffiths, Frank	6	97
Angel Visits: from Biplane to Jets	Thomas Harmsworth	Griffiths, Frank	12	35
Arctic Airmen	William Kimber	Schofield and Conyers-Nesbitt	5	51
Avro Aircraft since 1908	Putnam	Jackson, A J	10	86
Avro Manchester.	Midland Publishing	Kirby, Robert	17	53
Bader's Duxford Fighters	Ramrod Pubs	Sarkar, Dilip	18	118
Bamboo Workshop, The	Merlin Books	Sansome, R S	17	56
Barbed Wire and Footlights	Merlin Books	Taylor, Frank	5	58
Bases of Air Strategy	Airlife	Higham, Robin	20	111
Battle of Britain - a Jubilee History	Hodder and Stoughton	Hough, R and Richards, D	7	72
Battle of Britain - new perspectives, The	Arms and Armour Press	Ray, John	17	51

Battle of Britain Day - 15th September 1940	Greenhill	Price, Alfred	23	142
Battle of Britain, The	Sutton Publishing	Conyers-Nesbitt, Roy	23	141
Battle-Axe Blenheims	Alan Sutton	Scott, Stuart R	17	50
Berlin Airlift	Airlife	Pearcy, Arthur	20	109
Berlin Raids - Winter 1943-44, The	Viking	Middlebrook, Martin	5	57
Beyond the Front Line	Harper Collins	Geraghty, Tony	17	56
Biggles: the life story of Capt W E Johns	Veloce Publishing	Ellis, P B and Schofield, J	12	34
Blitz on Britain, 1939-45	Sutton Publishing	Price, Alfred	23	143
Bomber Command - Reaping the Whirlwind	Harper Collins	Overy, Richard	18	125
Bomber Command War Diaries	Penguin	Middlebrook, M and Everitt, C	8	46
Bomber Squadrons at War - Nos 57 and 630 Sqns	Sutton Publishing	Copeman, Geoff D	18	128
Bombers - from the First World War to Kosovo	Sutton Publishing	Wragg, David	21	175
Brian Trubshaw - Test Pilot	Sutton Publishing	BT with Sally Edmundson	20	113
British Airfield Buildings of the Second World War	Midland Publishing	Buchan, Graham	15	99
British piston aero-engines and their aircraft	Airlife	Lumsden, Alec	14	32
British Secret Projects - Jet Fighters	Midland Publishing	Buttler ,Tony	24	82
Burma 1942 - The Japanese Invasion	Zampi Press	Lyall-Grant, I and Tamayana, K	21	169
Burma Campaign Memorial Library, The	SOAS	London, Univ. authors	21	170
Business in Great Waters; U-boats	Leo Cooper	Terraine, John	7	74
Call to Arms; History of Military Communications	Focus	Bridge, M and Pegg, J (eds.)	25	118
Christmas Island Cracker	Thomas Harmsworth	Oulton,Wilfred	3	67
Colours of the Day, The	Country Books	Chapman, Patricia A	21	172
Combat Aircraft since 1945	Airlife	Wilson, Stewart	24	81
Combat and Competition	Newton Publishers	Ince, David	12	33
Courage and Air Warfare	Frank Cass	Wells, Mark K	16	126
Cross Country	Hothersall and Travers	Travers, E	8	47
Crucible of War 1939-1945, The	University of Toronto Press	Greenhous, Brereton	16	128
Darkness shall cover me	Airlife	Humphrey, Wynn	7	76
Day of the Typhoon (new edn), The	Airlife	Golley, John	24	90
Day We Bombed Switzerland, The	Airlife	Granholm, Jackson W	23	138
Dennis 'Hurricane' David - my autobiography	Grub Street	David, Dennis	24	87

Desert Eagles	Airlife	Wynn, Humphrey	25	130
Despatch on War Operations	Frank Cass	Harris, Arthur	16	126
DFC and How It Was Won, The	Savannah Publications	Carter, Nick and Carol	20	110
DFC Register for WW2	Savannah Pubs	Tavender, Ian	25	118
Douglas Bader - a Biography	Airlife	Turner, John Frayn	25	121
Each Tenacious	Square One	Edgerley, A G	12	35
England and the Aeroplane	MacMillan	Egerton, David	10	80
Even the Birds Were Walking	Tempus	Kington, John and Rackliff, Peter	24	75
Eyes of the RAF: a history of photo reconnaissance	Alan Sutton	Conyers-Nesbitt, Roy	17	54
Faster Than The Sun	Grub Street	Twiss, Peter	23	135
Fighter Command Losses of WW II – Vol 2	Midland Publishing	Franks, Norman L R	20	116
Fighter Command Losses of WW II – Vol 3	Midland Publishing	Franks, Norman L R	23	140
First Air War, The	Maxwell Macmillan	Kennett, Lee	9	99
Flight of Rudolf Hess – Myths and Reality, The	Sutton Publishing	Conyers-Nesbitt, Roy and Van Acker, Georges	24	86
Fly for their Lives	Airlife	Chartres, John	5	55
Flyer's Tale	Merlin Books	Hall, William A	7	77
Flying Camels: History of No 45 Sqn, The	Author	Jefford, C G	16	122
Flying Start	Penguin	Dundas, Hugh	8	46
Flying Start: a fighter pilot's war years	Stanley Paul	Dundas, Hugh	6	95
Flying to the Limit	Patrick Stephens	Beamont, Roland	18	129
Forgotten Air Force, The	Brassey's	Probert, H A	15	99
Forgotten Offensive: Coastal Command, A	Frank Cass	Goulter, Christina	15	95
Free to Fight Again - RAF Escapes	Airlife	Cooper, Alan W	18	114
From a Cat's Whisker Beginning	Merlin Books	Cordingley, Norman	6	98
From Needles Sewing to Irons Soldering	Merlin Books	Bridson, Amy	7	76
Global Warrior	Private	Charpentier <i>et al</i>	24	79
Good Aggressive Fighter Pilot, A	Author	Simpson, Geoff	22	140
Great Government Aerodrome, The	Narborough ARG	Narborough Airfield Research Group	25	125
Green Eagles of Calshot, The	W J Ray, Walsall	Shipley, Edwin	12	33

Hardest Victory, The	Hodder and Stoughton	Richards, Denis	14	34
Hawker Aircraft since 1920	Putnam	Mason, Francis K	10	86
High Cold War	Patrick Stephens	Robert, Jackson	20	112
High Commanders of the RAF	HMSO	Probert, Henry	10	79
History of 73 Squadron - Pt 1	Tutor Publications	Minterne, Don	14	32
History of 73 Squadron - Pt 3	Tutor Publications	Minterne, Don	25	112
History of RAF Halton - No 1 SoTT	Buckland Publications	Tunbridge, Paul	16	125
History of US Electronic Warfare Vol 3, The	American Association of Old Crows	Price, Alfred	24	88
Hornchurch Scramble, Vol 1	Grub Street	Smith, Richard C	23	143
Hunters of the Third Reich	Tempus	Williams, David	25	112
Hurricanes over Murmansk	Airlife	Golley, John	25	131
Impact of Air Power on the British People and their Government, 1909-14	MacMillan	Gollin, Alfred	7	70
In Peace and War	Author	Rowell, E R	17	50
In the Midst of Things	Hodder and Stoughton	Cameron, Neil	1	35
Into Battle with 57 Squadron	Author	Hammersley, Roland A	13	81
Japanese Aircraft 1910-1941	Putnam	Mikesh, Robert and Abe, Shorzoe	10	87
Jiri. The Story of Spitfire R7218	Country Books	Hall, Vic	23	145
Junkers 87 <i>Stuka</i> , The	Airlife	Griehl, Manfred	25	124
Life and Times of Pilot Officer Prune, The	HMSO	Hamilton, Tim	9	101
Living with Japanese	Kellan Press	Kelly, Terence	18	121
Man is not Lost - the log of a Pioneer	Airlife	Richardson, 'Dickie'	18	123
Mandalay and Beyond	Merlin Books	Charlton, Morton	17	53
Masirah. Tales from a Desert Island	Pentland Press	Richardson, Colin	25	119
Memoirs of an Accidental Airman	Thomas Harmsworth	Rainsford, Fred	12	36
Men behind the Medals	Leo Cooper	Pitchfork, Graham	18	127
Merlin Power - the Grawl Behind Air Power in WW II	Airlife	Bingham, Victor	20	109
Mirrors by the Sea	Author	Scarth, Richard N	15	98
Montrose Airfield from 1913	Montrose Museum Trust	Anon	24	77
Mosquito - the Illustrated History	Sutton Publishing	Birtles, Philip J	21	174

Mosquito Thunder - 105 Squadron	Sutton Publishing	Scott, Stuart R	21	174
Most Secret Squadron: Story of 619 Sqn, A	Skitten Books	Curtis, Des	16	123
My Part of the Sky	Patrick Stephens	Beamont, Roland	6	95
My War (as a WOp/AG in Coastal Command)	Merlin Books	Padbury, Andy	9	101
Names with Wings	Airlife	Wansborough-White, Gordon	17	62
Naval Fighter Pilot: Lt-Cdr R J Cork	Heron Books	Wren, A H	23	136
Night Fighter Ace	Sutton Publishing	Spooner, Tony	18	129
No Hero, Just a Survivor	Robert Willis Assocs	Willis, G R T	24	74
Noble Endeavours - 3 Generations	Author	Noble, Bernard	21	170
Number One in War and Peace	Grub Street	Franks, N and O'Connor, M	24	71
Ocean Bridge: History of Ferry Command	Midland Publishing	Christie, Carl A and Hatch, Fred	16	121
Of Wind and Water: a Kiwi in Coastal Command	Airlife	Sanders, James	8	44
Off to War with '054	Merlin Books	Kemp, John	9	102
Only Birds and Fools	Airlife	Ashton, J Norman	22	139
Our Tribute to Air Chf Mshl Sir 'Gus' Walker	Yorks Air Museum	Sawden, Dennis	18	128
P-47 Thunderbolt	Tempus	Shacklady, Edward	24	76
Park; The biography of Air Chf Mshl Sir Keith	Grub Street	Orange, Vincent	25	127
Parnall Aircraft since 1914	Putnam	Wixey, Kenneth E	8	47
Pilot Diplomat and Garage Rat	Merlin Books	Pearson, Toby	7	77
Pilot's Summer	Tiger and Tyger	Tredrey, Frank D	23	137
Planning in Wartime	MacMillan	Cairncross, Alec	10	80
Poles in Defence of Britain	Grub Street	Gretzyngier, Robert	25	132
Polish Air Force in Lincolnshire, The	Beckside Design	Ingham, M J	6	98
Pursuit through Darkened Skies	Airlife	Allen, Michael	21	173
Radar Days	Adam Hilger	Bowen, E G	2	65
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