# Logistics & Air Power – A Failure in Doctrine?

By Group Captain Peter Dye

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Readers of this Journal will be aware from Gp Capt Stuart Peach's article in Volume 1 that AP 3000, Air Power Doctrine, is currently being updated. Having looked at how other air forces communicate their doctrine and reflected on the content and approach embodied in the present edition (1993) of AP 3000, I have to conclude that the second edition suffers from serious deficiencies. The most obvious omission is the complete absence of any discussion about the intimate relationship that exists between air power and logistics. This is all the more remarkable given that the bulk of the RAF's resources, including most Service manpower, is employed in the various activities that together comprise operational logistics. I would suggest air power and logistics are so closely entwined that to define one without reference to the other weakens the validity of our current doctrine and inevitably compromises war fighting capabilities.

To an external observer it must seem axiomatic that the delivery of air power is entirely dependent on adequate logistic and infrastructure arrangements, derived from and, in turn, sustained by the nation's technological and industrial base. In this regard, the individual weapons platform (and its crew) embodies the collective investment of both industry and the Services over a considerable period of time. As and when the first Eurofighter engages in combat, it will do so on the back of not only the single most expensive UK military procurement programme in history but also a comprehensive support and training programme, across the aircraft's entire operational life, that represents an equally large national investment. [1] The scale of this undertaking, and the evident difficulty in divorcing the air weapon from such complex support arrangements, is as much a defining characteristic of air power as is the familiar mantra of *'height, speed, reach, ubiquity, flexibility, responsiveness and concentration'*.

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This all-embracing view of what comprises air power is by no means novel. Many years ago, Sir John Slessor wrote that air power *"...is a compound of air forces and all those things on which air forces directly or indirectly depend, such as a flourishing industry and Civil Aviation, a good meteorological service, secure fuel supplies and so on."* [2] AP 3000, in exploring the same question, consciously rejects the wider perspective in favour of what it terms *"a purely military concept"* of air power.[3] When one reads on, it becomes clear that this is not so much a more cautious appreciation as a narrow definition that focuses almost exclusively on the nature of air vehicles. This seems a debatable strategy, even given the seminal role of the manned aircraft in the creation of the RAF. It is the equivalent of the Army describing its doctrine in terms of the tank, or the Navy the surface ship.

The blurring of the distinction between aircraft and air power permeates the remainder of the second edition of AP 3000, but is particularly noticeable in the debate about air power's relative strengths and weaknesses. I have to say that, while I feel the supporting analysis is flawed, my over-riding concern is the relevance of this line of argument in the first place (other air forces seem quite able to express their doctrine without resorting to a pecking order of characteristics). It seems to me that a qualitative approach is alien to the central purpose of establishing a coherent picture of air power – a view, I hasten to add, that is not driven by the inclusion of logistic-related issues as air power weaknesses!

AP 3000 explains that the characteristics of air power can be divided into primary strengths *(height, reach* and *speed*), secondary strengths (*flexibility, ubiquity, responsiveness* and *concentration*) limitations *(impermanence, payload* and *fragility*) and other considerations (such as *cost* and *dependence on bases*). According to Sir John Slessor, the simplest definition of air power is

*"...the use of the air to enforce the national will"*. Even if we substitute AP 3000's more pedantic description *"...the ability to use platforms operating in or passing through the air for military purposes"*, it is difficult to understand how height, reach and speed are contributory characteristics. They are, in fact, terms that help describe the lack of friction potentially available when operating in the air compared to the sea or the land. In themselves, they do not and cannot define air power and, equally, should not be thought of as strengths or indeed weaknesses. *Fragility* and *inpermanence* may be regarded as the other side of the coin, in that there is a reciprocal relationship between friction and fragility. To exploit the air, we need to develop and support, often at great distances, a level of technology significantly greater than that needed to operate at sea or on the land in an environment that is intrinsically more hostile. Crudely put, reduced friction has been gained at the price of greater fragility. In fact, this is a truism across the entire operating spectrum of land, sea, air and, indeed, space.

The secondary strengths of *flexibility, ubiquity, responsiveness* and *concentration*, are in reality enablers – good practice for air forces in the delivery of air power. This was certainly how Sir John Slessor saw them, sensibly adding *mobility* for good measure.[4] As far as the 'limitations' are concerned, and putting *fragility* to one side, it is possible to argue that *impermanence* is as much a strength as a weakness – if we seek discrete and proportionate military action. This is why air power is used so often, as the weapon of choice, by the UN and NATO to achieve their policing and coercive aims. As to 'other considerations', the limitations represented by *cost* or *dependency on bases* seems to me to be about as relevant to the debate as recording the tank's vulnerability to attack helicopters in a discussion on the nature of land doctrine or stressing the high cost of nuclear submarines when examining maritime power.


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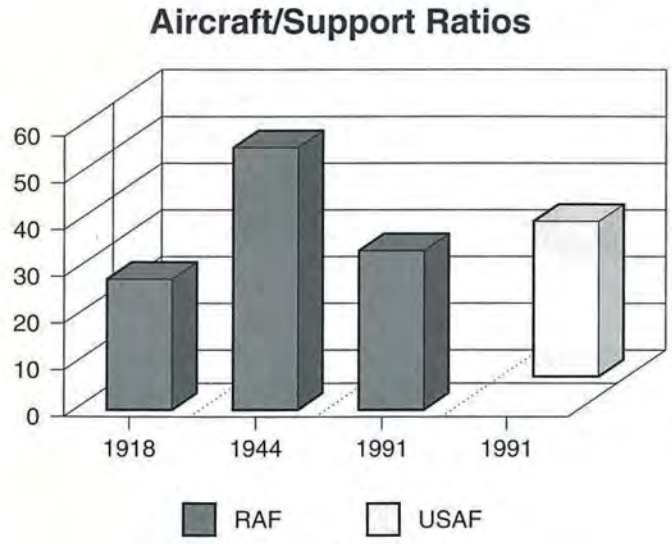
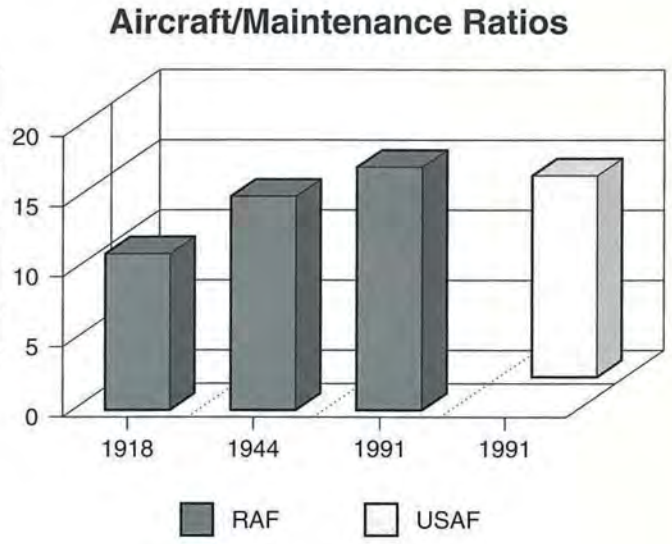
In sum, AP 3000 second edition takes an extremely narrow but confused approach to the question of what is air power, such that, at times, the argument can appear defensive and self-serving. In the process, the opportunity is lost to focus on the 'enablers' that permit air forces to deliver air power. The result is a distorted emphasis on the weapon rather than the environment and little attention to the wider constituent components, particularly logistics. Why this has come about is not particularly important, although I sense that it derives partly from a belief that the manned-aircraft is in itself the embodiment of air power (rather than the final link in a complex chain of processes) and partly from an historic aversion to any suggestion that the support area has a war fighting role. What is important, however, is that we have inflicted on ourselves a definition of air power that is largely divorced from reality.

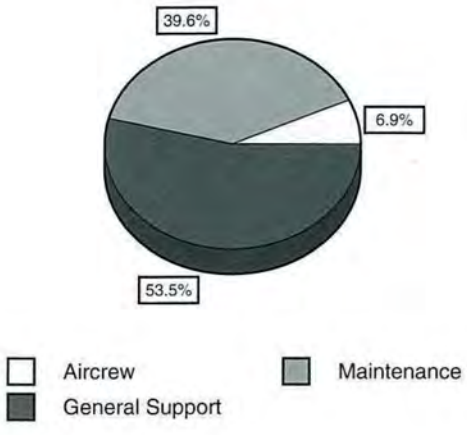
So what is reality? Well, the truth is that air forces, by their very nature, consume vast resources. It was Britain's wealth, industrial capacity and technological development that enabled air power to be exercised so effectively on the First World War battlefields. Without a ready supply of aircraft and trained aircrew, and the infrastructure to support both, the RAF would have been stillborn. A vast and complex organisation was created at home and overseas to allow the air war to be prosecuted – in effect linking industry to the front line. This was not a simple one-way pipeline, but a series of complex interrelated processes encompassing repair, overhaul, modification, testing, development and training, that saw materiel and manpower move continuously between the home base and the front line in response to technological advances and operational circumstances.

This picture – of immense national collective effort harnessed for the purpose of delivering air power – is as true today as it was in 1918. If one looks simply at the human resources required to support aircraft in the field over the last 80 years, a familiar pattern emerges. The RAF deployed 54,000 personnel to France in 1918 and more than 87,000 to support 2 TAF in France and Belgium in 1944. In the attached graphs, I have indicated how these operations in terms of supporting manpower compared with the Gulf in 1991 for both the RAF and the USAF.

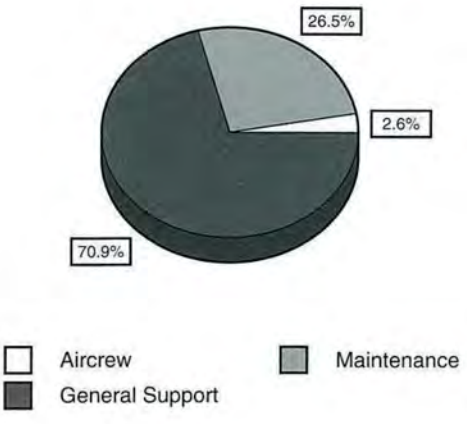


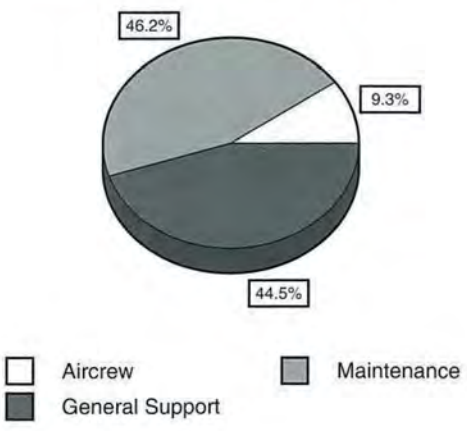
## RAF - FRANCE 1918



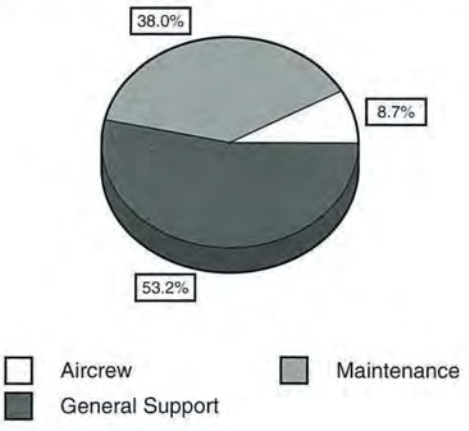

## RAF - FRANCE 1944




## RAF - GULF 1991




## USAF - GULF 1991




Interestingly, the number of direct maintenance personnel appears to have remained much the same, at about 10-20 per airframe. The higher support total in 1944 reflects the large number of personnel involved in airfield construction and the demands of a highly mobile campaign. Even allowing for errors of interpretation and the differing scale of individual campaigns, it is clear that air power is, and always has been, a maintenance intensive business.

This is equally true of supply. The RAF was not only the world's largest air force in 1918, it also possessed the largest range of stores ever managed by a single organisation. The total number of different items held in stock was in the region of 100,000. Simply organising the purchase and handling of this stock, in the vast quantities required to support the front line, was an achievement

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in itself.[5] In the intervening years, the challenge has become even greater as aircraft have inexorably grown in complexity. By 1945, the RAF was struggling with more than 400,000 separate line items, and at the time of the Gulf War, it was probably well over one million. Provisioning and storing this immense range of spares would be difficult enough without a high rate of modification action (even before the Tornado entered squadron service over 5,000 modifications had been approved and the total is now probably closer to 15,000), and the overriding concern for air worthiness. In short, it is a task very different in scale and intensity to the management of the 25,000 different food items found in the average supermarket, [6] and, incidentally, the 410,000 separate items held by Boeing to support the world's largest commercial aircraft fleet.[7]

Evidence in support of my interpretation of what constitutes air power can be found by turning the question round and looking at what comprises an air force's centres of gravity. Colonel John Warden, writing in 1988, argued that an air force's vulnerability lies in the equipment chain, from manufacture to employment and other similarly interdependent systems such as fuel, or pilot training. He noted that logistics (in this context, supply) could well constitute the real centre of gravity, but also added that other targets (or enablers), such as airfields, personnel and command and control, might be suitable for attacks aimed at destroying an enemy's air power.[8] This echoes Sir Basil Liddell Hart's assessment in 1934, when he noted that the large ground organisation of a modern air force was its Achilles' heel.[9] Interestingly, this was written before re-armament saw RAF expenditure reach some 35-36% of total defence spending (much of it on infrastructure) and an expansion programme that demanded the lion's share of the available manpower. By 1942, 750,000 personnel were allocated to the RAF and the Ministry of Aircraft Production – as great as the Navy, the ship-building industry, the Army and the Ministry of Supply put together.[10]

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I hope there is no need to labour the point further. A central characteristic of air power – a thread that has run through the RAF's entire existence – is the provision of a sophisticated and comprehensive logistic system. This is not to suggest that repair and overhaul is somehow more important than any other activity undertaken by air forces. The fundamental point is that we should see air power as the sum of a series of complex processes stretching over time and across organisations, including flying training stations, repair depots and industry. In its current form, AP 3000 second edition fails to provide this understanding and, in so doing present a flawed picture of air power.

Why should this be a cause for concern? Well, I think it matters for several reasons. First, by focussing on the weapons system we deny ourselves a balanced view of what comprises air power. When difficult resourcing decisions have to be made, we are inclined temperamentally to favour platform numbers at the expense of enablers such as combat support, training and logistics. In failing to recognise those as proper constituents of air power, we are not well placed to exploit the continuity of experience that provides valuable lessons for present and future support requirements. By appearing to argue that fixed bases and complex logistic support arrangements weaken air power, we not only confuse ourselves but also create the impression that the logistic 'tail' is something to be embarrassed about. We have fostered the idea, at least in the minds of external observers, that logistics and air power are separate entities, somehow enmeshed by inefficiency and outdated ways of doing business. As a result, I sense that there has been a wider willingness to embrace efficiencies in the support area in the belief that the risk is self-contained. That this is not the case, has been amply demonstrated over recent years as the hollowing out of logistics has rapidly bitten in the form of falling front line availability. The effective delivery of air power is self-evidently not about 'teeth' or 'tail'; rather it depends upon how we manage the continuum that links the industrial base with the front line.

There is a further danger, arising from this doctrinal confusion, in the softening of the distinction between operational and business logistics. [11] If the former can be separated from what comprises air power then it is a relatively easy step to conclude that the commercial world provides a template for how we should organise our support arrangements. This has particular implications for our ability

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to maintain the capacity for surge. Once resilience is perceived purely in terms of the overhead involved (because logistic processes are not an integral part of how we deliver air power), it will inevitably fall victim to the pressure to cut costs.

Not surprisingly, business has little experience of reverse logistics (the flow of material back to depots for repair, modification and re-issue) and even less of attrition. All the evidence to date indicates that the ability to cope with surge is equally questionable, witness the well-publicised problems confronting Boeing. Having adopted a streamlined production process, optimised on the principle of 'just in time', the company discovered that it faced immense difficulties in attempting to double its commercial production rate to meet an unplanned and sudden increase in demand. [12] It was only by halting the production line, and incidentally recording its first loss in 50 years, that the situation was recovered. Not all the contributory problems were production related, but material and parts shortages played a significant part in exacerbating the situation. As one senior executive put it *"...we did not have the resiliency to absorb a series of things that happened to us, none of which was individually big"*. A similar, but less well known, incident occurred earlier this year when a 29,000 ton forging press producing aero engine components in Houston broke down. This single failure threatened to disrupt not only engine production at three separate manufacturers but also final assembly at Boeing and Airbus. Off loading work to competing companies was complicated because of dies and proprietary processes. Self-evidently, optimisation of the supply chain not only reduces the ability to respond to short notice requirements but also creates a greater vulnerability to 'shock'. It is these very dangers that a military logistic system should be designed to counter.

Turning for a moment to a specific issue, I think it is fair to say that the present ambivalence regarding the place of logistics in delivering air power has made the argument for the retention of 3rd Line (depot-level) maintenance facilities more complicated than it should have been. Without a clear commitment in our doctrine to the principle of managing the logistic chain as an entity – from industry, through the depots and on to the frontline – we risk seeing what should be a holistic process reduced to a collection of sub-optimised and ill focused activities. Aside from the obvious damage that this would inflict on an organisation built around the efficacy of its logistic system, such an outcome would also deny the opportunity to develop the many synergies that exist across the support chain. All the evidence indicates that there is considerable scope for innovative partnership arrangements between air forces and industry – 'Smart Support' for want of a better phrase [13] – once we have clarified the role of our in-house facilities and the wider place of logistics in air power doctrine.

If technology lies at the heart of war then the support chain lies at the heart of an air force. The processes and inter-dependencies that comprise this continuum can only be managed effectively in a holistic manner; indeed, the Integrated Logistics Support concept, pioneered by the USAF and RAF, is based on this very principle. However, we need to move beyond optimising logistic support to developing a strategy that embraces the entire process, from industry to the flying squadrons, seeking to develop synergies and reduce vulnerabilities. To do this successfully will require the development of appropriate mechanisms and suitable metrics. The latter focussing on not only readiness and availability but also sustainability and resilience. Finally, we must examine how our air power doctrine relates to the other Service and environmental doctrines and, in the case of logistics, with the integrated approach implicit in the decision to form the CDL organisation.

None of this is to argue that the RAF's logistic system can avoid change or that there is no scope for improvement. Business practices do have a place in the defence environment. We cannot escape the budgetary pressures that demand more effective ways of supporting the front line. On the other hand, unless we have a proper understanding of how our collective efforts contribute to "*the use of the air to enforce national will*", we run the risk of weakening this very ability in the name of greater efficiency. The revision of AP 3000 provides a timely opportunity to examine these issues. Our aim should be to create a robust and coherent air power doctrine that transcends both aircraft and air forces.

## NOTES

1 The British share of Eurofighter development and production costs is reportedly in excess of £15 billion. However, the life cycle costs will certainly match, if not exceed this sum. *Daily Telegraph*, 5 Sep 98.

2 Air Chief Marshal Sir John Slessor, *The Past Development of Air Power*, RUSI, 1986.

3 AP 3000, *Air Power Doctrine*, p.13-17.

4 Sir John Slessor, *The Great Deterrent*, p.259, Cassell & Co, London, 1957.

5 Beyond the immense increase in the output of airframes and engines, huge numbers of spares were provisioned. In November 1918 alone, the output of turnbuckles and bolts was 1.2 million and 10.5 million respectively.

6 *The Times*, 3 Nov 97 and 5 Feb 96. On a typical day, some 2,500 lorries head for TESCO's 22 depots.

7 Boeing's Spare Parts Distribution Centre has over 410,000 different part numbers in a total inventory of more than 20 million items. *Overhaul & Maintenance*, Jul/Aug 96, p.48-49.

8 Colonel John Warden, *The Air Campaign*, Pergamon-Brassey's, p.34-48, Washington 1989.

9 Sir Basil Liddell Hart, *Thoughts On War*, p.54, Faber & Faber, London, 1944.

10 John Terraine, *The Right Of The Line*, p.602-603, Hodder & Stoughton, London, 1985.

11 *Logistics Spectrum*, Spring 1995, includes a thoughtful article on the difference between military and business logistics, and, while concluding that there has been some convergence, argues that the disciplines retain unique objectives and characteristics.

12 Boeing, which was building 10 737's in early 1997, was producing 21 a month by early 1998 and was scheduled to be producing 24 every 30 days by the end of the year – Aviation Week, 16 Mar 98.

13 The USAF have pioneered a similar approach under the 'Lean Logistics' label.