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The Gulf War and Australia's Strategic Posture

By Lieutenant W. M. Hayward, RAN

'Cutting necks is better than cutting means of living. Oh God Almighty, be witness that we have warned them'.

— Saddam Hussein

Introduction

And cutting necks it was to be. The invasion of Kuwait by Iraq's forces in August 1990 'provoked one of the greatest international crises since the Second World War'. The United Nations' Security Council reacted quickly (and almost without precedent) by voting unanimously to condemn the invasion, and thereby paved the way for the imposing of economic sanctions aimed at forcing Iraq's withdrawal. Economic sanctions would eventually have an effect, but they would take time; and in any case they were meaningless without the wherewithal to enforce them. Thus, acting under Article 51 of the UN Charter several governments deployed naval ships to the Persian Gulf to impose a blockade of Iraq's seaborne trade. Australia was among the first nations to commit naval assets to this apparently worthy cause; however, the Government's action sparked considerable public and media debate concerning our involvement, with opponents arguing that we turned a 'blind eye' in similar circumstances within our own region, amid claims that the decision to commit naval assets was taken unilaterally by the Prime Minister. Unrepentant, the Government defended the decision, pointing out that circumstances were different because Australia had vital national interests at stake. They claimed that success of the UN action in restoring Kuwait's legitimate regime was closely aligned to our own strategic security, and that of our region, in the turbulent years ahead.

History now records that Iraq remained resolute — Hussein thumbed his nose at world opinion and declared Kuwait the 19th Governate of Iraq — and that Australia contributed to the Coalition Forces' crushing defeat of the world's fourth largest army.

The aim of this article is to review Australia's involvement in the Gulf War, and to relate this to our strategic posture in the geographic region defined as our Area of Primary Strategic Interest. To achieve its aim, this article will first discuss the factors which precipitated the Gulf conflict. Secondly, it will outline our current strategic policies and forge a link between these (policies) and the rationale behind our involvement. And finally, the article will express an opinion on factors instrumental in the Gulf War which are likely to affect Australia's future strategic circumstances, and it will comment on how strategic policies should evolve to meet changing circumstances.

Factors Leading to the Gulf War

Iraq's contemporary territorial claims to Kuwait have their origins in the sixteenth century when both nations formed part of the Ottoman Empire. However, by the nineteenth century the authority exercised by the Ottomans over the region now delineated as Kuwait, was minimal to the degree that the Ottomans appointed Sheikh Mubarak Al Sabah as Governor in 1897. In effect, this action initiated the partitioning of Kuwait from Iraq, and when following World War I Britain's League of Nations Mandate facilitated unilateral delineation of the borders of Saudi Arabia, Iraq, and Kuwait, the process was completed.

Exercising her Mandate further in 1921, Britain installed an alien monarchy in Iraq led by King Faisal, which sparked a period of rebellious resentment punctuated by violent tribal uprisings and, which ended in 1958 with a bloody nationalist coup in which the entire 'Royal Family' and hundreds of others were 'purged'. For the next decade the political environment was fractious, tribal and secular, until in 1968 another coup resulted in the Baath Party becoming the first government for a
millenium to concentrate power in Baghdad. The Party’s ideology was fundamentally nationalism based on socialist and secular principles, and this automatically placed it at odds (ideologically) with Kuwait’s monarchial regime with its commitment to capitalism. After 11 years in the shadows, Saddam Hussein seized leadership of the party in 1979 through a systematic and ongoing liquidation of political opponents and immediately commenced establishing himself as a cult figure.6

Kuwait’s capitalist economy based on massive oil revenue enabled it to amass enormous global wealth, which it diversified by international investment. Paradoxically, Iraq’s equally massive income from oil indirectly led it to economic disaster, because it funded Iraq’s ascendancy as the world’s largest importer of military equipment during the disastrous Iran-Iraq War. Despite having the fourth largest army in the world, Iraq was unable to secure a decisive outcome and emerged from that conflict in desperate need of petro-dollars to rejuvenate its crippled economy. Attempting to force oil prices up, Iraq was frustrated by Kuwait’s arrogant refusal to stem production to OPEC quotas, with the result that Iraq’s belligerence intensified with accusations that Kuwait was causing massive losses in revenue. Moreover, Iraq accused Kuwait of moving their common border straddling the Rumaila oilfield thereby allowing it (Kuwait) to draw more heavily on the resource, and demanded financial compensation.7

Iraq proclaimed Kuwait’s actions were a ‘tool to implement American policy’ in the Middle East and linked this with the notion that Washington applied double-standards towards Iraq and Israel.8 Hussein’s attempts to draw Israel into the dispute was a thinly veiled ruse by which he hoped to rekindle Arab nationalism in the face of ‘Zionist-Imperialist conspiracies’, and thereby realise his ambition for recognition as leader of the Arab world, whilst simultaneously diverting attention from his decidedly unneighbourly intentions toward another Arab state. Immediately preceding the invasion the US administration sent confusing ‘signals’ to Baghdad via its Ambassador and the US State Department, which declared ‘the US had no obligation to come to Kuwait’s aid if attacked’.9 Crisis talks aimed at defusing the situation were torpedoed by Iraq’s insistence that Kuwait concede every point; less than 12 hours later the invasion commenced.

Australia’s reaction to the invasion of Kuwait highlights the principles behind our strategic posture: ‘that international borders must be respected; and that those who use force must not be permitted to prevail’.10
THE GULF WAR AND AUSTRALIA'S STRATEGIC POSTURE

Promoting the United Nations role as an effective arbiter.

Australia's Strategic Posture

Foreign Policy

In developing foreign policy, Australia has defined an Area of Primary Strategic Interest (APSI); an area extending north-south from Indo-China to Antarctica, and east-west from the eastern Indian Ocean to the south-west Pacific Ocean. Explicitly, this is our area of primary interest, but Australia's foreign policy involvement is not confined by these imaginary boundaries. In addition to defining an APSI, Australia has enunciated foreign policy objectives, foremost of which are: 'to defend Australian sovereignty and political independence; to secure a free and liberal international trading regime; to contribute to global security; and, to be a good international citizen'.

With these objectives in mind, Australia seeks to amass political kudos by participating across a wide spectrum of international affairs, and in multilateral and bilateral forums. In this manner, our foreign policy endeavours to identify Australia as a cooperative middle power which is prepared to work with the world community to pursue a common good. In our APSI, such recognition is particularly important as Australia is a developed nation in a region where many nations are emerging from less developed status, and are seeking assistance in their development processes. Australia is well-placed to provide benevolent assistance, and thereby pursue opportunities to influence outcomes beneficial to our national interests.

Defence Policy

Security is intrinsic to national interests, and Australia's defence policy seeks to ensure security by establishing a high degree of self-reliance based upon a strategy of defence in depth across the sea-air gap to the north. This is complemented by a capability to conduct effective operations throughout our Area of Direct Military Interest; an area spanning north-south from the Indonesian archipelago to the Southern Ocean, and east-west from New Zealand to the Cocos Islands.

Whilst self-reliance is a key aspect of our defence policy, it exists within an "interdependent set of international relationships and alliances". Prominent among these are the Five Power Defence Agreement, and the Australia-New Zealand-United States (ANZUS) Treaty. In addition to these formal alliances, Australia is pursuing increased bilateral defence co-operation with several regional states,
and last year proposed the Conference on Security
and Co-operation in the Asia-Pacific.\textsuperscript{15}

Notwithstanding the parochial emphasis of Aus­
tra利亚’s defence policy, the Government also recog­
nises the need for a broader perspective which cats­
er for our contribution to an international framework
of global security.

\textbf{Australia’s involvement in the Gulf War}

‘This is the broad framework within which the
Government has considered Iraq’s invasion of
Kuwait and Australia’s response’.\textsuperscript{16} Obviously
Australia’s strategic security may be jeopardised by
unfavourable developments in far-flung regions of
the globe, but more importantly our strategic
security is vulnerable to adverse circumstances
which may arise in our APSI. In the wake of
reduced tension between the superpowers, the world
is ‘breaking ranks’ to create a multipolar political
environment, in which, major and middle powers
will compete to occupy any regional strategic void.
To protect our national interests during the un­
certainty which lies ahead, Australia desires broad­
based acceptance of the UN’s policing of inter­
national affairs; however, the resolve to punish
nations which transgress the boundaries of accept­
able international behaviour is dependent on
possessing the wherewithal to effectively impose
punishment. In this context, Australia committed
naval forces to the UN blockade of Iraq with the
intention of reinforcing the perception of the UN’s
capability for punitive sanctions. As the Minister for
Foreign Affairs stated, ‘the situation in the Gulf... will provide an example and set the tone for the
future.’\textsuperscript{17}

\textbf{The Future}

The conditions which precipitated the Gulf con­
flict are typical of factors instrumental in any
conflict, and as the Prime Minister indicated, ‘it is
not inconceivable that those conditions could emerge
in the Asia-Pacific region’.\textsuperscript{18} Indeed, many of
the conditions already exist in Australia’s APSI. Clashes
over territory between China and India, India and
Pakistan, and China and Vietnam regularly dominate
regional broadcasts; moreover, China supports
the Khmer Rouge rebellion against the Vietnam
backed regime of Hun Sen in Cambodia, and
political tensions remain high between North Korea
and South Korea (who are technically still at war).
Elected governments have been ousted recently by
military coups in Fiji, Myanmar and Thailand; and
Australia’s strained political relationship with
Malaysia and Indonesia is never far from the
tabloids. Religious hatred leading to violence was
strikingly illustrated by the recent assassination of
Rajiv Ghandi, and Muslim fundamentalists have
been involved in violent clashes with other religious
and ethnic groups in Malaysia and The Philippines.
Armed forces espousing nationalist sentiments are
active in Cambodia, Sri Lanka, Papua New Guinea
and The Philippines.\textsuperscript{19}

Considering all the factors present in our APSI
that were instrumental in the Gulf War, the most
potentially damaging to regional security is the
concern that nations may hold for threats against
their economic development. Many regional nations
are emerging from near Third World economies
seeking to exploit natural resources, and recognising
the criticality of establishing sovereignty over geo­
graphic areas to support claims; as exhibited by
China and Vietnam’s clash over the Spratly Islands.
In this multifaceted and multipolar environment,
Australia must attempt to predict strategic develop­
ments which may have adverse implications for our
national interests, and we must implement policies
aimed at averting, or at least reducing any harmful
effects. The basis for Australia’s strategic policies
appears sound, because it correctly places import­
ance on promoting Australia’s image as a ‘good
neighbour’ globally, whilst emphasising active
involvement in regional development (Australia’s
proposal to lead a UN peace-keeping force in
Cambodia would provide visibility to this image).
Despite America’s disapproval of such suggestions,
Australia should continue to pursue the formation
of multilateral interest groups which will bind
regional states. The Asia Pacific Economic Co­
operation process provides a good baseline from
which to establish closer economic relations within
the region, and the proposed Conference on Security
and Co-operation in the Asia-Pacific would pre­
sumably do likewise for defence. Australia’s strategic
policies should aim to cement our involvement in
any interest groups to preserve our place as a
middle-power in the region, and should promote
our role as a spokesman for smaller, less politically
mature states. In pursuing multilateral involvement,
Australia must not neglect the benefits of strong
bilateral relationships. Maintaining these relations
will provide Australia with a conduit to be active in
resolving regional conflicts between states, and bilateral ties will allow Australia to lobby other states individually to form temporary coalitions on issues of common interest. If Australia is to remain secure and prosperous, it must foster and maintain its image as good citizen in our APSI, whilst not forsaking its contribution to the global community.

The Gulf War crisis initiated by Iraq’s invasion of Kuwait provided the forum for all nations with a concern for global security to stand-up and be counted; Australia did not relinquish its responsibility despite well intentioned, but perhaps misinformed domestic criticism. Australia’s early contribution to the formation of a Coalition Force acting under the Charter of the United Nations, assisted greatly the probability that such a force would evolve, and in so doing, promoted the UN’s role as an effective arbiter in international disputes. Broad acceptance of this role will be critical to the security of nations such as Australia in the uncertain years ahead.

Australia’s strategic policies are well defined, as are its Areas of Primary Strategic, and Direct Military Interest. Our foreign policy seeks to promote an image of a concerned member of the global community prepared to work through difficult situations in a diplomatic manner, in consultation with interested parties; whilst our self-reliant defence policy illustrates our determination (within realistic resources) to ensure our strategic security is not compromised. Regional self-reliance is the basis of our defence planning, and this capability is supplemented by a framework of alliances.

Australia’s Area of Primary Strategic Interest is volatile, with many present and potential sources for regional conflict. Foremost among these sources is the threat to economic development likely to be perceived by nations emerging from underdeveloped economic status. Low levels of industrialisation will make these nations more dependent on exploitation of natural resources; and establishing sovereignty over geographic areas will be critical to support of claims. Therefore, whilst disputes may manifest as territorial disagreements, it is probable the root cause will be economic.

In the years ahead, Australia must foster and maintain the respect of its regional neighbours; simultaneously, Australia must promote its image globally if it is to remain an influential player on the world stage. Australia’s national interests, and those of our region may well depend, not so much on the image we hold of ourselves, but on that held by our regional and global neighbours.

NOTES
5. Ibid cit.
11. 9 ESC Study Guide 3. Australia’s Strategic and Foreign Policies, p 2-2 para 207.
12. Evans, G. Australia’s Foreign Policy: Responding to Change.
13. 9 ESC Study Guide 3. Australia’s Strategic and Foreign Policies, p 3-11 Note 5.
17. Evans, G. Australia’s Foreign Policy. Responding to Change.
Change in Work Value in the Defence Forces

By Lieutenant Colonel Gerard Nelson, RA R and Captain Gillian Daniell, A Res.

Introduction

What is Work Value and why has the Australian Defence Force (ADF) spent a considerable amount of effort on a Work Value Project? After the 1987 Service Allowance Pay Case, the (then) Defence Force Advocate, David Quick QC recommended that a study on work value in the ADF be undertaken as the results of that case indicated that there have been significant changes in the type and scope of jobs carried out by members of the ADF. It was decided that a project team would be established to investigate changes in work value.

Work Value can be defined as the product of the work, skill and responsibility of a particular type of employment expressed in dollar terms. Work Value change arises from changes in the skill and responsibility of a job or changes in the conditions under which work is performed. Integral to work value change assessment are the following factors:

a. any changes in Work Value must be significant,
b. these changes have to be performed by the category, and
c. the results of these changes would have to occur regularly and permanently.

Throughout this article several terms will be frequently used. The definitions of these terms for the purpose of this article and the survey terms are as follows:

a. Job Standard. This is regarded as the minimum standard of professional competence that supervisors in a particular trade would accept from personnel in their employment classification.
b. Job Environment. This refers to the normal environment within which the employment classification is found.
c. Manning Levels. This refers to the established Manning level.
d. Employment Classification. This is the single, service neutral term that relates to the employment fields or trades within the three services.

This article will discuss the importance of a need to look at the ADF in terms of job value and how the importance of change can affect even the most routine jobs with a view to maintaining accurate and dynamic information on ADF work for future structural reviews, pay cases and conditions of service.

Until 1981, no investigation into the jobs performed by members of the Australian Defence Forces (ADF) in terms of Work Value had been undertaken. In 1981 the first Work Value Inquiry took place. This inquiry looked at changes in the work environment in terms of responsibility, and skill level with a view to establishing whether there has been any change and what areas these changes have taken place. Assumptions that skill levels have increased because of the introduction of high technology equipment is not sufficient to argue a case for a pay rise due to increased skill. Skill is a product of training, education and on-the-job experience. An increase in skill level would therefore mean that there is a tangible increase in these factors.

An empirical study was initiated, using the first study as a base. Titled the Australian Defence Force Work Value Project (ADF WVP), this study of all the jobs in the ADF consists of four comprehensive surveys designed to collect specific information on all jobs in the ADF and not only those previously listed in the first (1981) survey. The objective of this study was to provide a data base for all work performed by members of the ADF in terms of skill level, skill specialisation, responsibilities and job setting, constructed in industrially useful terms. It is this data base that will form a datum point against which future changes in the work of the ADF can be assessed.

All officers are included in the survey population and 12,000 Other Ranks were selected to form a sample population for the Other Ranks Work Analysis survey.

The raw data is collected and viewed wholistically. As in most surveys, the “big picture” is important for looking at emerging patterns. Information received from individuals piecemeal, provides the basis for the big picture, however every facet of every job needs to be considered to gain a realistic and complete profile. Geographic location in many cases, influences the format and type of training and
The WVP was tasked to inquire into work value changes in the ADF. The inquiry was to cover all jobs in the ADF and the information collated in industrially useful terms: i.e. presented in such a way that military jobs are described in terms that are applied to industries outside the ADF.

Preceding any study there needs to be some underlying assumptions. One of the main issues concerning the WVP is the assumption that salary should be correctly set to reflect the value of the job done. Accordingly, that salary should be increased for any employment classification in the ADF where significant changes in Work Value can be shown. Essentially, the WVP can be seen as an industrial relations exercise which would ascertain whether current salary levels properly reflect the worth of jobs being done.

The results gained from this inquiry would represent the data which could be presented if necessary to the Defence Force Remuneration Tribunal (DFRT) in support of pay variations for some employment classifications. For this to be successful, it is necessary to take into account the substantial re-orientation that is occurring in the conduct of Australian Industrial Relations in Australia. There is a much greater emphasis on industry and enterprise factors in the determination of wages and conditions. As project consultant Howard Guille states:

a. There is a shift to “productivist” strategies such as those under the two tier system, where pay increases are predicated more upon future efficiencies than upon trade-offs. In short the rate of “flow on” of improvements in pay and conditions will be reduced.

b. Economy-Wide and sectorial pay determination is giving way to industry and enterprise level agreements. The major effect of this will be the reduced influence of inter sectorial and cross-industry comparisons in wage determinations.

c. Skill development and training are becoming important elements in wage determination. These are accompanied by extension of pay scales, emphasis on career scales and the removal of barriers to progression along scales.

d. A simplification of pay scales is occurring, in part to complement multi-skilling. The result is reduction in the number of classifications covered by an award. One effect will be that some long established comparisons between and within awards will no longer be available as ground for establishing an ‘arguable’ case.

These changes in the direction of Australian Industrial Relations are relevant to the formulation of any major pay case for the ADF. The arguments put forward to industrial tribunals will need to be industry specific and be supported by evidence drawn from within the industry in preference to drawing comparisons from outside industry.

Keeping the changes in industrial relations in the forefront without directly comparing the ADF to industry became the focus for the development of the job evaluation methodology and the questions pertaining to the jobs in the ADF were designed to emphasise the uniqueness of the ADF. This was done in all survey instruments.

The Survey Instruments

There are four surveys in various phases of completion underway within the WVP. The largest of these, the Other Ranks Work Analysis had a selected population of 12,000. The second largest survey covers all officers in the ADF of the rank of PILOT OFFR to MAJ (E) and has a population of 8,500.

The Senior Officer Job Evaluation Questionnaire covered all ADF officers from the rank of LTCOL (E) to MAJGEN (E). This represents some 1,623 personnel. The fourth survey, The Medical and Dental Officers Job Evaluation (two separate questionnaires) captured data on all the jobs of Medical and Dental Officers in the ADF.

The Other Ranks Work Analysis, the largest of the surveys was a questionnaire designed for analysis by computer. The sample selected for this survey represented ten per cent of each employment classification, or in cases of small employment classifications, 20 personnel. Overall this represents 17 per cent of the ADF. The population sample covers 330 different employment classifications across the three services. Most of the respondents were of Warrant Officer Class One and Class Two (E). Indeed all personnel in the warrant ranks were included in the survey.
The rationale for this is that Warrant Officers would be the best source of information about their particular trade. They have had at some stage performed the job at operator level and would have also supervised operators. They are also in a better position to gauge change since most if not all of them were in the ADF in 1981 which is the datum point for change in all the surveys, as this was when the last Work Value Inquiry was conducted.

The survey instrument sought factual information on how duties in each employment classification are performed by an operator working at normal job standards, making the survey rank-free. Warrant Officers were not asked to fill out the questionnaire about what they do in their current jobs, for they may be in non-Corps/Branch Mustering jobs. Any survey of this nature needs to be valid and as value-free as possible. To achieve this, the survey has some stringent controls imposed on its conduct:

a. The questionnaire is completed after a standard briefing under the guidance of a member of the project staff. This was designed to minimise the number of questions that may be answered incorrectly because the recipients misunderstood what was being asked of them and it also ensured that the documents were in possession of the WVP Team on completion and reduced the “losses in transit”.

b. Service-neutral terms were used in the design and structure of the questionnaire to avoid bias towards a particular service; and

c. An independent consultant would analyse the data and compare his results with our primary analysis of the data.

The main limitation that this survey faced was that it was a “snap-shot” sample and out of the 12,000 selected only 6,000 responded. The sample was drawn from a data base of personnel in jobs in March 1989 but the team could only collect data from June 1989. Consequently, a sizeable proportion of the sample had left the Services or had been posted to another job by the time the team visited their location.

**Senior Officer Job Evaluation**

Job Evaluation measures the contribution individual jobs make to the ongoing operation to the ADF. Two measures are considered for job evaluation and they are internal relativity (industry based specific comparisons between jobs within the ADF) and external relativity which is determined by comparison with specific market salary practice. The output of job evaluation is principally the development of a grading system for jobs.

The Senior Officer Job Evaluation Survey was trialled in May 1989 and distributed to all LTCOL (E) to GEN in the three services, representing some 1623 positions. Unlike the OR Work Analysis Survey Questionnaire this instrument was divided into two parts, the first part being a set of qualitative questions that required written short form answers that would compliment and qualify the second part of the document which included a series of suites of questions designed to evoke alpha-numeric responses for computer analysis.

A main problem associated with the Senior Officer Job Evaluation was a review of the ADF organisation conducted by Major-General Sanderson was under way at the same time the survey instruments were distributed. It appears from initial analysis of the data, that some of the recipients felt that they had to justify their positions and this had some effect on the data showing job size and accountability. This effect is assessed as minimal.

The Medical Officer and Dental Officer Job Evaluation Questionnaires are very similar, with many questions identical or with specific references to medical or dental aspects of the job interchanged as appropriate.

The purposes of these two questionnaires was to gather data on all medical and dental officers as a distinct group operating in the ADF. The data from this questionnaire will be used for objective evidence as part of the salary policy determination process. The data becomes an instrument in establishing the value of medical officers in the ADF and relating that value to other public and private sector doctors and dentists to establish arguments for an appropriate salary scale to maintain the military medicine speciality within the ADF.

The survey document used for the Medical and Dental Officer was based on the Senior Officer Job Evaluation Questionnaire. The Medical Officers received a document that was designed to capture information about medical and military aspects of their jobs and the Dental Officers Job Evaluation was a similar document with appropriate modifications for specialist dental aspects of their jobs.

The Junior Officer Job Evaluation is the second largest survey with a population of over 8,000 personnel which represents all ranks from Pilot Officers to Major (equivalent) in the three services. The final survey instrument has been finalised, it is similar in composition to the Senior Officer Job Evaluation Questionnaire, with two parts to the
document for separate analysis. This particular questionnaire has been designed to put the Senior Officer Job Evaluation into some context and the results should complement those found in the Senior Officers Job Evaluation.

The Other Ranks Work Analysis Questionnaire generated the most follow up analysis work. The software programme that the WVP adopted for the analysis is the Statistical Package for Social Sciences — for Personnel Computers (SPSS-PC). This software package proved to be the most suitable for the needs of the project. It allows data to be analysed to show trends and correlations between all the responses.

As already discussed, this particular survey is the focus point for any re-structure of employment classification within the ADF.

One of the projected outcomes of the review is to examine the anomalies that currently exist with pay levels between the services in particular employment classifications with regard to changes in Work Value. For example, in the Medical Assistant Employment Classification, a Navy Medical Assistant is on pay level 5 while his army counterpart (including underwater medics trained by the Navy) are on pay level 3. The RAAF Medical Assistants are on a pay level that differs depending on qualifications. If training for particular skills becomes the responsibility of a tri-service organisation (such as the PTI School at HMAS Cerebrus) then these differences in pay after the same training and experience become significant cause for concern. Already the Army is experiencing a loss of its trained underwater medical assistants to more lucrative civilian organisations.

**Job Sizing Exercise for The Senior Officer Job Evaluation and the Medical and Dental Officers Job Evaluation**

The Job Sizing Exercise was conducted for purposes of perspective rather than straight comparison with jobs within other large organisations. The ADF employed the Hay Management Consultants Group Data Base for this part of the exercise. Hay Management has a very large salary database in Australia and therefore had information that would be useful as a guide to determining the parameters of job sizes for the Senior Officers.

Essentially, the Hay System works with a series of matrices that break the job down into three main components; Know-how which refers to the specialist knowledge as a result of training and experience that the job in question requires, Level of Thinking Sphere which refers to the extent to which the job is theoretical or analytical, and Accountability which refers to the effect of inadequate performance in the particular job in terms of how local or widespread this effect is. These three components are rated and the scores added. The higher the score, the larger the job in job size terms.

The type of job profile is also an integral part of the Hay system. This is determined by the difference between the thinking rating and the accountability rating. If these scores are level, then the job is said to have a level profile; the incumbent does not only conceptualise, he is also accountable for implementing what he develops.

If on the other hand the accountability rating is higher than the level of thinking rating, the incumbent of the job is usually operating under a set of pre-determined parameters and is highly accountable. Such profiles could be expected of Commanding Officers of ships, units and squadrons. A project officer on the other hand would be expected to have a profile that indicates more thinking and less accountability.

Applying this rating system to the ADF provides a challenge because of the unique conditions under which members of the ADF operate and the role that the ADF has currently. No matter how similar in infrastructure some large civilian organisations may be, direct comparison because of the unique nature of the ADF is not feasible or appropriate. Industrially speaking, conditions and pay in other industries can only provide indicative information.

The job sizing exercise focussed on the jobs as distinct from rank of the incumbent which may be appropriate for reasons other than job size, therefore it was not unusual for a LTCOL (E) job to be the same size if not larger than a COL (E) job in some instances.

Once all the reports on the data have been written and all the data is stored — what then? The information will need to remain dynamic if it is to be a true reflection of what is happening in the ADF in terms of work value.

In order to maintain an updated database, there are several options. The first is to survey the ADF on a regular basis in total, providing a total snap shot of the entire ADF population, using the same survey instrument and this survey as the datum point against which all changes are recorded. The second option is to survey a sector of the entire population, say 20 per cent, every year, so that the entire ADF is surveyed over a period of five years. Both options need to be examined carefully in terms of cost.
effectiveness. Both options would be costly in time and money.

An on-going project like this specialising in monitoring work value change, needs staff that have some expertise in Industrial Relations matters. Currently such an expertise resource is limited in the ADF, but there have been indications that there are increasing numbers of personnel who are interested in specialising in this area. The decrease in economy-wide flow-ons for increases in pay and conditions and the increase in industry-based initiatives to bring about change, expertise in Industrial Relations Matters is no longer something that is just advantageous to have in the ADF, it is decisively necessary.

There are four members of the WVP team, the authors together with Squadron Leader Barry Robinson and Warrant Officer Reg Mussig. There are also several consultants who are providing advice to the Project Officer and they are: Dr Howard Guille, PhD, a senior lecturer in Industrial Relations from Brisbane College of Advanced Education and Consultant to the Queensland Trades and Labour Council, Mr Allan Farquhar from the Hay Management Consultants Group (Ex RAN), Dr Michael Adina, PhD from InStat and Dr Roger Peters, PhD, (a Major in the Army Reserve Psychology Corps). The two parts of the Senior Officer Job Evaluation Survey instrument were analysed by two separate working parties. The first part of the document was a job-sizing and salary determination exercise and was reviewed by a tri-service panel of Brigadiers (E). They were, Commodore P. M. Mulcare (RAN), Brigadier B. M. Edwards (Army), and Air Commodore M. J. Brennan (RAAF). The methodology used for this analysis was based on the Hay Data Job Evaluation System, which is explained in this article. The second part of the survey instrument formed part of the data base along with the Other Ranks Work Analysis and was independently analysed by one of the consultants, Dr Michael Adina from InStat.

As for the Senior Officers survey, a tri-service panel consisting of the three Directors General, Health Services reviewed Part A of the document for the Medical Officers Job Evaluation Questionnaire. They were Rear Admiral G. J. Bayliss (RAN), Major-General W. O. Rodgers (Army) and Air Vice Marshall M. D. Miller (RAAF). The Dental Officers Job Evaluation Review Committee consisted of the three Directors Dental Services, and they were; Captain M. Dowsett (RAN), Colonel V. A. Bird (Army) and Group Captain J. E. Tobler (RAAF). These two survey instruments were managed by Colonel I. J. Pennell, the Director Defence Force Health Services Staff, HQ ADF.

Part A of the Officer Job Evaluation Survey Instrument will be reviewed by experienced senior officers who include some of the Directors of Service Conditions from the three services. They are: Captain J. C. L. Foote (RAN), Lieutenant Colonel R. Shoebridge (Army) with some input from Colonel C. R. Campbell and Group Captain A. J. White (RAAF). The Job Evaluation (Part B) of the survey instrument will be done by computer.

The information that is obtained from the Other Ranks Work Analysis Questionnaire provides the contents for a Work Statement for each of the employment classifications and for a job rating sheet which will be scrutinised by a review committee consisting of three Warrant Officer Class I (E), one from each service, Warrant Officer George Wall (RAN), Regimental Sergeant Major — Army Kevin Wendt (Army) and Warrant Officer Tony Barrett (RAAF), a consultant from the Australian Defence Force Academy — Dr Hugh Smith, a departmental representative — Mr Andre Bobets and two representatives from DIR.

NOTE
The Mind of the Soldier
His Most Important Weapon?

By Major A. Foster, RA

Introduction

Over the years much has been written about the mind of the soldier. It is a subject that has captivated the interest of psychologists, sociologists, historians and military men. Their reasons are perhaps clear; as Thomas Hardy once put it: 'More life may trickle out of men through thought than through a gaping wound'. To understand the intricacies and workings of the soldier's mind is to give an invaluable insight into the very nature of human conflict. However, such a quest is beset with problems, as perhaps may be seen by the sheer volume of literature on the subject! For the study of the human mind, according to Descartes, requires the study into a man's soul; the very seat of consciousness, thought, volition and emotion. When combined with the immense and unpredictable stresses that play on the minds of men in war, we should not be surprised when men such as Lord Moran proclaim: 'there is no science of the mind'.

However, there is still much that can be learnt from the study of man's behaviour in conflict. Here we are given a glimpse of the potential value and greatness of the human mind. The actions of the Australian Corps in August and September 1918 in France are a testament to the way in which the human mind can be of value in war. Despite hitherto 18 days continuous fighting, the Australians managed to achieve a remarkable victory in turning the German line on the Somme. 5 Brigade's capture of Mont St Quentin was particularly noteworthy. 'The task ahead was in some ways the most formidable ever faced by Australian infantry',2 In daylight and without reconnaissance, eight very tired, 'awfully bucked'3 companies comprising some 550 rifles and supporting troops, captured over 700 Germans; many of whom came from the elite Kaiser Alexander's Regiment. This success is attributed to the excellent morale and daring of the Australian troops.4 The imaginative leadership at unit level and the 'cheek'5 of General Monash's plans are also evidence of how the soldier's mind can be utilised as an instrument of warfare.

However, history relates that as often, the frailty and vagaries of the human mind can be the portent of collapse, not success in warfare. 13,000 British psychiatric casualties in WWII, widespread indoctrination of American POWs in Korea and D'Erlon's counter marches at Quatre Bras and Ligny bear testament to the fallibility and double-edged nature of this so-called weapon; the soldier's mind. Moreover, man brings many other attributes to bear in war. Strength and physical fitness were highly prized by the Spartans, as epitomised in their cry 'the men are our walls'. Therefore, it is only by exploring these kinds of issues and understanding their inter-relationship that we can ascertain the validity of the statement: 'the mind of the trained soldier is his most important weapon'.

A State of Mind

By its very nature, war can have a profound effect on the condition of the human mind. Man is subjected to a degree of hardship and horror which he seldom encounters in peace. Maurice Hussey writes that "war is a brutalising agent and the soldier a degraded patient driven into a hell of insanity, hysteria and cowardice".6 In such a predicament, the mind of the soldier is awash with competing and discordant emotions. As Lorenz states, man is by nature an aggressive animal and towards warfare there is a strong instinctive appeal. However, his capacity for imagination and reasoned thought also provides the soldier with an ability to appreciate and interpret the full horrors of warfare. Fear can so often be the result; fear of the unknown, fear of the unexpected, fear of killing and fear of the noise and sight of battle. The human mind therefore struggles with a strong impulse to flee the battlefield; or as Montesquieu states 'a rational army would run away!' This panoply of rival emotions is referred to by psychologists as the 'fight flight' syndrome and might be thought of as a hindrance to man's performance in battle. The sophistication of the human mind is revealed as a weakness, not a source of strength to the soldier in combat.

However, in the eyes of some, there are other facets of the human mind which serve to assuage
instinctive appeals towards self survival. Moran identifies 'character' as being one such commodity. He argues along traditional lines, that the development of character (the daily choice between right and wrong) forms the foundation of courage. This may in fact be so, and history provides many examples of where strength of character has supplanted any recourse towards self-centredness. Captain Oates and Lieutenant Colonel 'H' Jones are two such illustrations. However, too literal an interpretation of Moran's views might suggest that only those of moral rectitude are capable of fortitude in war. Others maintain that courage is not the sole preserve of men of principle. Instead, it is suggested that with the benefit of high morale, most men are capable of some display of courage.

The pre-requisites for high morale will be as numerous and varied as the soldiers that populate the battlefield. Physical factors such as food, rest and sleep will clearly have an influence. Similarly, mental factors will be of significance. Bidwell writes that 'man has a soul as well as a cerebral cortex' and accordingly, a sense of purpose will be central to his performance in battle. Patriotism, religion and cultural norms might provide the necessary support in some, as shown by the Samurai's adherence to the precepts of 'bushido'. Cromwell applauded the soldier 'who knew what he was fighting for and loved what he knew'. Equally, it might come from a deep hatred of the enemy; a trait apparent in Soviet attitudes during WWII. However, for the majority, where the futility of war presents a powerful image, motivation is likely to come from a 'willingness to fight for friends, to stay alive and for an end to the conflict'. As S.L.A. Marshall so perceptively writes: 'I hold to be one of the simplest truths of war, that the thing which enables an infantry soldier to keep going with his weapon is the near presence or presumed presence of a comrade'.

This state of high morale might be attributed to other, more tangible factors such as sound leadership, training, esprit de corps and discipline. Even the lure of financial reward, drugs and alcohol can exert some temporary influence. The benefits and power of high morale are to be seen in the Worcesters' performance at Gheluvelt in October 1914 and Chamberlain's men at Gettysburg in 1863.

However, we should also recognise the finite nature of human courage. This is germane to our understanding of the influence of the soldier's state of mind on the outcome of battle. We learn from Moran that there is a limit to any man's courage in war. He draws a parallel between human courage and a bank account; continually drawing on the account can eventually lead to it being overdrawn. F.M. Lord Slim agrees, insisting that trained men should not draw too heavily on their stock of courage; the consequences are to be seen in the British defeat by Rommel at Gazala in 1942. Courage will therefore vary according to time and circumstances. As Sun Tzu states, 'Courage or cowardice depends on circumstances'. Accordingly the state of mind of the trained soldier will be a key variable in the equation of human conflict. Paradoxically, it can be a source of strength and weakness. As to its overall significance, Moran provides us with a good indication when he writes 'a man's will to fight is the ultimate arbiter of war' or as Xenophon proclaimed: 'whichever army goes into battle stronger in soul, their enemies gradually cannot withstand them'.

Liddell Hart states that it is in the 'mind of the commander that the issue of battle is really decided'. In the past, hardness of character, akin to Zhukov and Model, might have been the only asset required in a commander. This strength of character, or 'ahimsa' might refer to a determination to drive others to battle (Caesar), or in not showing despair (Foch) or in a decisiveness even in times of adversity (Napoleon). Yet as Moran points out, the secret to success in war is success. Therefore with the complexity of modern warfare, are we now correct in assuming that the mind of the commander is capable of delivering military success? Concerns over the intellectual capacity of the military mind can cast doubts.

Intellecct is defined as the capacity for understanding, thinking and reasoning. In the military context, this might refer to an understanding of the profession of arms, a creative originality or mental agility and speed of mind. It is not difficult to appreciate the value of such a gift in a commander. Rommel's clarity of mind, Guderian's concepts of armoured warfare and the principles of Auftragstaktik are expressions of this intellectual dimension in human conflict. In the words of Clausewitz; 'the maximum use of force is not incompatible with the maximum use of intellect'. However, according to critics such as Bidwell, the military have neither the inclination nor ability to fully utilise the potential of the intellectual mind.

It is suggested that the military fight shy of an intellectual approach to warfare; 'war is still a game;
A determination to drive others.

Assumptions about the capacity of the military mind are also challenged by the conflicting requirements of peace and war. In peace, the commander is cast in the role of trainer and manager. Compromise, tolerance, compassion and clemency are therefore a *sine qua non*. In war, qualities such as aggression and determination can be of more significance. Their incompatibility is self evident. Hudson even suggests that the requirements of peacetime command are diametrically opposed to the requirements of war. 'They do not prevail in battle, nor do they provide the intellectual cloak to nurture an aggressive, ruthless and single-minded commander'.

Training will clearly help to ameliorate some of the problems. But even so, there is a suspicion that the human mind lacks the dexterity to satisfy the requirements of modern day command. To imitate the tiger in a future conflict might prove harder than Shakespeare once supposed:

*In peace, there's nothing so becomes a man as modest stillness and humility.*

*But when the blast of war blows in our ears, Then imitate the action of the Tiger.*

The frailty and vagaries of the human mind are also exposed in the person of responsibility. Stress will often be the root cause; its origins lying in the added responsibility and complexity of modern command. Questions of ethics and an excess of
Information can also act as a catalyst. According to medical journals, the remedy is companionship, encouragement and reassurance, or as Dinter prescribes: group integration, hope, trust and the close leadership of seniors. However, such benefits are rarely available to the commander; as alluded to by Montgomery when speaking of the ‘loneliness of command’. Personality and ability may be the only solace, and when insufficient, the result can be an unwillingness to take decisions, lack of perception, irrationality and over-reaction. This was apparent in the BEF of WWI, when over 20% of senior commanders were sacked on account of stress. It is a factor recognised by the Soviets, who believe that the ‘first casualty of stress is clear and reasoned thought and the last thing to go from a soldier’s mind is rehearsed drills’. We therefore see an emphasis on drill and repetition as opposed to intellect and initiative, the commander being encouraged to use flow charts and algorithms to ease the pressures of field command.

This loneliness of command can also reveal a more ingrained, deep-rooted weakness in soldiers’ make-up. Psychologists such as Prof N. Dixon suggest that the military offers a safe haven to individuals prone to anxieties such as fear of failure, need for approval and deafness to unpalatable information. Not until the position of ultimate responsibility is reached are such weaknesses exposed. Moreover, the problems can be compounded by the military’s recourse to collective decision-making. ‘Group-think’, according to Dixon, can actually accentuate the weaknesses in a commander. It can serve to rationalise away items of disturbing information and create an illusion of invulnerability. Pearl Harbor is cited as one such example of the disastrous consequences of this.

We might not necessarily agree with all of his views. However, Dixon provides a useful illustration of the inherent dangers in the fallibility of the human mind, and if we are to reject attempts to portray the commander’s mind as an ‘achilles heel’, we should at least recognise that it will not always be the source of abiding strength.

Mind Over Matter

Just as we might like to think of the human mind as being a weapon in the soldier’s arsenal, his physical attributes might be regarded in a similar light. The much vaunted physical prowess of the Gladiator and the collapse of Sir John Moore’s troops at Corunna are examples of the importance of the physical dimension in human conflict. The
imperatives of health, strength and even acclimatisation are well illustrated in T.S. Hart's comment: ‘only the physically fit soldier will be able to combat battle fatigue’. Moreover, when the Delphion Oracle replied that it was ‘luxury’ Sparta had most to fear, it recognised the importance of the soldier's physical qualities in battle.

In particular, age might be considered a critical influence on men in war. Opinion, though, is divided as to where it is of most significance. One report suggests that the 18-20 year old age group are the most physically fit and suitable for the rigours of war. Dinter remarks that ‘for front line combat, age and even experience tend to be a disadvantage’. However, other schools of thought credit the older man with the advantage. ‘His stamina and creative flair are preferable to the aggressive vigour of the junior man’; a claim which perhaps the Israelis might wish to challenge. To which particular side of the argument one subscribes is not of key importance. The essential point is to once again recognise the relevance of the physical dimension in human conflict.

It is oversimplifying matters to suggest that the mental and physical sides are mutually exclusive and merit separate consideration. Such a division can only ever be artificial; with mental and physical aspects constantly interacting. ‘Orandum est ut sit men sana in corpore sano’. This is clearly illustrated in the actions of von Paulus' Sixth Army at Stalingrad and Napoleon's army in Russia. At Stalingrad, an attitude of mind prevailed over physical hardship, whilst in Russia, it was the effect of physical conditions on men's morale that eventually led to military collapse. As stated by Napoleon: ‘the moral is to the physical as 3 is to 1’, it is therefore important to recognise that the human spirit is the predominant influence over men in battle. Plato nicely sums up this relationship when he states: ‘the mind is in charge of the body’. The actions of von Manstein's army in the Don and Donitz basins and the disease-ridden British Army's performance at Agincourt support such a view and exemplify a now familiar maxim, 'mind over matter'.

War on the Mind

Psychological warfare is very much a part of human conflict. History contains many examples of attempts to influence the minds of soldiers. Techniques have included the use of propaganda, brainwashing, indoctrination, persuasion and drugs, and have been employed in such campaigns as Malaya, Korea and Vietnam. These methods are designed to
Mind and Technology

Technology is already a feature of modern conflict. Harnessing this technology has afforded the soldier greater influence, lethality and efficiency over the conduct of warfare. In addition, new developments such as artificial intelligence and particle beam theory are set to further increase the soldier’s fighting capacity. This apparent inexorable march of science begs the question: can and will military technology eventually replace man as the primary determinant in war? Has the passage of time succeded the teachings of Mao Tse Tung who ‘put men above machines’ and is the Orwellian era of the ‘Great God Computer’ now upon us? If so, we might reasonably acclaim technology as being the soldier’s most important weapon.

However, the view that ‘tools and weapons... form 99% of victory’ as initially espoused by Fuller, is not widely held. In the eyes of many, the human spirit is still the ultimate arbiter in war. Griffiths argues that the outcome of battle is decided in close combat, not by technology, and supports S.L.A. Marshall’s view that ‘push-button war is fundamentally a fallacy’. The German Sturmstruppen of WWII are a good example of the pre-eminence of the human spirit, even in modern warfare.

Nor does Bellamy’s portrayal of a future automated battlefield imply the eventual triumph of technology over the mind of the soldier. De Bono may be correct in predicting a future ‘thinking’ computer and Dinter may be justified in saying ‘technology will increasingly determine the way of thinking’; nevertheless, war is essentially a human experience, with the soldier as its main orchestrator. Technology is just one of the many instruments within the orchestra. Or, as Hudson says, ‘man wins battles with the aid of technology; the commander giving direction to the one and purpose to the other.’ It is therefore axiomatic that the mind of the soldier will always be the master and not the servant of military technology; the soldier providing military technology with its overall sense of legitimacy.

A Mind to the Future

The character of human conflict is in a state of perpetual change. According to some analysts, the image of future conflict is to be seen in a more hostile, lonely and impersonal battlefield. Van Crefeld paints a vivid picture when he writes:

‘Here and there a target appearing, being engaged by an anti-tank weapon perhaps, or a laser designator, and then a flash far off and an explosion as an invisible artillery shell plummets precisely into its target.’

Some suggest that war will be likened to a rapier; fought by small, specialised forces in a state of high tempo. Others envisage a future war of attrition.
and mass destruction; a space age Verdun.  

Faced with these new challenges, doubt must already surround the soldier’s capacity, resolve and intellect for a future conflict. In the eyes of some, such fears are only reinforced by current trends in society. Dinter believes that soldiers will be more self-centred and unwilling to take risks. Keegan suggests that future generations will reflect a societal deep foreboding and antipathy to violence. These changes in attitude could be interpreted as the presage to major change in the character of future conflict.

If war is to remain ‘part of the intercourse of the human race’, it might be necessary to reduce some of the intolerable pressures faced by future generations of soldier. For instance, battlefield mobility might have to be restricted in order to provide the soldier with a greater sense of group identity and security. Alternatively, Keegan contends, battle might be totally abolished. In either case, the human mind will have exerted a considerable influence over the shaping of future conflict; its limitations serving to narrow, not broaden, the frontiers of modern warfare.

Not everyone, however, shares this view of either the scale or nature of future developments. In the opinion of Richard Holmes, soldiers are flexible and capable of quickly adapting to new conditions. Consequently, war will remain a legitimate expression of human nature. Recent experiences in the Gulf, Lebanon and Falkland Islands would seem to vindicate such a view.

In reality, though, predicting the nature of future conflict may be a lot harder than anyone supposes. As Clausewitz said of war: ‘the very nature of interaction is bound to make it unpredictable.’ What we can predict, however, is the continued importance of the soldier’s mind in determining the shape and outcome of battle. Whether it will be as the soldier’s sword or shield, only time will tell.

**Conclusion**

A study into the mind of the soldier is to give an invaluable insight into man’s emotions, reactions and influences over the character and nature of warfare. It is to highlight the soldier’s continual struggle between duty and selfishness, courage and cowardice, conviction and apathy. It is to recognise the value of character and morale in suppressing the stress of battle. It is to demonstrate the soldier’s susceptibility to psychological attack as well as highlight the connection between the mental and physical. It is also to acknowledge the influence of the soldier in the shaping of future conflict and his struggle to achieve competent generalship. Finally, it is to appreciate the intellectual dimension that man brings to warfare, from the harnessing of technology to the mastering of the profession of arms.

From this emerges an awareness of the importance of the soldier’s mind in human conflict. A realisation that the human mind is the quintessence of man in battle; his ultimate source of strength, weakness and enlightenment. The very qualities that distinguish man as the most sophisticated, lethal and unpredictable of all combatants. For this reason, the mind is worthy of the distinction, ‘the trained soldier’s most important weapon’ — indeed, it may even be his only weapon!

“. . . It’s all in the mind.”

(Thomas Wolfe, 1900-38)

**NOTES**

3. Ibid p 814.
5. See note 2, ibid p 796.
8. Ibid: p 144.
It's all in the mind.

14. Thoughts on War: Liddell Hart.
15. A term used by Kipling to mean character.
17. See note 7: ibid Chapter 1: p 8.
18. On the Psychology of Military Incompetence: N Dixon:
   Chapter 29.
20. Correspondence de Napoleon ler (32 vols: Paris 1858-70)
   Chapter 32 p 379.
22. A Study of Command in General War: M J H Hudson:
   Part 2 p 69.
24. Medical and Nursing Dictionary.
25. Hero or Coward: Dinter: Unpublished Report: Chapter 18:
   p 124.
26. The Soviet Attitude to Stress: Donnelly: Unpublished
   Report.

27. See note 18.
   paper.
29. Age and Resistance to Military Stress: Brill, Beebe, Loewen-
32. Two Centuries of Roman Poetry: Kennedy: p 74. (We
   should pray for a sound mind in a sound body.)
34. See note 7: Chapter 12: p 199.
39. Military Lessons of the Yom Kippur War: Van Crefeld:
   p 101.
40. Race to the Swift: Simpkin: Chapter 3.
41. See note 37: ibid: Chapter 8.
42. On War: Clausewitz: Pelican: p 162.

Editor's Note:
This article was the winning entry from the Peter Stuckey Mitchell Commonwealth Armies Essay Competition 1989. This essay was submitted by Major A J Foster, Royal Artillery, c/o The Staff College, Camberley, Great Britain, while he was a student at that college.
Introduction

The subject of air power has received a great deal of attention of late with the publication of the RAAF’s Air Power Manual, a 70th Anniversary Conference on Air Power into the 21st Century and numerous articles and letters in the Australian Defence Force Journal. This article seeks to add to that discussion by setting out an alternative approach, particularly to the explanation of air power. The approach taken is, hopefully, one that is free of the jargon that inevitably pervades the official statement of doctrine in the Air Power Manual. It does not, however, seek to dispute the official doctrine, but rather to better explain what air power is all about. It should be read as a supplement, not an alternative, to the Air Power Manual.

The Air Power Manual defines air power as: “the ability to project military force in the third dimension by or from a platform above the surface of the earth.” A simpler approach is to regard air power as being all about the use of the aeroplane as a weapon of war. Certainly, to be pedantic, air power can employ any vehicle, be it aeroplane, airship, missile or satellite, that operates “in the third dimension”. However, it is the aeroplane that gave rise to air power and it is the aeroplane as a weapon of war that sets its essential characteristics. Thus, in order to understand air power it is necessary to understand the strengths and weaknesses of the aeroplane, both as a vehicle and as a weapon.

The Aeroplane as a Vehicle

The advantages of the aeroplane as a vehicle are generally obvious and widely understood. It can travel at speed and range widely over land and sea. Once airborne, it is largely independent of terrain and weather, until such time that is that it must “locate a target” or “return to base.” What are less well understood, however, are the limitations of the aeroplane. Thus it is to these that particular attention will be given.

First, to the aeroplane in comparison with other vehicles, such as, trucks, tanks or ships. At all stages of its history the aeroplane has been at the forefront of technological development as man has striven to use technology to extract the last ounce of performance out of the aeroplane, to make it go faster, higher and further, and to carry a greater load. This has resulted in a vehicle that has the disadvantages of being, relative to other vehicles, delicate, complex, unreliable and expensive.

The aeroplane is, because of the need to limit its weight, necessarily lightweight in construction. Hence it is not at all robust, which in turn means that it must be treated with great care. Critical parts can be easily damaged, even by someone stepping on the wrong place! Thus the aeroplane does not always take kindly to the rough conditions that of necessity so often pertain on the battlefield and its immediate environs, or to the equally harsh conditions on a warship at sea.

The aeroplane is also a complex piece of machinery. It contains a number of sub-systems that are literally vital to its continued operation. Many of these sub-systems operate correctly only within a narrow range of parameters. Unlike other vehicles, an aeroplane cannot “drift along” or “pull over to the side of the road” if things go wrong due to the failure of one of its sub-systems. Thus the aeroplane needs a high level of double and treble redundancy within its workings, which in turn adds to its cost and complexity.

Complexity and advanced technology alike have resulted in producing a machine that is inherently unreliable. With an aeroplane there is always “something going wrong”. Part of the counter to this is close attention to preventive maintenance, to the extent that more effort is put into this aspect than the post event repair of faults. Aircrows have also developed over the years a keen “sixth sense” to alert them to respond promptly and positively to even quite small signs of impending trouble.

Aircraft maintenance and repair requires extensive facilities, facilities that do not fit well with the conditions of the battlefield or shipboard life. This
means that it is extremely difficult to continuously maintain an aeroplane “in the field”. Periodically, it must be withdrawn for overhaul, which is essentially a preventive maintenance procedure, back to a comprehensively equipped maintenance facility located by necessity in a, comparatively, safe area.

Due to the continuing quest for maximum performance, the aeroplane tends to operate in its normal mode at the limits of its performance envelope. Thus it has an extremely small margin between normal operations and becoming “a heap of twisted wreckage.” This in turn demands close attention to its fitness for flight and its operation in the air. With the aeroplane there is no room for complacency or neglect. Nor can well established limits be exceeded without the strong possibility of disaster.

In a never ending attempt to wring the last ounce of performance out of it, the aeroplane is designed to be maintained and flown by people who are well trained and fully alert. While the soldier and the sailor can accept high levels of fatigue, and are often called upon to do so, fatigue and aeroplanes is so often fatal. In normal flight, with all systems “go”, the aeroplane is relatively easy to operate. Where it becomes critically demanding of its crew is when one or more of its sub-systems fail, as they all too often do. Recovery of the aircraft, and its crew, can then become, literally, a life and death matter.

Perhaps the one thought that pervades the thinking of all those associated with the operation and maintenance of aeroplanes is safety. Safety is the margin that the prudent operator allows between the performance that will enable him to do his job and the absolute performance limits of his aircraft. Safety is also the effort that is put in to prevent catastrophic events from ever coming to pass. War fighting is a dangerous and risky business and airmen, along with soldiers and sailors, must accept these risks. What the airman must not do is to accept the additional risks associated with the imprudent operation of his aircraft. In doing his normal job he is often already operating at the limit; to go beyond it is to seriously risk his life, his aircraft and the lives of others. Unfortunately, these risks are not well understood, and sometimes not accepted, by the soldiers and sailors whose operations the airman is called upon to support.

Complexity and advanced technology also mean that aeroplanes are expensive both to acquire and to operate, with operating costs over the likely lifetime of an aeroplane being many times the capital cost of its acquisition.

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**The Aeroplane as a Weapon**

As a fighting vehicle the aeroplane is essentially an offensive weapon system. Its prime weapon is the bomb or air-to-surface missile, which in turn is most effective against large surface targets, such as buildings, vehicles, structures and ships. The aeroplane is a relatively inefficient weapon against small targets, due mainly to having too great a capability against such targets. Also, the aeroplane is, in general, a “single shot” weapon. While it can deliver a heavy punch it can do so only once before having to return to base to reload.

The aeroplane has a very poor self defence capability. Operating as it does in the open skies, it cannot hide, and being relatively delicate cannot take much battle damage. Indeed, its only defence against attacking aircraft is, if it has the capability, to attack its opponent, or to use its speed and manoeuverability to “run away”. When attacking surface targets, the aeroplane’s best defence is height and distance. The further away from the target area it can be at weapon release the better. Larger aircraft of the patrol or transport type are extremely vulnerable to both air attack and surface-to-air missiles.

While an aeroplane can be multi-role it often cannot be so during a single sortie, its multi-role capability being a function of being able to carry different weapon loads and add-on equipment. Thus, for example, a strike fighter on a ground attack mission with a load of bombs cannot revert to being an air defence interceptor without first jettisoning its bomb load and, possibly, extra fuel tanks.

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**The Aeroplane in Support — Maritime Power**

Such is the impact of the aeroplane on the conduct of warfare at sea that sea power and air power in the maritime sphere are virtually as one. This is well illustrated by the epitome of naval power, the aircraft carrier battle group. One could well ask whether such a group is an expression of sea power or of air power. In reality, it is both, its ships having all the characteristics of sea power and its aircraft those of air power. A better term for this marriage of sea and air power is maritime power. Nor is maritime power limited to the aircraft carrier battle group. The aeroplane is pervasive, in either offence or defence, in all aspects of naval operations.
Surface ships are particularly vulnerable to attack by air-to-surface missiles. Even under the sea, the submarine cannot easily escape the modern anti-submarine aircraft. Increasingly, the helicopter is becoming an integral part of surface ship weapon systems, thus greatly extending the eyes and the offensive reach of the surface warship.

The second thing that air power can do for the troops on the ground is to reduce the enemy’s resupply by attacking his supply lines. As with air defence, a complete severing of any army’s supply lines is likely to be extremely difficult, if not impossible.

The third thing that air power can do is to provide aircraft for the transportation of men and supplies into and around the combat area. Here, however, the limitations of the aeroplane need to be kept fully in mind. Aeroplanes, particularly those used for transport, are vulnerable to enemy fire, and indeed make excellent targets, easy to hit and of great value. Aeroplanes are themselves demanding of supplies. In many situations aeroplanes will use a higher resupply tonnage than they are able to bring into the combat area. Aeroplanes also require extensive ground facilities; even the ubiquitous helicopter requires a cleared landing pad with an unobstructed approach. And all aeroplanes are fuel thirsty.

The fourth thing that air power can do is to provide a special set of “eyes” to observe the enemy. Reconnaissance from the air can yield a great deal of information on the enemy and his activities, but is very demanding in specialised air resources, resources that will no doubt be in demand, as well, for tasks beyond the ground combat zone. Air interdiction and strike operations also need “intelligence” if they are to have any chance of success.
The final thing that air power can do for the troops on the ground is to attack targets on the battle front. This, however, is not an easy task for the aircraft. Target identification in the heat of battle is often difficult, friendly troops can be attacked by mistake and the aeroplane low over the front line, which is where it needs to be in order to carry out an attack, is vulnerable to small arms and hand-held SAM fire.

When aircraft are being operated in close support of, in particular, army units in the field, army commanders sometimes appear loath to accept that air force aircrew and maintenance personnel alike are not able to live and work “just like the rest of the diggers” and that aircraft needs must be subject to strict performance limits. If those limits are exceeded, no matter how desperate the circumstances, the odds are high that aircraft will be destroyed, not by enemy action, but by accident. There will never be sufficient aircraft that they should be jeopardised needlessly by being asked to perform beyond the limits of aircraft and crew.

One of the dilemmas in the use of air power is whether it is best used in direct support of troops in combat or against the enemy’s rear areas. For example, an aircraft could be used against a tank that is coming over the hill with its guns blazing, or against a number of tanks in a vehicle park behind the front line. It could also be used against a ship load of tanks being transported to the combat zone, or against a tank factory in the enemy homeland. In general terms, air power is at its maximum efficiency against factories and least efficient against targets on the battlefield, and so on in between. However, there is a time factor involved here. Destroying the capability to manufacture tanks is unlikely to translate into a reduced battle capability for some time, and certainly would be of no assistance to troops in the path of an oncoming enemy tank. In summary, it could be said that, while using air power against the enemy homeland and his rear combat areas may not help the battle, it may just help to win the war.

Air Force Organisation

The final comment in this article relates to air power and organisation, to the vexed and contentious question of the independent air force and the setup of separate air forces within the army and the navy. Such is the nature of the aeroplane that only around 5 per cent of the effort goes into actual flying and 95 per cent into support in the form of aircraft and equipment maintenance, supply, airfields and other ground facilities, and administration. Of the air activities, some 75 per cent is related to what is called pure flying, and only 25 per cent to operational aspects. Thus, only about one per cent of the effort and attention involved in using an aeroplane as a weapon of war is related to the particular operational environment, while 99 per cent is related to what might be called “aviation” matters. Irrespective of what Service they belong to, or what uniform they wear, all of those concerned with the operation of aeroplanes are “airmen”. They think like airmen, for if they do not they will quickly and surely come to grief. The aeroplane is a demanding and unforgiving piece of machinery that requires 100 per cent dedication from its operators.

One point often overlooked by generals and admirals who seek to acquire their own organic air services, as a counter to the “heretical” ideas on air power that they see as coming out air forces, is the fact that the original independent air force (Britain’s Royal Air Force) was founded by men whose prime military experience was in the army and the navy. The much maligned Trenchard was a soldier who, when the RAF was formed in 1918, it had only a short experience of air operations. Yet, from that short experience of using the aeroplane as a weapon of war he was able to develop an independent view on the use of air power. What gave Trenchard his
understanding of air power, and his belief in the independent air force, was not his air force service, but his experience with aeroplanes. Similarly, being part of the United States Army up to 1947 did not prevent members of the US Army Air Corps developing views on air power similar to those of their colleagues in the, independent, Royal Air Force. Air power is not about being in the air force, it is about the use of the aeroplane as a weapon of war.

For some, air power is limited to the strategic employment of aircraft in attacking the enemy homeland, with air power in support of the land and the sea battle being part of land and sea power respectively. This, narrow, view misses the point that the application of the aeroplane as a weapon of war follows a consistent set of rules and guidelines that exist irrespective of whether the target is in the enemy homeland, on the battle front or at sea.

Most of the arguments for an independent air force relate to the use of air power in the strategic role, in a role independent of the land and sea battle. Of far greater importance is the argument that the operation of the aeroplane as a weapon of war demands a separate profession, the profession of the aviator, a profession that can best be fostered in a Service separate from that of the soldier and of the sailor. For a nation the size of Australia, three air forces are a luxury that we cannot afford.

That air power is an integral part of the combat triad of maritime, land and air power, and that those who "command" air power resources must cooperate fully with their army and navy colleagues, is readily acknowledged as being essential if the nation’s armed forces are to be in any way effective. There can be no independent use of air power; it must at all times be used to best overall effect in support of the combat triad.
How Many Weapons? How Many Aircraft?

By Flight Lieutenant Michael Spencer, RAAF

The problem of analysing targets and assessing the weapons and aircraft needed to achieve the required amount of damage, necessary to meet the objectives of the air operation, is the task that besets the weaponeering officer. The weaponeering problem is no longer resolved by committing all available resources to overwhelm the enemy, it requires a scientific method for calculating the level of force required to achieve mission objectives with an economy of effort and resources.

The RAAF

On a world scale, the RAAF is a relatively small conventional air force with limited assets that must be carefully managed during any air campaign. The WWII tactic of converting large cities into moonscape is no longer economical nor acceptable. The RAAF will use airpower to deliver firepower to an enemy’s vital areas in order to achieve the military objectives. The targets to be attacked must be carefully selected to ensure a high probability of success with a minimum effort, cost and attrition whilst still accomplishing the overall military objective.

The Chinese warrior-philosopher Sun Tzu wrote, ‘So it is said that if you know others and know yourself, you will not be imperiled in a hundred battles; if you do not know others but know yourself, you win one and lose one; if you do not know others and do not know yourself, you will be imperiled in every single battle.’

In planning air operations, one must know the enemy’s command and control structures, order of battle, communication and supply lines, disposition of forces and military support industries. Furthermore, no military campaign can be planned without a complete knowledge of the military effectiveness of one’s own forces. Weapon effort planning is all about target and weapon selection from a knowledge of the capabilities of both the enemy and one’s own forces.

Target Analysis and Weapon Effort Planning

The efficient employment of weapon systems depends on a full and intelligent assessment of all aspects of air operations, the weapon systems available and the target system. This process is called the Weapon Effort Planning Cycle and follows a logical sequence of steps for conducting an effective air operation.

a. Definition of the overall objective of the air campaign,
b. Target selection and analysis,
c. Definition of the immediate objective for each mission,
d. Determination of weapon system effectiveness and selection of the optimum munition and fusing for the nominated target to match the best weapon system available to the target,
e. Assessment of the requirements to deliver the weapon systems successfully ‘over-the-target’,
f. Post-flight analysis of the mission to assess its contribution to the overall objectives of the air operation.

This process can also be used to assess the resources required by a potential adversary to attack friendly assets, or to assess the damage levels that might be achieved by a force of known composition. In this case, the weaponeer assumes the role of the enemy and uses a description of the enemy order of battle to conduct a paper battle against friendly forces. This information can then be used to assess the survivability of national and defence assets and/or the effectiveness of systems committed to their defence.

Defining the Ultimate Objective

The overall objective of a campaign is to win the war but while this is acceptable as a concept, a fighting force needs more specific objectives. This can be illustrated by the aims of Operation Desert Storm. The political aim was to use the coalition military forces to ensure an unconditional withdrawal by Iraq from Kuwait, in accordance with
United Nations Resolution 678. However, the overall military aim was the destruction of Saddam Hussein's offensive military capabilities that threatened the stability of the Middle-East and the coalition forces. Furthermore, the tactical objectives presented to the armed forces at the operational level were more specific:

a. Interdict and impede the movement of Iraqi troops and supplies,
b. Destroy war-related industries in Iraq,
c. Destroy Iraqi military arsenals, and
d. Reduce the threat to the coalition forces posed by Iraqi ground forces occupying Kuwait.

This resulted in the coalition air forces firstly attacking Iraqi command and control installations, aircraft, military runways and air defence systems. The destruction of these assets helped the allies to establish and maintain control of the air over Iraq, before continuing the air campaign that would meet the tactical objectives with a reduced threat to allied air force crews and assets.

Interdiction missions were then flown against military communication and supply lines between bases in Baghdad and Basra and the Iraqi ground forces in Kuwait. Bombing missions concentrated on destroying nuclear facilities, chemical and biological weapons factories and Scud missile support installations, Scud missile sites, ordnance stores, tanks, armoured vehicles and artillery parks. Iraq's Republican Guards, well camouflaged and dug-in to the north of the Kuwaiti border, were subjected to an intensive strategic bombing campaign not seen since the Linebacker campaign over North Vietnam.

The foregoing demonstrates how the objectives should be filtered down the chain of command, from a broad objective originated at the executive level of headquarters down to a specific mission aim at the operational squadron level. It would have been ineffective to simply task the strike squadrons to 'destroy the Iraqi war effort'. Nor would it have been wise for the headquarters executive to have advised specific aircraft requirements and armaments to attack the nominated POL storage facilities, bridges, hardened aircraft shelters and other targets of their choosing.

The rest of the weapon effort cycle depends greatly on precise definitions of the ultimate military objective and mission aims. Consider a simple fictitious example that will be used throughout this article: in order to reduce an enemy's capability to support a war effort, friendly forces are tasked to attack an oil refinery that is vital to producing fuel for enemy ground vehicles, warships and aircraft and force a halt in production for six months.

Target Selection and Analysis

After the aim of the air operation has been defined, the target system must be analysed and the essential target elements identified and prioritised. The characteristics of the various target elements are analysed by a study of both the functional and physical features of the target complex to determine which of the vital target elements could be attacked and successfully damaged with a high probability of success.

Functional Analysis

A functional analysis identifies the activities performed by target elements and establishes their relative importance to the overall operation of the target system. This prioritisation aids in deciding which unitary elements, if attacked, would achieve the mission objective without the need to commit resources to attack the entire target complex.

Consider the oil refinery complex, shown in Figure 1, that must be forced to halt fuel production for a period of six months. A small raid against a vital element may achieve the same military advantage with fewer aircraft as would a 'thousand bomber raid' tasked to destroy the entire facility. The target elements could be prioritised in order of their importance to the overall functioning of the oil refinery, as suggested by the following list:

a. POL storage tanks;
b. pumping stations;
c. main electrical power supply;
d. fractionating towers;
e. operations centre;
f. port facilities, and
g. oil tanker ships.

Functional analysis becomes even more significant for precision guided munitions which can be accurately guided to particular unitary target elements within a target complex. A single guided weapon attack against an oil refinery can now focus on individual pumping stations; previously it would have been necessary to expend massive resources to destroy the entire refinery complex. Laser guided weapons were used to devastating effect against the Iraqi controlled oil supply lines pumping oil from the Mina Al-Ahmadi refinery into the Persian Gulf. The in-flight infra-red camera footage released to the media showed the accuracy and effectiveness of
the precision guided munitions in destroying the oil lines and pumping stations.

**Physical Vulnerability Analysis**

Having determined the key elements of the target system, their vulnerability to damage mechanisms such as blast, fragmentation, incendiary and cratering devices must then be assessed. This is achieved by analysing target element dimensions, construction materials, the equipment or personnel operating inside and the enemy's damage repair capability. A process of elimination reduces the list of target elements to only those that are vital and which can be attacked with a high probability of success using the weapon systems available.

In the refinery example, intelligence reports might suggest that the enemy has a very capable damage control system for the POL storage tanks and the network of pumping stations may be too widespread and the oil too easily re-routed to be effectively disabled in a single raid. Consequently, a target analyst might recommend the destruction of the main electrical power supply and/or the fractionating towers as an effective way to halt production at the refinery for the required six-month period.

Unitary targets can be similarly analysed to identify elements that can be attacked to achieve specific types of kills depending on the effort that can be afforded. Total destruction in itself is rarely the aim of any air operation and indiscriminate damage does not necessarily constitute an advantage. Attacking only the tread links of an enemy tank is easier than destroying it outright and this may immobilise it long enough for the friendly forces to continue with the next tactical phase; it is easier to reduce a warship to non-combatant status by attacking the weapon systems onboard instead of expending the large effort required to sink it; a single Wild-Weasel aircraft attacking the fire-control radar may be just as effective against a SAM threat as a wing of B-52 bombers carpet bombing the entire air defence system.

**Sources of Pre-attack Information**

Information for pre-attack analysis comes from a wide variety of sources limited only by the resourcefulness of those looking for it. For instance, Saddam Hussein's fortified underground command bunkers and hardened aircraft shelters were analysed during information supplied by the European consultants responsible for their construction. In our example, oil refinery technology can be assumed to be similar all over the world such that friendly oil company consultants could be asked for information about oil
refinery systems, functions and the times required for repairs.

**Defining the Mission Objective**

Having analysed the target to determine the focus of an attack, the next step is to define precisely the mission aims. Each target selected will contribute different results at different times and remain effective for different durations. Is the aim to deny the enemy use of its airspace for six hours or six months? Is it solely to prevent the enemy from attacking friendly armoured ground forces? Is the aim a gradual escalation of hostilities or immediate annihilation?

Consider the operation against the oil refinery where the aim is to halt fuel production for a nominated period of six months only. If it takes two sorties to halt production for six months and ten sorties to completely destroy it, then only two sorties should be planned in keeping with the mission aim. The mission aim is to inflict levels of damage sufficient to support the tactical operation; any lesser damage fails to support the operation and any additional damage is a waste of resources.

**Determining Weapon System Effectiveness**

Knowing the kind of damage which each type of warhead can produce is as important as knowing the amount of damage required to defeat specific targets. The weaponeer will have to assess and compare the damage effectiveness of the different weapons available for the mission. This analysis is based on the use of statistical data collected on the effectiveness of a variety of weapons against different targets. The US Joint Technical Co-ordinating Group for Munitions Effectiveness has created the Joint Munitions Effectiveness Manuals (JMEMs) which are currently the main source of RAAF weapon effort planning information. JMEMs provide the data for determining the optimum weapon choice against particular targets. For instance, blast weapons are quite effective against large structures, building and bridges; a penetration device is effective against a heavily armoured warship; a cratering device is effective against a runway; a cluster munition is effective against ground-based radars, and fragmentation devices are effective against military personnel.

Consider the Rolling Thunder bombing missions flown against the Than Hoa bridge in the Vietnam War. The aim of these missions was to disrupt the North Vietnamese supply lines. However, the Than Hoa bridge soon developed the reputation of being the 'bridge that would never go down'. Nearly 700 sorties had dropped thousands of conventional bombs on it between 1964 and 1972. It was not until 1972 that the bridge was finally destroyed by three F-4 Phantoms armed with newly developed laser-guided bombs (LGBs). This highlights the force-multiplying advantage of LGBs over conventional bombs in that more effective damage could be achieved against unitary targets by fewer aircraft.

Having determined the optimum weapon choice, the next step is to use the JMEMs data to determine the number of weapons most likely to be needed to achieve the required level of damage. This weapon system effectiveness data, against particular targets, originates from three main sources:

a. Direct observation of the results of strike missions from World War II through to recent military conflicts;
b. Direct observation of weapons used against targets in controlled research trials; and
c. Computer modelling of weapon system effectiveness against computer modelled targets.

The weaponeer matches the target against the JMEMs model target, applies statistically derived scaling factors and calculates how many weapons will be required to achieve the required level of damage.

It is important to select the best available weapon for the mission to ensure the most cost-effective use of limited assets. Weapon effort planning becomes even more important when the optimum weapon is no longer available, as a result of expenditure or weapon commitments elsewhere, and a choice needs to be made from a variety of alternative weapons.

**Over-The-Target Requirements**

Over-the-target requirements will determine how many aircraft must be tasked for the mission to ensure delivery of the required quantity of weapons to the target. This will increase the number of aircraft required to complete the ideal mission, after consideration of the following factors:

a. Aircraft serviceability rates.
b. Attrition rates from an enemy's defences.
c. The probability of correct target acquisition amidst decoys, changing environmental condi-
tions and changes in target appearance and location.

d. The probability of correct functioning of the weapon. For example, a penetration weapon will be ineffective against a buried command bunker if the time-delay fuse fails and the weapon detonates on impact with the ground outside of the bunker.

e. Operational degradation of crew performance due to wartime stresses and other factors encountered in the war environment.

f. The weapon delivery accuracy unique to each aircraft and crew.

**Post-Mission Analysis**

Post-mission analysis is essential in assessing the effectiveness of each mission and its contribution to the campaign objective. This analysis can be conducted by various means: strike aircraft camera footage can be analysed for weapon delivery accuracy and functioning; a multitude of sensors in reconnaissance aircraft and satellites can monitor the damage and enemy activity associated with the target; intelligence services can monitor changes in enemy operations affected by the loss or otherwise of the target.

The post-mission analysis needs to be all the more critical with the advent of high technology dupery used to deceive analysts. The need for increased vigilance was critical in the Gulf War when Iraqi forces deployed wooden decoys, resembling tank hulls, with heaters to simulate the infra-red signature of a tank engine to distract Allied ground attack aircraft; painted craters were discovered on repaired airfields so that allied bombers would not continue to bomb them; decimated installations were hastily fixed up to make them look only partly destroyed so the allies would return to waste their ammunitions on useless structures.5

Post-mission analysis will determine whether or not the required level of damage has been achieved, in accordance with the mission aims, or whether more missions and resources will have to be expended against it. Only time will tell if the chosen target was the best choice. If the mission is successful then the targeting cycle is completed, otherwise it must be repeated.

**Conclusion**

The strategy of winning campaigns by committing a superior military force against the adversary, to win through attrition, has been replaced by scientific methods that can optimise the capabilities of even the smallest conventional forces. Target analysis and weapon effort planning is a tool that assists the weaponeer and tactician to achieve military objectives with an economy of effort. It does not give the definitive answer to mission planning but offers a guide for the direction to pursue in the choice of targets and available weapon systems and provides a statistically derived measure of the effort that will be required to meet the mission aim.

**NOTES**

2. Taken from the Pentagon Press Briefing given by Mr Dick Cheney, US Defense Secretary, 16 January 1991.

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Flight Lieutenant Spencer graduated from No 64 Navigator's Course and flew P-3C Orion long-range maritime patrol aircraft with No 10 Squadron from 1985-89. During this tour he completed the RAAF Weapons Systems Course at the School of Air Navigation to become the Squadron Weapons Officer. In 1989 FLTTLT Spencer was posted to the School of Air Navigation where he is currently employed as a Qualified Navigator Instructor and Weapons Systems Instructor specialising in Guided Weapons and Weapon Effort Planning.
What a Hell of a Mine

By Wing Commander A.J. Curr, RAAF

"With the destruction of the two capital ships, the battleship had been toppled from its lordly position and it was patently clear that henceforth surface combat could take place only where aircraft were absent, out of range or at night".

Introduction

The Japanese plans for the invasion of Malaya in 1941 were seriously threatened by the deployment to Singapore of HMS Prince of Wales and HMS Repulse. Once appraised of the appearance of these two capital ships in late November 1941, Admiral Yamamoto strengthened his offensive air capability in French Indochina. Japan entered World War II on 7 December 1941. The British were well aware that a Japanese carrier task force had assaulted Pearl Harbor with devastating results, and that surface ships did not actually participate in the destruction visited upon the American installations.

It was a mistake leading to the most serious consequences that the British failed to heed this lesson and provide air protection for their prized battleships. This was the more surprising since, from the moment reconnaissance aircraft discovered the whereabouts of the British Fleet, an intensive aerial assault against the Prince of Wales and Repulse was inevitable. Within two days of entering World War II, Japanese naval air power, once again without the participation of surface vessels, administered a crushing attack and rendered Britain’s Asiatic sea power impotent; remarkably, for the loss of only three bombers.

Why was there no Allied air power to oppose the Japanese torpedo and level bombers? This article will examine the decisions that contributed to this tragedy and attempt to dispel the myth that “the RAAF’s 453 Squadron failed to provide the air cover that had been promised, something the RN has never forgotten.”

On 20 October 1941, acting Vice Admiral Sir Tom Phillips was ordered to hoist his flag in the Prince of Wales as Commander-in-Chief designate, Eastern Fleet, with the rank of acting Admiral. This nomination did not enjoy universal appeal in the RN. Many considered that Phillips was essentially a staff officer, more theoretical than practical, with not very much sea experience in command and no personal experience of war at sea since 1914-18. Phillips was self-opinionated and possessed an abrasive personality. These traits combined with his reluctance to decentralise authority must certainly have compromised the powers of leadership expected of a Commander-in-Chief.

Before the outbreak of war, naval officers were generally convinced that the threat of high level and dive bombing was greatly exaggerated; torpedo bombing was taken more seriously but the barrage of AA fire from British warships was considered capable of shooting down enemy planes or, at least, putting the pilots off their aim. Nothing would make most naval officers understand the air threat to their
beloved battlewagons. Phillips was a foremost and
fanatical exponent of this line of thought.9 Ironically,
Phillip's first experience of flying his flag at sea was
ended by the aircraft whose value against capital
ships he had so long denied.

Deployment of Capital Ships

Prince of Wales was a 36,000 ton battleship com-
missioned in 1941 whilst Repulse, a 33,000 ton battle
cruiser, was constructed during World War I and
remained largely unmodernised. The Prince of
Wales departed the UK on 25 October 1941 and
rendezvoused with Repulse south of Colombo on
the 29 November. The fleet arrived in Singapore on
2 December 1941 without organic air since the
aircraft carrier HMS Indomitable ran aground in
the West Indies during workup exercises prior to
deployment.

Force Z Departs Singapore

Soon after midnight on 7 December, Japanese
forces invaded northern Malaya at Kota Bharu
(situated on the Malayan side of the border with
Thailand, approximately 340 miles north of Singa-
pore) from the sea. Some three hours later, 31
Japanese aircraft bombed Singapore. Admiral
Phillips, after discussions with Air Chief Marshal
Sir Robert Brooke-Popham, Command-in-Chief
of all British air and land forces in Burma, Malaya,
Singapore and Hong Kong, announced his intention
to take his fleet to sea to intercept the Japanese
transport ships. Since the Admiralty had insisted
that ships of the Royal Navy were to be excluded
from Brooke-Popham's command, he had no
formal authority over Phillips and consequently
could not stop him sailing.

Phillips considered that he only had three options
for the employment of Force Z (Prince of Wales,
Repulse and four destroyers). His first option was to
stay in Singapore and risk being bombed in harbour.
Secondly, he could sail to some anchorage or remote
area hopefully safe from the danger of air attack. His
remaining option was to attack the Japanese war-
ships and transports between Kota Bharu and
Singora (120 miles north of Kota Bharu).

The first two options were unthinkable to Phillips.
Although intelligence indicated that Japanese
opposition may include at least 30 warships, air
attack from bases in Indochina and torpedo attack
by submarine, he elected option three, assessing the
risk justified against the potential loss of Malaya.
Unfortunately for Phillips, British intelligence did
not know that the Japanese torpedo bombers had
an operational radius of as much as a thousand
miles. The range of the aircraft and efficiency of the
crews were grossly underestimated. Phillips' fleet
departed Singapore at 1700 on 8 December.
Availability of Air Support

Phillips requested from Air Vice Marshal Pulford, Air Officer Commanding Far East Command air reconnaissance 100 miles ahead of the fleet during daylight hours on 9 December, air reconnaissance up to 10 miles off the coast between Kota Bharu and Singora, commencing at dawn on 10 December and fighter cover over the fleet from dawn on 10 December. Pulford advised Phillips that fighter cover would most likely be impossible since the northern airfields were untenable due to Japanese action and the range of the Buffalo too limited to operate from southern bases. Reconnaissance would be provided on 9 December but was most unlikely on the 10 December. As the fleet passed Changi Signal station, Rear Admiral Palliser (Phillips' Chief of Staff who remained in Singapore) confirmed that “fighter protection was impossible”. Phillips shrugged his shoulders and said, “Well, we must get on without it” and did not modify his plans to “surprise and sink enemy transports and warships before air attack could develop”.

Manoeuvre in the Gulf of Siam

During the evening of the 9 December, despite observing at least three Japanese reconnaissance aircraft, Phillips sailed further into the Gulf of Siam. However, after a flare was dropped by an enemy aircraft in the vicinity of the fleet at about 2000 hrs, Phillips decided that surprise, essential to the success of his plan, had been lost and he abandoned the operation. The fleet retired SSE towards the Anambas Islands. HMS Tenedos, due to low fuel state, had earlier been detached to return independently with the instruction to transmit a message, on behalf of Phillips, at 0800 on 10 December (when well clear and unlikely to compromise the position of the fleet) indicating that the fleet would be off the Anambas on return to Singapore near earlier than 0600, 11 December. This message was received in Singapore.

A Fatal Diversion

At 2355, 9 December, a signal was received from Brooke-Popham's office that advised “Enemy reported landing Kuantan . . .”. Kuantan, approximately 120 miles SSW of Force Z and not far off the return track to Singapore, was considered a key military position which every effort must be made to defend, for, ensconced there, the Japanese would command the eastern terminus of the only viable east-west road on the peninsula. Controlling this road, the enemy could isolate all British ground forces to the north. Also, from Kuantan airfield, one of the best in eastern Malaya, they would have an excellent base within short range of Singapore. Phillips decided that he could achieve surprise at Kuantan and that the risk was justifiable. At 0052, 10 December he altered course SW for Kuantan and advised the fleet that he was going to attack this new landing force. Radio silence was maintained and Singapore was not aware of his revised plan.

As the ships approached the coast at dawn on 10 December an enemy reconnaissance aircraft was observed. From that time on at least, Phillips could be certain that the Japanese knew his fleet's position and that some form of air attack was probable. Yet he remained in the area. At 0930, after sighting nothing of the expected invasion force, Phillips headed NNE to investigate a small ship and three barges that had been spotted earlier. Deploying a
battleship, battle cruiser and three destroyers to ascertain the identity of such an insignificant force (which his embarked Walrus seaplane could have easily conducted) was ludicrous. Phillips loitered off Kuantan continuing to show no concern for an air attack. At 1100, 10 December, the inevitable attack by Japanese Nell and Betty bomber/torpedo aircraft began. Repulse sank at 1233 and Prince of Wales went down at 1320.

Meanwhile, eleven aircraft of No 453 Squadron were on alert to provide air cover for the fleet, when in range, on return to Singapore. The first and only indication that the movement of the fleet was not in accordance with the plan transmitted from HMS Tenedos was an emergency report at 1204 from Captain Tennant (Repulse) that the fleet was under attack. Phillips did not signal for assistance until virtually sinking. The 453 Squadron Brewster Buffalos departed RAF Sembawang at 1215 and arrived on the scene as the last of the Japanese attackers was departing.

The loss of Prince of Wales and Repulse dealt the Allied forces an enormous moral and physical defeat while contributing to Japan’s record of stunning air power victories. This calamity was directly attributable to Admiral Phillips’ decision to maintain radio silence and not advise authorities in Singapore of his change in plans nor signal for fighter protection as soon as he knew air attack was imminent off Kuantan. His cavalier attitude to air power generally and the capability of the Japanese Navy Air Force specifically also contributed to his “Waterloo”. 453 Squadron, tasked with providing air cover to the Fleet when in range of Singapore, was never afforded the opportunity to assist. Even though the performance of the Buffalo was indeed modest, the Japanese bombers had no fighter protection and were vulnerable. If 453 Squadron had been alerted to the perilous predicament confronting the fleet, they may very well have generated enough havoc to save Phillips and his fleet. The destruction of these two capital ships marked the end of the era of sea power epitomised by Nelson and the teachings of Mahan.

**Conclusion**

The loss of Prince of Wales and Repulse dealt the Allied forces an enormous moral and physical defeat while contributing to Japan’s record of stunning air power victories. This calamity was directly attributable to Admiral Phillips’ decision to maintain radio silence and not advise authorities in Singapore of his change in plans nor signal for fighter protection as soon as he knew air attack was imminent off Kuantan. His cavalier attitude to air power generally and the capability of the Japanese Navy Air Force specifically also contributed to his “Waterloo”. 453 Squadron, tasked with providing air cover to the Fleet when in range of Singapore, was never afforded the opportunity to assist. Even though the performance of the Buffalo was indeed modest, the Japanese bombers had no fighter protection and were vulnerable. If 453 Squadron had been alerted to the perilous predicament confronting the fleet, they may very well have generated enough havoc to save Phillips and his fleet. The destruction of these two capital ships marked the end of the era of sea power epitomised by Nelson and the teachings of Mahan.
WHAT A HELL OF A MINE

NOTES


3. Lieutenant M.L. Bailey, RAN, The Medium Power Air Force — What Need to Exist? Defence Force Journal, No 83, July/August 1990. This allegation by Lieutenant Bailey is non sequitur. M. Middlebrook and P. Mahoney, at page 150 of Battleship: The Loss of the Prince of Wales and Repulse state "The Kuantan area was well within the area which, if not under absolute control of the RAF, was at least capable of being patrolled from the air. The British aircraft at Kuantan airfield had actually been withdrawn to Singapore on the 9th because of Japanese bombing attacks, but had it been known that Force Z was about to steam into that area at dawn on the 10th, the Buffalo fighters of 453 Squadron at Singapore, earmarked for the support of Force Z and kept out of all other fighting, could have flown patrols over the British ships next morning and possibly have used Kuantan as a forward base for refuelling... RAF Headquarters at Singapore had no idea at all of where Force Z was, and the Buffalos remained on the ground at Singapore next morning."

4. Marder, Old Friends, New Enemies, p.385. Phillips and Slessor (Marshal of the RAF) were colleagues in the Joint Planning Committee before the war. Slessor recorded that Philips was so irrational on the subject of air power, at times violently so, that "we had to have a sort of pact not to discuss aircraft versus ships except when our duty made it inevitable in committee — when there was usually a row." A.T. (Bomber) Harris, who preceded Slessor as Director of Plans in the Air Ministry had the same battles with Phillips. When Phillips was leaving the Plans Division in 1938, Harris proposed a jocular toast and said, "Tom, when the first bomb hits, you'll say 'My God, what a hell of a mine!'"


6. Marder, Old Friends, New Enemies, p.514.

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Wing Commander Curr is currently on staff at the Air Power Studies Centre. He has extensive experience as a strike navigator and a long involvement with weapons systems training in the RAAF. His operational experience began with No 2 Squadron in Vietnam 1969-70. After completing an F111C conversion in 1974, WgCdr Curr's flying tours have been exclusively with No 1 Squadron RAAF Amberley. Whilst Weapons Flight Commander in No 1 Squadron, he was responsible for all aircrew operational training on the F111C Pavetack and Harpoon Systems during its introduction in 1985-86.

He has on two occasions held the position of Chief Weapons Instructor at the School of Air Navigation and in 1988-89 was Commanding Officer Base Squadron RAAF East Sale. WgCdr Curr attended Joint Services Staff College in 1990 prior to his current appointment.

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Return to Greece is illustrated by Defence artist, Jeff Isaacs with text by Michael Tracey.

Return to Greece is available from the Australian Defence Force Journal at a cost of $20.00.
The First Battle of Britain

By Air Commodore A. D. Garrison, OBE, RAAF, (Ret).

The fact that zeppelins bombed London in the First World War is fairly well known. The extent and duration of these raids is perhaps not so well known. That London and other cities in England were also attacked by heavy bombers is hardly known at all. In fact, these raids were quite devastating and reached ‘blitz’ proportions. The zeppelin raids and bomber raids led to a most impressive defence network in Great Britain, and a great struggle for air supremacy in the skies above. These events led directly to the creation of the Royal Air Force as a separate and independent service. Also, many of the basic principles and tactics of air defence evolved in those far off days were again applied with equal success in the later and far more famous Battle of Britain which we now celebrate each year on the 5th September.

First Air Attacks

The first bomb to ever fall on British soil was dropped on Dover on 24th December 1914. It was a single bomb, weighing a mere 10 kg. and came from a lone German aircraft. There were no casualties, and damage was estimated at forty pounds. Another aircraft had been the first to actually enter British air space three days earlier, but it turned away after dropping two small bombs harmlessly in Dover Harbour. On both occasions, surprise was complete, and the raiders returned to their bases unharmed.

This type of ‘hit-and-run’ raid by one or two aircraft on the coastal towns was to continue throughout the war. They did little harm, and produced few casualties. In fact, the first casualties from these raids did not occur until 13th September 1915 when two people were killed and six injured in a raid on Margate. Also, it was not until 19th March 1916 that any of these coastal raiders were even shot down. Guns and aircraft were certainly deployed against them, but they were considered to be mainly nuisance raids. The main threat was expected to come from raids by airships, and after a late start it certainly did.

The British had fully expected devastating attacks by zeppelins to begin from the moment war began on 4th August 1914, but no such attack occurred for nearly six months. Meanwhile, they were able to do much to improve their air defences, the responsibility for which lay with the Admiralty and not the War Office. The origin of this arrangement went back to the very beginning of the British air services.

Early Air Defence

The Royal Flying Corps formally came into existence on 13th April 1912, absorbing the Air Battalion created the year before. The new service came entirely under War Office control, but consisted of a Naval Wing as well as a Military Wing. Right from the start, however, the two wings developed quite separately and became very independent of each other. This was recognised officially on 1st July 1914 when the Naval Wing became the Royal Naval Air Service (RNAS) and was placed directly under the control of the Admiralty. The Military Wing adopted the title of the Royal Flying Corps (RFC), and remained under the War Office.

Originally the War Office was to be responsible “for... air supremacy in the British Isles or in any land operations in which the army are concerned.” The Admiralty was to be responsible “for all aerial services of the fleet.” It was further agreed that the Navy would have the task of preventing air attacks against warships, dockyards, and all other naval targets along the coast. Even so, the War Office insisted they operate under Army Control, thus claiming complete responsibility for the Air Defence of Great Britain.

Despite this responsibility, the War Office made no effort to establish any units or organisations for home defence. The Admiralty on the other hand, decided to set up a chain of air stations right along the east coast from north to south. When WWI began the army did not even have enough aircraft to meet their complement to accompany the Expeditionary Force to France. They were just able to muster a total of four squadrons for this purpose, with nothing left over.
The RNAS, on the other hand, already had a number of air stations favourably situated to intercept any raiders, and also the aircraft to go with them. Very few of these would be able to go to sea with the fleet. Thus it looked as if the air defence of Britain would pass to the Admiralty by default. The government then agreed that the entire responsibility should officially pass to the Admiralty on 3rd September. As part of this new role, it soon followed that the Admiralty was to man all anti-aircraft guns for the defence of London and other centres. The army was only to be responsible for manning the guns at defended ports and other vulnerable points, and then solely against surface attack from the land or sea.

At the time the Admiralty took over, there was a total of only 33 guns available for air defence. Of these a mere three light pom-poms had been allotted for the inner defence of London. One each was allotted for protection of the Admiralty, the Foreign Office and the Crown Agents. The remaining 30 guns were spread out at vulnerable points throughout the country. Nevertheless, extra guns and some searchlights were quickly obtained and put into position. London was 'dimmed-out' on 1st October, and by this time the defences of the city had been increased by an additional twelve heavy guns and twelve searchlights to go with them.

Although now responsible for home defence against air attack, the navy believed that the real safeguard was to set up a vigorous offensive against the airship sheds and to intercept the enemy well before they reached the shores of Great Britain. They already had an RNAS force of three squadrons at Dunkirk in support of a marine brigade. Plans were drawn up to bomb the sheds at Dusseldorf and Cologne at the earliest opportunity, but bad weather intervened. Even so, the first attacks were launched on 22nd September, but were not successful. On 8th October the raids were repeated and one shed at Dusseldorf and the airship inside it were completely destroyed. On 21st November a raid was carried out against the sheds at Friedrichshafen. All aircraft reached their objective and bombed the shed causing severe damage to the Zeppelin inside. These raids were to continue.

All these preparations, and the raids, had been carried out with an extreme sense of urgency. Airship raids continued to be expected against England at any moment, but still the zeppelins did not come. Fortunately for the defence, the German airship service was not yet in a position to begin their attacks.

The Zeppelins

At the outbreak of war, the German Navy had only one Zeppelin, having just lost two others in accidents. However, they quickly acquired a further seven from commercial sources. The German Army had a strength of six, but in the first month of the war they lost four in flying accidents and two by fire in their sheds. A building programme was started at once, with the production being shared between the two services. New designs were also initiated, with the object of improved performance, particularly in speed and lift capacity. However, the need for ever higher altitudes soon became the top priority.

Despite the initial shortage of airships, the German Navy and Army fully intended to use the Zeppelins against England at the first opportunity. However, there were constraints placed on them quite apart from their operational readiness. Offensive use of the Zeppelins was prohibited by personal direction from the Kaiser. For the time being they were to be used solely for reconnaissance work.

As far back as 1899 there was a Hague Declaration that prohibited combatants from “launching projectiles or explosives from balloons or other kinds of aerial vessels.” Another agreement was the Land War Convention of 1907 which stated, simply, that the bombardment of undefended places “by any means whatever” was forbidden. The Naval Convention, however, did modify the bombardment of otherwise undefended places by stating that: “Military works, military or naval establishments, depots of arms or war material, workshops or plant which could be utilised for the needs of a hostile fleet or army, and ships of war in the harbour are not included in this prohibition.” In the spirit of the times it must be considered that, at least in the beginning, there were really strong moral considerations on both sides about the bombing of cities and towns as opposed to obvious military targets which lay apart from them. For the time being, therefore, the Kaiser’s prohibition remained in force.

The German Navy in particular disagreed strongly with this restriction, saying London was a highly important target with its docks, arsenals and military establishments. Their arguments were reinforced by the British raids from Dunkirk. It was now feared that these continuing attacks might well mean the eventual destruction of the zeppelin fleet while still in their sheds. This view gained further impetus from a special raid by the RNAS on 24th December 1914 against the German naval base at Cuxhaven.
Two earlier model Zeppelins. The L12 (top picture), commissioned in June 1915, had a ceiling of only 3,000 metres. It was damaged by gunfire over England and was forced down in the sea off Ostend two months later. The L30 (lower picture), commissioned in May 1916 had a ceiling of 5,400 metres. It survived the war after carrying out a total of 37 operational sorties.

Although it did little material damage, it forced the fleet to move further up the Kiel Canal out of range of further attacks.

Finally, on 9th January 1915 permission was given for limited airship raids on Great Britain. However, the Kaiser laid down personally that such raids were to be: "Expressly restricted to military shipyards, arsenals, docks, and in general military establishments; and that London itself was not to be bombed." The first raid against England was mounted ten days later.

A shortage of airships, combined with extremely bad weather, kept the raiders away for a further three months. Several sorties were mounted but all were driven back either by the weather or mechanical failures. Indeed several were lost from both causes. It was not until 14th April that the next Zeppelin raid took place. This was made by a single airship (L9) against the Tyneside, where 31 bombs were dropped, but casualties were light. There were no deaths, and only two injured. Two aircraft from the defences managed to take off, but did not make contact.

The very next night three Zeppelins carried out a raid against some further targets in East Anglia. This time, approaching at about 1500 metres, the raiders were met by concentrated and accurate small arms fire from mobile army units on the ground, which had been specially established for this purpose. One of the raiders was forced to retire as a result. The others dropped all their bombs, but there was no damage and only one person was injured. Raids continued during April and May, but were still confined to the coastal areas.

Originally, the airship sheds and bases were, of course, confined to Germany. However, with the fall of Belgium the Germans began to concentrate all airships in that area, and airship sheds began to spring up right across the country. This shortened
their trip to England and allowed deeper penetration. Sheds were also erected for the new series (LZ37, LZ38, LZ39) which were now becoming available. After a few skirmishing raids had been made on East Anglia, these were ready to carry the air war to London, and could be expected to produce significant results.

Finally, in February the Kaiser gave approval to attack London but such raids were to be limited “to military objectives east of the Tower of London.” This embargo kept them away from central London and the city proper. It was not until 20th July that approval was given for the central areas to be bombed, but again with the restriction that “buildings of historic interest were not to be damaged.”

First Raids on London

On the night of 31st May, 1915 one of the new naval Zeppelins (LZ38) finally made the trip to London and attacked the north east area, dropping a total of 89 incendiary bombs and 30 grenades. Casualties on the ground were 7 killed and 35 injured. The airship got clean away, but did meet some A/A fire at the coast coming and going. Warning of her approach had been received and nine aircraft were sent up to intercept. They were typical of the period. One was an F.E.2a two-seat pusher. The observer sat in front in the nose, his sole weapon a rifle, loaded with incendiary bullets. The machine failed to reach the 1500 metres needed and crashed on landing, killing the pilot. Another defender airborne that night was a Short S81 two-seater seaplane. It was so underpowered, however, that it could only carry the pilot, who was armed with a rifle and two grenades in his lap. This aircraft also failed to make contact and crashed on landing, although the pilot was unhurt. Another aircraft aloft that night was a pre-1914 Deperdussin. The pilot of this machine also was armed with a rifle and two grenades in his lap. This aircraft also failed to make contact and crashed on landing, although the pilot was unhurt. Another aircraft aloft that night was a pre-1914 Deperdussin. The pilot of this machine also was armed with a rifle and two grenades in his lap. This aircraft also failed to make contact and crashed on landing, although the pilot was unhurt. Another aircraft aloft that night was a pre-1914 Deperdussin. The pilot of this machine also was armed with a rifle and two grenades in his lap. This aircraft also failed to make contact and crashed on landing, although the pilot was unhurt. Another aircraft aloft that night was a pre-1914 Deperdussin. The pilot of this machine also was armed with a rifle and two grenades in his lap. This aircraft also failed to make contact and crashed on landing, although the pilot was unhurt.

First Zeppelin Destroyed from the Air

Early in the morning of 7th June, two airships were returning from a raid on Kent. One of these (L37) was sighted over Ostend by Flight Sub-Lieutenant R. H. J. Warneford flying a Morane parasol. At the time he was on a bombing mission against the Zeppelin sheds. He soon caught up with his target, but met with withering machine gun fire from the airship. He then pulled out of range, and climbed above the Zeppelin to a height of 3600 metres. He next went into a dive and released his six 9 kg bombs from 45 metres above the airship as he passed from one end to the other. The Zeppelin burst into flames with a violent explosion which turned the attacker onto his back and out of control. Regaining control, the pilot was forced to land in enemy territory due to a damaged fuel line. He was able to repair the line and restart the engine. He then managed to take off again and return safely to his base. Sub-Lieutenant Warneford thus became the first airman to destroy an airship in mid-air combat. For his action he was awarded the Victoria Cross.

A third Zeppelin which had set out with the other two had returned earlier with engine trouble and had been put back in its shed at Evere. There she was bombed and destroyed that same night by an RNAS force from Dunkirk of which Warneford had originally been a part. By a remarkable stroke of retribution this airship was the L38 which had carried out the first raid on London, just a few days earlier. There was now only one survivor of the three latest airships, and she was withdrawn from Belgium.
Zeppelin L43 which was shot down by an RNAS seaplane over England in June 1917 and captured intact. It was one of the very latest airships with a ceiling of 6,500 metres. It was 196 metres in length and had a diameter of 24 metres. Note the black camouflage on the undersides to make it more difficult to see at night. (Aust War Memorial Neg No. A3891)

and moved to the Russian front. The continuing and persistent attacks by the RFC, as well as the RNAS, were now so successful and disruptive that all the Belgian sheds were abandoned as permanent bases, and thereafter only used in emergencies.

Further Raids

The loss of two of their latest airships put a stop to any further raids on London for another two months. In between these widely spaced raids, however, sorties by the older type of Zeppelin continued against East Anglia and the Midlands. The total casualties from these raids were 76 killed and 164 injured. It was in one of these raids (on 9th August) that one Zeppelin was so damaged by gunfire that it was forced to land in the sea near Ostend. There it was taken in tow by a German patrol boat, but was destroyed by bombing by the RNAS force from Dunkirk. Then on the night of 17th 18th August the raiders struck again at London.

This second raid was followed by a further series of attacks on that city on 17th August, and the 2nd and 7th September, and again on 13th October. Total casualties for the August and September raids were 50 killed and 173 injured. In the October raid alone, however, there were 47 people killed and 102 injured. There was now to be another respite for London, and no further attacks were made against that city until April of the following year.

As usual, however, raids continued to be mounted at fairly frequent intervals on provincial targets, and casualties continued to rise, but were very much lower than expected.

During the whole of the eight months between the last and the very next raid on London, from June 1915 to April 1916, it is recorded that only one zeppelin was brought down by gunfire and none by defending fighters.

Early Warning

The initial failure to destroy the Zeppelins was mainly due to a complete lack of an early warning or communications system. Added to this was the real need for more equipment and better all round performance. Furthermore, there was a total lack of night flying experience. At the time it was not even known if it was possible to fly in the dark.

A basic system of observer posts and communication net had been set up once the first raids began. This was enlarged and refined as time went on, and one of the improvements was to interpose area control centres between individual posts and the operational centre in Whitehall. These were able to provide immediate warning to aircraft and guns in their own area, and thus speeded up the reaction time, as well as acting as filters for the main centre. Also as early as October 1914, the War Office had
set up a listening station to monitor the main German radio transmitters. This was now expanded to include the Zeppelins. They were all fitted with radio, and they used this frequency to pass and receive weather reports, position reports and orders. The unit was given a direct line to Whitehall and the movements of the airships plotted. Also when they were noted to be over the French coast, either coming or going, the RNAS unit at Dunkirk was alerted.

Night Flying

The first experimental night flying tests were carried out by the RNAS. A searchlight was set up on the aerodrome, and the pilot then flew down the beam to a landing. As they gained confidence, the searchlight was done away with, and a flare path was set out on the ground in the form of an 'L'. The pilot landed parallel to the longer arm, towards the short one, which indicated the up-wind direction, and also the limit of the landing run. This method proved most satisfactory in practice. In fact, it remained in use right up to, and into, the Second World War as the standard night flying aid.

A special night-landing device to indicate height above the ground was also developed. This was a length of cord, with a weight at one end, which could be reeled out so that it lay fifty feet below the aircraft. Then, when coming in to land, the weight would touch down first. The pull exerted on the string released a catch which started a buzzer and lit up a red light in the cockpit. In practice, false heights were indicated if the weight hit a tree or other obstruction such as a tree or a building. Also, more often than not the pilot was so startled by the buzzer and red light at a most critical point in his approach to land, that the crash rate rose, rather than fell.

Despite their huge size, Zeppelins were also very difficult to see at night. On the ground a sense of direction could be obtained from the noise of their engines, and even on a dark night it might be possible to see them against the stars. In the air the noise of the attacking plane's own engine would, of course, drown out the zeppelin engines, and even if right over the airstrip it could not be seen against the ground unless there was a background of lights or other illumination from below, such as searchlights.

Finally, of course, having first caught your Zeppelin, the next problem was to shoot it down. Part of this problem was the lack of aircraft performance; but this was not so important in the early days as the lack of any suitable ammunition to do the job. Ordinary ammunition just went straight through the light structure of the airship.

Special Ammunition

As early as 1912 the Zeppelins had been recognised as the main threat, and many ideas were tried out in an effort to find a suitable weapon for dealing with them. By the outbreak of war, however, the only weapon considered effective was the Hales grenade, specially designed for the purpose. However, it had to be fired from a normal service rifle. Even so, this was the 'preferred' weapon, along with a Very pistol or a shotgun firing chain shot.

Also developed were the Rankey darts. These were cylinders of explosive designed to penetrate the outer skin of the Zeppelin, and then hold fast. On contact a friction strip ignited the contents which then burst into flames. Finally, of course, many considered the only effective way to destroy a Zeppelin would be to ram it. Pilots often discussed the best way of achieving this, and the best place to strike. However, bombing soon became the popular method, particularly after the success by Warneford over Dunkirk.

Types of German bombs used in World War One. From left to right, they weigh, 50 kg, 100 kg, 300 kg, 12 kg and one tonne. The latter was the heaviest used by either side.
The most vulnerable part of the Zeppelin, of course, was the hydrogen filled gas bags. Finding a bullet capable of igniting them was not as simple as it sounds. The normal small arms (0.303 inch) ammunition had no effect, and would not ignite either the hydrogen or the fabric. Any punctures made were infinitesimal compared to the total volume of gas. Also as the gas was not under pressure, any such leaks would in any case be very slow.

A bullet filled with phosphorous, soon to be known as the incendiary or tracer bullet, was quickly developed, but the gas still failed to ignite. For a while it was thought that the Zeppelins were provided with a layer of inert gas protecting the hydrogen, but this was not so. The problem turned out to be one of finding a way to mix the hydrogen with enough oxygen to create an explosive mixture, and then set it alight. An explosive projectile was needed, and to fit the standard machine guns. Such a bullet, known as the Pomeroy, was eventually produced, but it also had problems of its own.

If the bullet was too sensitive, it would explode in the gun. If not sensitive enough it would not explode on contact with the gasbag, and the latter characteristic was essential. The whole idea was for the bullet to pierce the outer fabric covering of the Zeppelin without exploding, and then to detonate on the surface of the gasbags. A mixture of incendiary and Pomeroy bullets, finally appeared to be the answer. It now only awaited a trial against a real target.

In September, a combination of factors gave the defenders their first real taste of success.

**Victory over London**

On 2nd September 1916, a fleet of twelve navy airships were detailed for an attack on London. These were augmented by three of the very latest airships provided by the army. At least fourteen of the attackers reached the coast. Adequate warning had been received through the by now very efficient wireless intercept service, and the defenders were ready. The first of the Zeppelins (L11) arrived over London at 1.50 a.m. on the morning of the 3rd September. It was caught in the searchlights and came under heavy fire from the London guns. It immediately released its bombs, without damage or casualties, and beat a hasty retreat.

The co-operation between guns, searchlights and aircraft had by now reached a high degree of understanding and efficiency. The defending fighters had been alerted early and were already on patrol. The pilot of one of these aircraft, Lieutenant W. Leefe Robinson, flying a B.E.2c, had already been on patrol since 11.10 p.m. and had earlier sighted the same airship about 1.00 a.m. on its run in, but lost contact in cloud. Now he sighted it again at 2.00 a.m. on its way out. This time he was at a height of 4,000 metres and well above the airship. He dived towards it and drew close up. Shells from the gun barrage were bursting all round him — and his target — but he continued to press home his attack. Then when he was in position, he fired a recognition flare and the guns stopped firing at once.

Lieutenant Leefe Robinson emptied one drum of mixed incendiary and explosive ammunition into the belly of the Zeppelin, but with no apparent effect. He next flew down one side, again emptying a drum of similar ammunition without any noticeable effect. He then made a third attack concentrating a whole drum on just one part of the hull. This started to glow at once, and in a few seconds the whole rear end was blazing. To observers, suddenly a flame flashed out from one end, and almost at once L11 went into a nose dive.

Fregattenkapitan Peter Strasser, leader of the Zeppelin fleet. He lost his life in one of the last Zeppelin raids over England.
The flames soon spread throughout the whole length of the immense body. The area round London was lit up for miles around as the one and a quarter million cubic feet (31,864 cu. metres) of hydrogen erupted. It took ten minutes for the airship to fall to earth, and it was said that the light was bright enough to read a newspaper at a distance of 25 kilometres. Leefe Robinson quickly slipped out of the way of the falling Zeppelin and landed safety at 2.45 a.m. He was awarded the Victoria Cross for his action.

The effect on the rest of the Zeppelin force was devastating. They had all witnessed the spectacle, some from as far away as 64 kilometres. One by one, they turned for home, dropping their bombs quickly to lighten their load and gain as much height and speed as possible. The 'Leefe Robinson' raid was significant in that it showed the success which could be achieved by a closely co-ordinated and carefully worked out scheme in which guns, searchlights and aircraft each had a definite role, and each supported the other. In fact it was the beginning of the end of the airship menace.

**Effect of the Raids**

Despite the disaster to L11 and the complete failure of what was to have been the greatest air raid of all time, the Germans were not deterred. They quickly recovered from their shyness about London and resumed normal operations about a week later. By now it was obvious to both sides that in combat between an airship and an aircraft, the odds were heavily against the airship. Unless the latter could get completely out of reach of the aircraft, she was virtually useless and particularly vulnerable. Thus began the struggle for more height.

Until now the Germans had been raiding at 3,000 and 3,650 metres. They felt the minimum altitude should now be 4,500 or even 5,000 metres. However, to maintain this height they would need to greatly reduce their bomb load. As this was not readily acceptable, for the time being they decided to stay away from London and attack other targets where the defences were not so strong. The 'Leefe Robinson' raid was significant in that it showed the success which could be achieved by a closely co-ordinated and carefully worked out scheme in which guns, searchlights and aircraft each had a definite role, and each supported the other. In fact it was the beginning of the end of the airship menace.

On 23rd September, a raid was again mounted against London with three of the newest super Zeppelins, with a diverting raid on the Humber area by six of the older airships. The latter attacks resulted in 40 killed and 130 injured, whilst the London casualties amounted to 37 killed and 114 injured. One of the London raiders (L33) received a direct hit from the defending guns, but the shell passed right through the hull. She was also severely damaged by near misses, but continued on her way. She was later intercepted by one of the defending fighters which kept up a running attack for about twenty minutes. Although the Zeppelins did not catch fire, she rapidly lost height. Soon after passing out to sea, she decided to turn back and carried out a forced landing in a field. There was a slight fire which quickly burnt itself out, there being practically no gas left to burn. There was almost no damage to the structure or equipment, and one of the very latest German airships thus fell into British hands more or less intact.

One of the two remaining raiders was intercepted by a British fighter at 4,000 metres, and an attack initiated from below. As had happened before, the first two drums of ammunition appeared to have no effect. It was the third drum which was seen to cause the envelope to catch fire in several places. The airship quickly burst into flames and fell to the ground. The third London raider got away safely, as did the ones which attacked the Humber area, although the latter were diverted by intense A/A fire.
Most Zeppelins were equipped with an observation car, pictured above, which could be lowered on a cable. They were mainly used for navigation and observation when above cloud. They held one man and were equipped with a telephone. Note the tail fin for stability.

End of the Zeppelins

The defending fighters continued to have ever mounting successes against the raiders. The Zeppelins were falling victims to the new incendiary and explosive bullets against which they had no defence. Even the latest, high flying Zeppelins were not immune. One more Zeppelin was destroyed in the next raid on 2nd October, and then another double victory, this time both by fighters, on 28th November. Although the British did not know it at the time, they had just won a great victory. There was only ever to be one more airship raid against London, and that was exactly a year away. In fact in all, there were only to be about another half-dozen or so Zeppelin raids against any part of Britain from here on until the end of the war. However, there was now to be a new and far more deadly threat.

End of the Zeppelins

At noon on 28th November 1916, a single high-flying German aircraft dropped six 10 kg bombs on London. This was the first direct attack on London by an enemy aircraft. Prior to this, small German aircraft and seaplanes, in ones or twos, had dropped a few small bombs along the coast, mainly in the Dover area. The first of these raids occurred as early as 24th December 1914, and by the time of this first London raid there had been a total of twenty-four such raids. However, they did little damage, produced few casualties and were considered merely a routine nuisance.

The damage to London from this first aircraft raid was certainly very slight, with casualties of only ten injured, and no deaths. However, it came without warning and the raider got clean away
without any reaction from the defenders. The raid was not repeated and was soon regarded as one with the 'hit and run' raids on the coast. Although not known at the time, this was to be the last raid on London of any kind, either by airship or aircraft, for just on six months.

There were a few of the raids by single aircraft against coastal towns, and an occasional zeppelin attack against the same targets from time to time. However, it certainly looked as if the defences had at last gained complete mastery over the German raiders.

**The New Threat**

The war in the air over Britain generally became so quiet over the next six months that the lights came on again, most of the guns were withdrawn, and many of the home defence squadrons sent to France. Then suddenly, on 25th May 1917, a force of 29 Gotha bombers attacked Folkestone at 6.30 p.m. It is probable the attack was meant for London, but was diverted because of heavy cloud. There was no warning, and 95 people were killed and 195 injured.

Although no direct warning had been received, the defences were still in a fair state of alert from one of the rare Zeppelin raids which had occurred the night before. They were able to put 74 fighters into the air, but the response was far too late, and in any case few were capable of reaching the height of the raiders. The raiders turned for home unharmed. However, on the return journey they were intercepted by the RNAS at Dunkirk and one was shot down. Another was severely damaged, and crashed on landing at base.

A further raid in strength followed on 5th June when 22 Gochas attacked Sheerness at 6 p.m., resulting in 13 killed and 34 injured. One of the raiders was shot down by A/A fire, but no contact was made by the fighters. The public and government were already alarmed by these two attacks when the Gothas struck at London a week later.

**First Gotha Raid on London**

The first Gotha raid on London came at 11.40 a.m. on 13th June 1917. Eighteen aircraft reached their target and 72 x 50 kg bombs were dropped. All landed within one mile of each other, showing a high
The prototype Gotha (GII) which made its first appearance in late 1916. It was the much improved GIV which went into quantity production and was used in the raids over England.

degree of concentration and accuracy. There was little A/A fire, and although 92 fighters were airborne in defence, not one made a single contact. The defending aircraft came from a variety of sources and all operated individually without any attempt at coordination. The raiders all returned home safely, leaving 192 killed and 432 injured in the one raid. There was now no doubt that the defences were more or less utterly confused, and powerless, against the new weapon. In fact, very little was even known about it, or its performance.

The Gotha

The Gotha bomber was a natural development from the need to carry heavier bombs and more of them. Early attempts at bombing were not really very effective, even in concentration by large numbers of aircraft, because of the extremely limited size and number of bombs which could be carried by the aircraft of the time. Gradually a twin-engined specialised bomber began to emerge and a prototype first flew in 1915.

The first of this long line of twin-engined machines began to enter service in 1916, and took the name 'Gotha' from the first manufacturer, Gothaer Waggonfabrik. About the time it was becoming operational, the limitations of the Zeppelin were becoming obvious, and its production became assured. It was produced throughout the war in a variety of models, from GII to GIX, but all were biplanes, and all were fitted with two engines. However, the one which was produced in any quantity was the GIV.

In general, however, they carried a crew of three and could lift a bomb load of 500 kg over a range of 500 km, or 1000 kg over a shorter distance. The bombs which could be carried included those of 50, 100 and 300 kg individual weights in various combinations, together with incendiaries and the smaller bombs of an earlier vintage. They were three free-firing Parabellum machine guns, one being fitted to fire forward from a gunner’s cockpit in the nose; and a second to fire upwards to the rear and
The Staaken RVI, or 'Giant'. This was by far the largest and most powerful of any aircraft in World War One. They were chiefly used for night raids against London, where they caused heavy damage and casualties.

side from another gunner's position in the rear fuselage. There was a tunnel beneath this which allowed the rear gunner to fire the third gun downwards and behind the tail.

They were fitted with two 260 hp Mercedes D1V engines, mounted in nacelles between the wings on either side of the nose. Because of the particularly deep, double hum of these engines, the Gothas soon became known to the British as the 'Wong-Wongs'.

Problems of the Defence

The chief problem in dealing with the new raider, of course, was the very much shortened warning period. The time taken by the Gothas to reach London, in particular, after first being reported by the observers on the coast, was far less than the time needed for the fighters to climb to height. As the fighters were also without radio they could receive no new information once they became airborne. Also, the raiders were not that easy to find. They presented an extremely small target after the giant Zeppelins. This was said at the time to be 'rather like having to switch overnight from harpooning whales to swatting mosquitoes.'

Above all, the performance of the British fighters was just no match for the Gothas, even if they could make contact. Most of the aircraft in the home defence squadrons were B.E.2c's. They were beautiful aircraft to fly and had been more than good enough for the Zeppelins. They now lacked the rate of climb, speed and ceiling to cope with the Gothas. The very latest fighters were going to be needed to handle the new threat, but for the time being they were all heavily committed in France, where the position was most precarious. Meanwhile, the public and the press began to clamour for action.

Government Action

The very first of the Gotha raids (against Folkestone) clearly revealed the utter failure of the defences. What had been successful against the airship at night was obviously of no use against fast, high flying aircraft by day. A high level committee was set up at once 'to consider and report upon the question of the defence of the United Kingdom against attack by aeroplanes . . .'

No really constructive ideas emerged, other than to strengthen the observer posts, and to make training units more readily available. It was also proposed to build up the front line strength as and when machines and men became available. Even while these talks were going on, there was the second raid (on Sheerness), and then came the first raid on London. The casualties from the latter, totalling 594, were by far the heaviest yet in any single raid. In fact this total was just about the equivalent of three-quarters of all casualties inflicted by the 23 airship raids in 1915, which was the peak year for zeppelins. There was an immediate feeling of deep anxiety and uneasiness among the population. The government at once appreciated the full gravity of the situation and instituted more immediate steps to overcome the weakness in defence.

On the very day following the raid, the Government recalled two fighter squadrons from France for the defence of London, despite the gravity of the situation at the front. One of these squadrons was armed with S.E.5a's which were more than a match for the Gothas. They could climb to 3000 metres in twelve minutes, and had a speed of 190 km/hr, as well as being armed with two forward firing machine guns. The other squadron was armed with Sopwith Pups. These had a ceiling of 5000 metres and an
endurance of three hours. They would be ideal for standing patrols.

At the same time it was decided that many more aircraft for all purposes would be required. An immediate increase in production was ordered, even if it was to be at the expense of other munitions. Plans were drawn up to increase the RFC from 108 squadrons to 200, with the RNAS being expanded in proportion. In effect, this meant that the strength of the air services was to be almost doubled. The significant fact, however, was that most of the new squadrons were to be equipped with bombers.

This, then, was the immediate outcome of a single raid by just on fifty German airmen in eighteen aircraft. Certainly they had caused nearly 600 casualties, but this was a trifle compared to the 2500 casualties the British alone suffered each and every day at the front. Even more than the immediate effects mentioned above, the raid in fact even changed the whole strategy of the war for a time. The view was strongly put forward, and accepted by the government that the most effective step of all against the raiders would be to capture the Belgian coastal area. This would not only break up the hostile air bases in Belgium and force the raiders to fly longer distances. It would also force the bombers to cross territory occupied by the allies, both going and coming. Three months later and after a quarter of a million casualties, the front was not even pierced and the offensive was called off. The Gotha bases remained intact and undisturbed except for the occasional raid by the RNAS from Dunkirk.

Second Raid on London

On 7th July there was a second Gotha daylight raid on London. Seventeen raiders approached in two groups, each of eight, flying in company and all led by a single aircraft. A force of 95 fighters was sent up against them, and 57 gun positions were activated. By a strange twist of fate the two squadrons from France had been sent back to France only the day before. The defenders, although high in numbers, were once again a very motley collection from training and maintenance units as well as the few, but outdated, operational squadrons. Most were of little or no fighting value, and once again the raid showed the futility of an unorganised defence.

Nevertheless, three of the defenders did succeed in making contact, but two were killed by the well coordinated and heavy fire from the Gothas. The third was turned away severely wounded. The guns managed to damage one of the Gothas, and this was forced to land in the sea. Total casualties in London were 103 people killed and 316 injured. It was this raid, more than any other single event, which led to the creation of the Royal Air Force as an independent service.

The Smuts Committee

The psychological shock of this second raid on London within a month, and again in broad daylight, was prodigious. As one writer put it at the time: “Alarm and anger re-echoed in the press, affecting public and politician alike”. The cabinet was absolutely shocked by the weakness of the defences and saw, clearly at last, that just to provide extra aircraft was not going to be the answer. Apart from their inability to cope with the new threat in the air, the air services were also creating problems of a different kind.

The RFC and RNAS were competing against each other for men, machines and engines amid a confusion of claims and priorities. A special Air Board had already been set up to try and sort all this out, but without much success. In particular, there was also the division of operational control between the Admiralty and the War Office and there was no existing level below cabinet to decide on priorities of one kind and another. Many people in high places, therefore, were already beginning to feel that there was a need for unification. It was also becoming apparent that there now appeared to be a specialised and separate role for the air services, divided or not. The need to defend London from the air, and carry out independent bombing attacks, clearly indicated that they no longer existed just to support the navy and army.

The government decided a complete overhaul of the whole system was needed, and that it had to be done at once. Just four days after the raid on 11th July, they set up a committee to investigate, and make recommendations on: “The defence arrangements for home defence against air raids, and the air organisational generally and the higher direction of aerial operations”. The Prime Minister (Lloyd George) felt the whole perplexing question called for “a fresh mind, free from departmental prejudices”. His choice fell on Lieutenant-General Jan Christian Smuts. At the time Smuts, who was a former foe in the Boer War but now a staunch friend and ally of Britain, was the Prime Minister of South Africa. He was visiting London to attend a meeting of the Committee of Imperial Defence.
The committee as set up consisted only of Lloyd George and Smuts. In the event, it was left entirely to Smuts, with the Prime Minister doing nothing except to provide the prestige of his title. The Smuts report, as it soon became known, was completed in exactly one month. It was handed to Cabinet on 17th August 1917 and was in two parts in accordance with the terms of reference. The first and most immediate concerned the defence arrangements for Great Britain, and London in particular.

**London Defences**

The Smuts Report came right to the heart of the matter regarding defences. The existing system had been built up solely against night attacks by zeppelins. Under these conditions once even a lone fighter, armed with the proper ammunition, came within range of an airship its destruction was almost certain. Also in the case of the guns, the target was a large one, and once illuminated could be held for long periods. There was no need to concentrate either guns or aircraft in time or space. The new day attacks by close formations of enemy aircraft needed a heavy, and co-ordinated, concentration of both. The first recommendation proposed the setting up of a barrage of A/A guns in a ring some 40 km around London. This was to be used to break up the enemy formations, so that the fighters would be able to take on single raiders, which would then be deprived of the supporting fire from others in their formation. Additionally, the defending fighters were to be established at altitude, on standing patrols, ready to pounce on the raiders once their formations were broken up by the guns. Additional squadrons were to be formed at once and located along the route to London. All pilots were to be trained to fly and fight in formation whenever possible.

Finally, the whole of south-east England was to become a single Air Defence Area under the one commander. He was to have complete authority over all the defences, including guns and searchlights as well as all aircraft. Included in this single command also was the complete warning system of observers and communications. In addition, the RNAS units at Dunkirk were brought into this defence net, and given the task of intercepting the raiders on their way home.

The second part of the Smuts Report relating to the higher organisation of the air services was also submitted on 17th August. It proposed that a separate Air Ministry be set up, having its own Minister and an Air Council along the lines of the Army Council and Board of Admiralty. The RNAS and the RFC were to be amalgamated into one service, to be known as the Royal Air Force, and placed under the direct control of the new Air Ministry. It was proposed, and agreed, that the Air Ministry, with staff, be set up at once to work out “the arrangements necessary for the amalgamation of the Royal Naval Air Service and the Royal Flying Corps and the legal constitution and discipline of the new service . . .”.

The Air Force Bill, which created the Royal Air Force, was introduced into Parliament on 8th November 1917, and received Royal assent on 29th November. The Air Council was formally constituted on 3rd January, 1918, with the Royal Air Force officially coming into being on 1st April, 1918. On that date, all naval personnel serving with the RNAS, and all army personnel serving with the RFC were automatically attached to the RAF. The new terms of reference made it quite clear that the air service now had a role of its own, and was no longer merely an ancilliary to naval and military operations.

**Daylight Raids End**

Oddly enough, after the raid on 7th July, London was never again attacked by day. In fact, throughout the whole of Britain, there were only to be three more daylight raids before they stopped altogether on 22nd August. During these last few daylight raids, the new defences were already to prove most successful. The gun barrage was so intensive and accurate that four of the Gothas were shot down in flames. The defending fighters were also able to shoot down two more of the raiders.

The new defences were now forcing the Gothas to either fly above 5000 metres, or abandon their daylight tactics altogether. The Germans decided on the latter, and henceforth all raids against Britain would be at night. This in itself would create new problems for the defence, but in addition, the Germans introduced new tactics which made it even more difficult.

The first of the night bomber attacks began on 2nd September, with a raid on Dover. It was a moonlit night, and two Gothas appeared over the town at 11.15 p.m. without warning, dropped their bombs and disappeared without any of the guns or aircraft coming into action. Casualties on the ground were light. The next night two more bombers crossed the coast and attacked Chatham, where they
dropped 26 bombs at 11.00 p.m. Two of these fell on the naval barracks and killed 130 sailors, and injuring another 88. Again, neither of the Gothas were seen, and no A/A guns or aircraft came into action.

Then the following night they came to London. The moon was still full, and 26 bombers in all crossed the coast. Now they were to use their new tactics and further confuse the defence. The raiders attacked in seven separate groups, or waves, spread out over a two hour period. To make it even more protracted and difficult for the defences, individual aircraft within each group were spaced out with about five minute intervals between them. Damage to buildings was quite heavy, but casualties were light. In all, about 800 A/A shells were fired, but only one hit was recorded. Eighteen aircraft went up to attack, only two made contact, and they were only able to fire a few rounds before they also lost their targets.

New Defence Measures

These night attacks caused further immediate and extreme concern to the government. On 5th September Smuts was once more called upon, and asked 'to hold an investigation into the last two nights' raids and forward this to War Cabinet with his views on the provision of protection for the civil population in the future, and his proposals as to carrying the air war into Germany at the earliest moment.' Smuts actually had the paper ready the following day, in which he set out the main aspects of the problem.

He stressed that 'the only proper defence against the night attacks was an offensive aimed at the enemy's air bases. Our aeroplanes afford no means of defence at night, as they find it impossible to see the enemy machines even at a distance of a few hundred yards. In recent night raids . . . they might just as well have remained on the ground.' He went on to suggest the introduction of two special measures.

The first was the installation of much more powerful searchlights with the object of blinding the enemy pilots, and so making it difficult to navigate and aim their bombs. The second idea was to establish a wire screen, or apron, hung from balloons to form a barrier in which the enemy machines might be caught, or which would force them higher up. Ten of these were eventually deployed on the approaches to London, with their tops at 3000 metres.

The remarks by Smuts about the fighters were certainly true in regard to the 'state of the art' at the time. However, a new but simple technique soon enabled the defending fighters to achieve some spectacular successes. The idea was for two or more searchlights to direct their beams as accurately as possible on the sound made by enemy aircraft, and not to weave the beams back and forth in a search pattern as they had been doing. The defending fighter would then fly towards the meeting point of the beams. While these may not actually be right on the enemy raider, the pilot now had a reasonable chance of finding his target by its exhaust flames.

All guns were required to remain silent within a recognised area. Conversely, none of the defending fighters were to fly outside this zone, and the guns could then assume any aircraft found in the outer zone were hostile. The system was soon refined by the introduction of accurate height finding and sound locator systems.

The Blitz Begins

After the raid on 5th September, there was a lull until 24th September, when the moon again entered its first quarter. This now became the signal for a nightly series of heavy attacks to begin. On the 24th sixteen Gothas crossed the coast at intervals, but only three had London as their objective. The remainder attacked Dover and other targets in Kent and Essex. Thirty defending aircraft were sent aloft, but no contacts were made. The guns also failed to secure a hit and all Gothas returned safely to base. But now yet another dimension had been introduced by the Germans. Hardly had the last of the Gothas left the coast, when ten zeppelins crossed the coast and bombed targets in Lincolnshire. They also escaped unharmed.

Then, following this 'double' raid, and starting on the 28th September, raids by up to 25 Gothas at a time were made on London on four successive nights. Actual casualties were light, but property damage was severe. In one raid alone, 700 houses were destroyed. Between twenty and thirty fighters were sent up for each raid, but had no successes. The guns were now capable of putting up a particularly fearsome barrage. On one of the nights in question, for example, the guns around London fired 12,700 shells. In fact the falling shrapnel and other debris from these barrages were beginning to create
problems and damage of their own. No doubt all this concentrated fire managed to keep some of the raiders away, but over the four nights they only managed to shoot down one of them.

During these raids the Germans managed to spring yet another surprise. On each of the four nights the Gothas were accompanied by up to three special bombers of an entirely new type. These were the first four-engined bombers to ever enter service on either side. They were officially known as the R-type, or Staaken, but were really an enormous aircraft for their day and soon became known as 'The Giants', both by the British and the Germans.

The Giants

The Staaken, or Giant, was a four-engined biplane of extremely large dimensions by any standards. It had a wing span of 42 metres, which was 10 metres more than the Handley-Page Halifax of World War Two, and only 0.9 of a metre shorter than the B-29 Superfortresses. In fact it was only two metres shorter along the wing than the present day Boeing 707 airliner. In total, 64 of these huge aircraft were built, in over twenty variants, at six separate plants. The principal of these was the Zeppelin works at Staaken, from which the giant took its official name. Their development goes back to before the start of World War One.

The first four-engined aircraft ever built was designed in 1912 by Sikorsky in Russia, where it flew for the first time in May 1913. It was known as 'Le Grand' and appeared to perform quite well. The forward part of the fuselage, quite ahead of its time, was built as a fully enclosed cabin, with full protection for the occupants. One year later, the Russians successfully built an even bigger version which flew with sixteen people aboard.

The Germans carefully noted these Russian developments, and even had considered a design of their own before the war. The first of their own multi-engined bombers (the RI) actually flew on 11th April, 1915. It was very much an experimental machine, being fitted with three engines. One was positioned in the nose, with one other on either side in the wing bays. This was quickly followed by another prototype (RII), but both were considerably underpowered with their all-up weight of nine tonnes. The next in the series (RIII) was fitted with six 110 hp Mercedes DIII engines, mounted in pairs in tandem. One pair was in the nose, geared to drive a single tractor propeller. The other pairs were mounted in nacelles in outboard positions between the wings. Each of these pairs was geared to drive a single pusher propeller at the rear.

These early models led to the final production model, the RIV series, which went into production in September 1917. These were fitted with five 220 hp Mercedes Benz engines, with one in the nose, and two on each side paired in tandem in nacelles. The outboard pairs were now geared to drive tractor propellers. The engine arrangement was later modified in the RVI to just two pairs of engines in nacelles in the wings. Other models did appear from time to time, but usually in no more than a single variant.

The Giants generally carried a crew of seven, but at times this could be increased to eleven. They had positions for seven machine guns, and could carry up to eighteen 100 kg bombs internally, or heavier bombs at 300 kg and even 1000 kg externally. They could lift a total bomb load of 2000 kg, but this was usually averaged out at about 1000 kg for longer trips. The aircraft themselves were extremely strongly constructed. The undercarriage was really sturdy, consisting of sixteen wheels each just on a metre in diameter, and mounted on two great axles. There was also a smaller auxiliary set of two wheels attached to the nose.

Each of the engine nacelles had a small cockpit in the rear to house a mechanic who could thus carry out repairs in flight. Each of these cockpits were also equipped with a machine gun operated by the mechanic. There was also a streamlined machine gun position in the centre of the top wing. It was reached by a ladder from the nose, and was known as the 'Swallow’s Nest'. Later models all had enclosed cockpits at least for the two pilots, and all aircraft were fully equipped with oxygen for the crew. They even had a pneumatic tube system for communicating with the various crew positions. Each Giant squadron was limited to a total of three aircraft.

The introduction of the Giants once again confused the defenders. The sound detectors and height finders in particular were rendered almost useless by the new aircraft and these were now playing a most important role in the night defences. The sound of the Giants was so much greater than the Gothas to which they had been tuned. A Giant at say 20 kilometres equalled that of a Gotha much closer. A mixed force was most confusing to these items of equipment. Similarly, the pilots of the defending aircraft had become quite proficient at judging range against the Gothas. They were now confused at first when confronted by an aircraft almost twice
At the end of WWI, No. 4 sqdn, Australian Flying Corps, moved into Germany as part of the Allied Occupation Force. They were located at an aerodrome at Bickendorf, near Cologne, which had been a heavy bomber base. There they found several Staaken 'Giants' with the fabric stripped as in the picture above which give a close up of the construction. The photo also gives a good idea of the size, compared to the Australian airmen. (AWM Neg No 4147)

The Independent Air Force

It was not necessarily the casualties, nor the physical damage, which caused the actual disruption to production. Whenever a warning was sounded, factories (most of which worked round the clock) were evacuated, and all trains and other transport brought to a standstill. Many workers would not report back for duty for a further twenty-four hours, by which time there would probably be another raid. The disruption to normal family and social life was tremendous. For example, even in those far off days, at least 100,000 people sought shelter each night in the underground stations. In summary, it was estimated at the time of the September raids that the output from the munition factories alone had been reduced to less than one-fifth of normal.

The press were strongly agitating for reprisals, and the population as a whole wanted to feel that the enemy would also suffer on their home front. The government was not slow to institute a special bombing force for attacks against Germany. A unit of long range bombers was hurriedly gathered together in France, and was soon expanded into what became known as the Independent Force. This then also became a very significant step in the development of the RAF.

Attacks on enemy aerodromes began on 25th September, and were repeated every day for over a week. These raids resulted in immediate disruption to the daytime overhaul of the night flying squadrons to such an extent that the Gotha squadrons were forced to withdraw and establish bases further to the north-east out of range. Then, as longer range aircraft became available, an offensive was activated against munition plants and military objectives generally in Germany. This campaign was then continued with vigour for the remainder of the war. This campaign deserves a story of its own, but in summary there were a total of just on 700 raids carried out on important German industrial and other centres, resulting in 750 killed and 1850 injured, with quite heavy damage. The real value, of course was — as in Britain — the increasing effect on morale and disruption to production. Also, again as in Britain, the Germans were forced to divert an ever increasing amount of resources to the defence of the homeland.

Despite the disruption to the German bomber bases, and industry, the Germans were able to maintain the pressure of their raids on Britain. A force of less than thirty German aircraft continued to hold down nearly ten times that number of aircraft in defence against them, to say nothing of the diversion of skilled pilots, mechanics and aircraft from France.

By the end of October, the moon was full once more, and on 29th October the raids over England
were resumed with a light attack on the coastal areas by three Gothas. Then on the 31st, a force of 22 Gothas crossed the coast en route to London. Most of the attackers were, however, scattered by a combination of the gun barrage and bad weather, and released their bombs on the coastal towns with only light casualties. There was then a lull until 6th December when six Gothas attacked London, dropping a total of 395 incendiary bombs. Damage from fires was very heavy, although casualties were again light. Two of the raiders were shot down by gun fire, and three others damaged. There were two more raids by Gothas against London during December, for the loss of three more of the raiders, with few casualties and little damage.

Then on 28th January 1918, there was another combined raid by Gothas and Giants. Thirteen Gothas and one Giant had set out, but six had to turn back because of fog and poor visibility. Four Gothas attacked the coastal towns, while three Gothas and the Giant carried on to London. One of the Gothas was shot down by patrolling fighters before dropping its bombs, but the others all reached their objectives. A great number of houses were destroyed, and casualties were heavy, with 51 killed and 136 injured. Most of the casualties came from the Giant, which on this raid carried 1200 kg of bombs, including two of 300 kg each, being the heaviest ever dropped by any aircraft to that date.

On its way in, the Giant had been intercepted by one of the defending fighters. A fierce fight ensued, but a hit in the engine put the British aircraft out of action, and the observer was wounded. The Giant then resumed its course, but flew into the balloon apron. It was apparently unharmed and continued in to its attack, leaving the apron itself badly damaged.

The following night four Giants set out to attack London on their own, but one turned back with engine trouble. Of the three which reached London, one was turned back early by the barrage fire. One of the remaining two was then attacked at 3500 metres by a defending fighter which scored some hits and forced the enemy to turn away before releasing its bombs. The one remaining Giant was then intercepted by four of the defenders who attacked simultaneously. There was no visible damage, but it also was forced to release its full load of bombs harmlessly, and turned back immediately.

On 16th February, one of the attacking Giants had on board a bomb weighing 1000 kg, which it released successfully, scoring a direct hit on the Chelsea Barracks, but with very few casualties. Attacks by Gothas and Giants continued into February and March, with some successes on both sides. Then suddenly, the Zeppelins returned to the attack.

### Last Zeppelins

On 10th March, two Zeppelins raided Grimsby and Hull, and again on 13th March a single airship attacked the same area. There was no damage or casualties on either occasion. Several interceptions were attempted, but the Zeppelins were at 6000 metres and could not be reached. Then on 12th April, five Zeppelins attacked Birmingham and other industrial towns in the midlands. Each carried 2500 kg of bombs, by far the heaviest load yet. Despite this, they were able to cruise at heights of up to 6500 metres, which made them immune to both gun and aircraft. It began to appear as if the Zeppelin might yet again prove to be a serious menace. However, they only paid one more visit to England before the end of the war, despite their new immunity.

The last raid by the airships took place on the night of 5th August 1918, when five airships set out from home. The force included the L70 which had only been commissioned the month before. It was the very latest model and was fitted with seven 290 hp Maybach engines, the most powerful to date. Even more importantly, it carried on board Fregattenkapitan Peter Strasser, who was the overall commander of the entire Zeppelin fleet.

The raiders split into two forces as they approached the British coast, and one group, including the L70, headed for Norfolk. The others turned south towards Yarmouth. Almost at once the northern force was intercepted by a D.H.4 and L70 was shot down in flames. All aboard, including Strasser, were killed. The remaining airships all turned back and released their bombs harmlessly in the sea. They were never again to be seen over England.

### Final Aircraft Attacks

The defences had really reached their peak of efficiency by May, when on the night of 19th May eight Gothas were either destroyed or forced down by defending aircraft and guns. This raid turned out to be not only the largest of the series, but was also the very last. It was a moonlit night, as usual, and from about 10 p.m. and for the next three hours there was a continuous stream of enemy bombers
This is the Gotha GIV which was used extensively in World War One for the bombing of London. It first came into squadron service in March 1917.

over Dover and London. In total, the attacking force consisted of 43 aircraft, made up of 38 Gothas, three Giants and two smaller aircraft. Between them they carried a total of 14 tonnes of high explosive bombs. Seventy-two bombs fell on London, killing 48 people and injuring 170, as well as damaging over 1,000 houses. A further 85 bombs were dropped in the Dover area, but with only superficial damage to property, whilst no one was killed and only four were injured.

This attack ended the German bombing raids by aircraft. On three further occasions — in June and July — enemy aircraft did in fact cross the coast. On each occasion it was by a single aircraft, and no bombs were dropped. It was thus left to the Zeppelins to have the final say with their raid on 5th August, already described. At long last the defenders had cleared the skies over Great Britain.

**Final Tally**

In retrospect, the German air raids on Great Britain do not appear to have been either sustained enough or powerful enough to have been worth the effort. The total military effort was, however, quite significant. In all, there was a total of 51 airship raids and 52 aircraft raids in which bombs were dropped. The Zeppelins dropped 5,806 bombs, weighing 196 tons; and the aircraft delivered 2,772 bombs weighing 74 tons. The total casualties from both sources were 1,414 killed and 3,416 injured. The London casualties, included in these figures, were 835 killed and 1,972 injured, or a total of 2,807. Total damage from all causes was estimated at just under three million pounds. The cost to the Germans was 23 Zeppelins and 23 aircraft lost to the defenders, while another 8 Zeppelins and 35 aircraft were lost from other causes while on operations.

The above figures in themselves may not appear to have had a very great effect on Great Britain, or its ability to carry on the war. However, for the loss of a comparatively few aircraft and airships, there was a very real effect in diversion of men and material from the active battlefronts to the home front. By June 1918 there were held back in Britain, a total of 469 guns, 622 searchlights, 258 height finders and ten sound locators. These were manned by a force of 6,136 officers and men. In addition, the RAF were holding 376 front line aircraft in Britain solely for home defence, which absorbed a strength of 2,665 all ranks.
In addition, there was the vast quantity of material and labour needed to build the airfields, gun positions, air raid shelters, and other military works. Also to be included is the huge amount of other equipment, fuel and ammunition. The barrage had come to fire as many as 20,000 rounds of 3-inch shells during the one raid. The life of a gun was put at 1500 rounds, so this would also mean at least twelve to fourteen guns had to be replaced after each attack.

Compare all this to the strength of the German raiding force. Except for the last great raid in May 1918, the greatest number of bombers which set out to attack Britain at any time was 27. There were, in fact, seldom more than 28 over the target and usually far less. For the airship raids no more than eleven were ever launched at once, and usually it was less than half this number. The number which actually crossed the coast was seldom more than five, and these usually dispersed in ones and twos to separate target areas. Finally, and perhaps most importantly, perhaps, was the fact that the Germans always had the great advantage of surprise.

For the British, however, it was a great challenge. They did not know in what strength, or how often, the attackers might appear. They were, within a fairly short time, to achieve complete mastery over the Zeppelins. Subsequently, despite earlier setbacks, they were also able to defeat the bombers. The manner in which they achieved these victories and the organisation and tactics adopted were to stand the RAF in good stead some just over twenty years later when they faced an even greater threat.

In that vital summer of 1940, just how many realised that the very service itself, and the basic principles in use, had been evolved in that much earlier, and much forgotten Battle of Britain?

**NOTES**

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Weller, Group Captain E. M., RAAF
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Wythes, Wing Commander P. J., RAAF
Quinn, Major Kathryn E., AA Psych Corps

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