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Front Cover

Buglers from the Menin Gate, Ieper, Belgium on a visit to Australia.

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Remembrance Day 1997, Australian War Memorial.

Letters to the Editor

Dear Editor

A.R. Bannister-Tyrrell perpetuates two myths in “Leadership” (ADFJ Sep-Oct 97).

The **first** is that the leadership-management debate serves a useful purpose in the ADF. There has been no greater waste of time and effort than the endless pursuit of some glib definitive demarcation between the two elements of the process by which individuals achieve results through the efforts of others.

This obsession seems confined to our profession. Most groups use the terms interchangeably, or at least cross the boundaries between the two without the need for a passport!

This pointless lusting after some pure, heroic, even mythological, state, to which a few special mortals manage to escape from the earthly trappings of mere management, and reach Olympian heights of inspirational leadership, obscures the fact that working effectively through others demands the effective use of every resource available to us. We cannot afford to be blinkered by any perceptions of a “first and second eleven” of executive functions.

The **second** myth is that leadership is something that leaders do. In fact, it is something that arises from the special relationship between the leader and the led. While the use of legal authority is essential in a military organisation, it can also cause us to confuse obeying with following. By concentrating on the person at the head of the pack, we overlook the fact that the final decision as to who leads, rests with those who choose whether, and whom, to follow.

It has been said that the most important leadership technique is the regular glance over the shoulder – to see whether anyone is still there! In a working life of over 30 years, I have followed some and merely obeyed many others. Unfortunately, too few of them ever thought to take that critical glance.

If we want to produce leaders, we must focus on the development of their two critical faculties: the perceptiveness to understand what potential followers expect of them, and the versatility and flexibility to deliver on those expectations.

*J R Leonard
SQNLDR
CO 21SQN*

*The Board of Management and Staff
of the Australian Defence Force Journal
Wish you a Merry Christmas
and a Happy and Prosperous New Year*



Military Logistics: What is it and Who Cares Anyway?

By Colonel Win L. Fowles, ARES

Introduction

Military logisticians lament that they are a sad and embittered race. They are sad because no one knows what they do or why it is important. They are embittered because no one wants to know.

So, what is military logistics? And why is it important for military people who claim to be non-logisticians to know something about logistics?

The official military definition tells us that logistics is the:

Science of planning and carrying out the movement and maintenance of forces.

Official publications often expand this definition further, but these 12 words really say it all. They bear closer examination.

The word *science* implies quantitative, objective, unadorned fact as opposed to qualitative, subjective and embellished opinion. Art, if you prefer.

Objective Science or Subjective Art

Is logistics an objective science or subjective art? Or a mixture of both?

Logisticians certainly require facts if they are to do their job properly. Things like ammunition usage rates, vehicle breakdown statistics and aircraft fuel capacities are grist to the logistician's mill. So are hundreds of other facts. Logistics is definitely a science.

A brief inspection shows that logistics also has an element of art in it, even though this is slightly at odds with the official definition.

Scholars of Clausewitz's "friction of war" will recognise that today's dead-certain forecast can be tomorrow's massive error of judgement. Dead-certain forecasts have a habit of not coming true. The "facts" change. And change rapidly.

No logistician can be sure of having all the facts all the time. This means that an element of opinion – informed opinion but opinion nonetheless – must

impinge on the logistician's deliberations. And this means that logistics is an art as well as a science.

The *planning* part of the definition should be obvious. If you cannot plan then you cannot be a logistician. Simple.

Carrying out is different. This term implies execution and execution implies having both the authority and the responsibility to implement a given course of action.

But nobody on a military staff – any staff – has the inherent authority to implement anything. A brigade staff officer cannot unilaterally order a battalion commander to attack an enemy position unless the brigade commander has authorised the staff officer to give such an order. And even then the brigade commander remains responsible for the staff officer's actions.

Authority is vested in the commander, not in his staff officers. And it is the commander who is always accountable to higher authority for the actions of all those under his command.

Authority can be delegated. Accountability cannot.

If the "carrying out" part of the definition is correct then accountability for logistic decisions is, clearly, vested in the commander. It is the commander, and only the commander, who has the inherent authority to "carry out."

A commander can certainly delegate his powers as he sees fit but he remains accountable in the fullest sense of the word.

This means that the chief logistician in a military force is not some staff officer with the title of "Staff Officer Logistics" or "J4" or whatever. Nor is the force's chief logistician the commander of a subordinate support organisation such as a fleet support vessel or a combat service support battalion or a transport unit.

The force's chief logistician is the force's commander. To say otherwise is also to say that the commander is not the chief tactician or the chief of personnel policy or the chief of anything else. This issue is worth revisiting later. It is important.

Movement is a self-evident, if often misunderstood², term. Sufficient to say here that to qualify as a logistician one must plan for, and carry out, the movement function.

Maintenance can refer only to repair; fixing things. In a wider sense it encompasses all activities needed to sustain a force – supply, transport, facilities and other services as well as repair. It seems clear that the definition embraces this wider sense.

The logistician must, as with movement, plan for and carry out the maintenance function.

Forces are the maritime, land and air components that can influence the outcome of an individual battle or an entire campaign.

The term is narrower in relation to a battle than it is to a campaign. The former implies tactics while the latter implies strategy. This means that consideration of “forces” for a campaign must include consideration of the nation’s training base and its materiel support base because both form the foundation for longer term military success.

In other words, a logistician must not merely take interest in the movement and maintenance of forces on a particular battlefield. He must also be cognisant of, and take action in regard to, the movement and maintenance of forces which may be required later in the campaign.

The definition seems sound enough. Perhaps the word “art” could be added so that the human dimension of logistics is not forgotten.

Why Worry About Definitions?

Why worry about definitions at all? Who cares?

The answer is simple. Without an understanding of the fundamentals of a profession one cannot hope for success within it. Definitions are part of the fundamentals of the defence profession and therefore need to be understood by its uniformed and civilian practitioners.

This is not to say that definitions are dogma but, as with principles, they need careful study before changes are made to suit a particular situation. Changes should be based on reason and commonsense and not on the opinion of the loudest person present at the time or, worse, through ignorance of the extant definitions and principles.

More fundamentally, agreed military definitions provide a common basis of understanding. They also save time and confusion because all defence professionals understand exactly what a given term means. That is why definitions are agreed internationally and promulgated widely.

Military definitions are the defence equivalent of legal terminology. Both are often criticised as jargon or pedantry but in fact have precise meanings which

their respective practitioners need to clearly understand.

The definition of logistics is no different. One cannot claim to be a defence professional without clearly understanding what logistics is.

This leads to the reason why it is important that military people need to know something about logistics even if they claim to be non-logisticians. This point was alluded to earlier.

Once upon a time we did not have the word “logistics”. Its elements were included in the term “war administration”. So were other things.

“Administration” was a good word, despite being a little vague. It was good because all uniformed people were weaned on the knowledge that administration is a function of command. They still are.

Any military college graduate, recent or relic, is well aware that administration is a command problem even though administration is not the stuff of glory.

Now, because administration is a function of command, the ambitious learn enough about it to get by. But higher command positions particularly in peacetime are almost exclusively held by people – warriors – who abhor administration.

Conversely, people who are good at administration rarely reach higher command in peacetime.³

Ambitious warriors do not get their kicks from administration. They do it because they know they have to but they would much rather be out there manoeuvring destroyers or firing howitzers or seizing a joystick.

Warriors get promoted in peacetime whether they would be good wartime administrators or not. And in peacetime the warrior need only know enough administration to get by. But at least that’s something.

What of logistics? Logistics is certainly a sub-set of administration so in a logical world the warriors should pay it some small attention.

But warriors tend to equate logistics with support people, particularly transporters, suppliers and repairers. Logistics is wrongly seen to be entirely different from administration and is thus (usually) rather beneath the peacetime warrior’s dignity to deal with or even understand.

Many military transporters, suppliers and repairers compound the felony by insisting that logistics is solely their preserve. They treat logistics as a black art which is best left to them because, in their opinion, the warriors are incapable of understanding it even if they wanted to.

They call themselves logisticians instead of service providers⁴, which is what transporters and suppliers and repairers really are.

Now none of this is to say that all commanders must have a detailed technical knowledge of all aspects of the movement and maintenance of forces. They don't.

Nor do commanders need to have a detailed technical knowledge of destroyers or artillery or fighter aircraft. And commanders also do not need to be pilots or submariners or signallers.

The good commander has a broad knowledge of the capabilities of all elements under his command. He then draws on the technical expertise of his expert advisers before he, and he alone, makes the decisions.

Conclusion

So it is with the commanders and logistics. Expert advice is needed on transport and supply and repair issues (and others) before the commander, and the commander alone, makes a logistic decision.

In the same way that the commander is the ultimate authority on tactics or fire support or

anything else, so is he the ultimate authority on logistics. And the sting in the tail is that he is accountable for logistic decisions made within his command in the same way that he is accountable for tactical decisions or fire support decisions or any other decision.

This means that he who aspires to command must understand logistics no less than he understands tactics or fire support or anything else. To do otherwise is to expose his troops, his mission and his nation to an unacceptable and entirely avoidable risk.

NOTES

1. The masculine is used because it is convenient and more accurate, not because the author is in any sense an unreconstructed chauvinist. Note that women are not yet allowed to crew tanks or to join the infantry. They are therefore less likely at present to achieve combat command than men.
2. "Movement" is not "transport."
3. Wartime is a different matter. That is because wartime commanders who are good at administration tend to win their wars while sacrificing few of their own people and many of the enemy's. Unfortunately for the good wartime administrator there is no similar key performance indicator in peacetime.
4. Perhaps the former term has a *cachet* lacking in the latter. "Service provider" smacks of ordinariness whereas "logistician" has a certain mystique if only because so few know what logistics is or what logisticians do.

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HMAS Collins seen running on the surface off the Western Australian Coast.

Photograph: LSPH Peter Lewis RAN

Detection of Submerged Vessels Using Remote Sensing Techniques

By Squadron Leader G.G. Wren, RAAF and
Squadron Leader D. May, RAAF

Introduction

Conventional mission proven technologies for the detection of submerged vessels involve both acoustic and non-acoustic techniques. These techniques are highly effective in sector location of submerged vessels. However, their ability to conduct wide area surveillance (WAS) and provide regular reporting is limited. Submerged vessels may also be detectable using oceanographic remote sensing technologies. Elevated sensors on a Low Earth Orbit (LEO) satellite, or aboard an Uninhabited Aerial Vehicle (UAV), may provide improved capabilities to satisfy the spatial and temporal requirements of WAS¹. This article considers the potential application of oceanographic remote sensing techniques to the detection of submerged vessels.

Acoustic techniques comprise active and passive sonar which requires the insertion of sensors into the water either to detect sound waves produced by the vessel's propulsion systems (passive) or detect reflected sound waves emitted by the sensor system itself (active). Detected information is transmitted back to an air or seaborne platform where processing is carried out. Besides visual detection, the primary *non-acoustic* method is Magnetic Anomaly Detection (MAD). This technology is mature and is used by the RAN and the RAAF's long-range maritime patrol aircraft.

There are several emerging techniques in oceanographic remote sensing for detecting submerged vessels. These methods range from the direct detection of the vessel structure, to indirect detection through analysis of the effect the vessel has on the surrounding marine environment. Advances in technology, such as detector sensitivity, are now making the operational use of these techniques more feasible.

Wide Area Surveillance

Conventional acoustic and non-acoustic detection techniques have limited application to wide area surveillance (WAS). A predominant reason is the limited range of the detection technique due to the nature of the physical phenomena being sensed. For example, MAD detects the local disturbance in the earth's magnetic field caused by a concentrated ferromagnetic body (e.g. a vessel's hull). However, given that magnetic field strength reduces with the cube of the distance, the range of such sensors is limited; current sensors are only effective out to a few thousand feet. Acoustic detection over a wide area requires the extensive deployment of sonar buoys or towed arrays and the data fusion of their responses to provide a surveillance picture.

Another limitation of conventional techniques to WAS concerns revisit time, that is, the period between successive surveillance of the same area. The entire Royal Australian Navy (RAN) fleet would, at maximum effort, have difficulty maintaining adequate coverage over Northern Australia alone, with each vessel being required to cover about 300 km of coast each day². The minimum revisit time required to provide adequate warning of a vessel's advance across our closest maritime approach is about five hours (around half a vessel's transit time)³. Moreover, it takes around 25 days for a maritime patrol aircraft to provide repeated radar coverage of Australia's area of direct military interest (ADMI)⁴. This estimate suggests that revisit times for acoustic coverage of the ADMI would be significant.

Elevated sensors in LEO⁵, or on high-altitude UAVs, may provide an opportunity to satisfy the spatial and temporal requirements of WAS. While platform issues are of interest, this article will focus on the merits of the sensing techniques. Contributing factors include advances in minimising submarine signatures making passive acoustic detection increasingly difficult.

Overview of Environmental Characteristics

There are two methods by which a submerged vessel could be located: direct and indirect detection. Direct detection involves locating the vessel structure itself; the indirect method involves the detection of environmental anomalies caused by the presence of a submerged vessel.

Direct Detection

Submerged vessels may be directly detectable by observing how a hull absorbs or reflects blue-green laser light (450-550 nm)⁶. This response could be used to create an image with the vessel appearing as either a bright spot in the normal background scattering of the ocean, or as a hole.

Indirect Detection

All other methods of detection are by indirect means. These are classified into: physical surface effects, optical effects and thermal effects.

Physical Surface Effects

The major physical surface characteristic is the wake developed by a vessel when it is mobile. The characteristics of the wake will be a function of the speed, depth and size of the vessel. Three separate hydrodynamic phenomena are either directly or indirectly caused by the wake: the Benoulli hump, Kelvin waves, and the surface effect of internal waves.

The Benoulli Hump. If a submarine travels at high speed near the surface of the ocean it produces a characteristic hump of water which is sometimes referred to as the Benoulli hump. The size of the Benoulli hump decreases rapidly with submarine speed and depth. For example, the height of the hump reduces from about six centimetres to one millimetre when a given submarine reduces its speed and increases its depth from 20 knots and 50 metres to five knots and 100 metres, respectively⁷.

Kelvin Waves. Kelvin waves are produced by both ships and submarines and are responsible for the characteristic "V" shaped wake that can be seen to linger behind a moving vessel. They have an angle of approximately 39° which is independent of the size of the vessel or the speed at which it is travelling⁸. Kelvin waves, like the Benoulli hump, reduce rapidly in size with submarine speed and depth. Using the above example, the wave size reduces from about two centimetres to immeasurably small.

Internal Waves. Internal waves are periodic variations in the temperature and density of water at depths near a *thermocline*, an ocean layer in which the temperature drops and the density rises sharply with increasing depth. The period of internal waves, known as the Brunt-Vaisala period, varies with time and location but is typically between 10 and 100 minutes⁹. The displacement of water associated with internal waves is influenced by many factors, including atmospheric pressure variations, ocean currents, and the presence of a submarine. In addition, internal waves are often formed in areas where the ocean bottom is irregular and the tidal range is large. Internal waves are rendered visible on the surface because the internal currents generated modulate the small scale surface waves overlying the internal waves, which leads to periodic variations in surface roughness¹⁰.

In the case of Benoulli humps and Kelvin waves it is clear that reasonable precautions could be taken to avoid detection by limiting speed and remaining at sufficient depth. However, this is not the case with internal waves which seems to be the most promising physical effect to exploit for the detection of submerged vehicles over a wide area.

Optical Effects

The oceans are populated with organisms that either emit light when they are disturbed (known as bioluminescence), or scatter light under all conditions. Such effects may be detectable above the ocean surface and may be used to reveal the location of sub-surface vessels.

Bioluminescence. The turbulent wake of a moving submarine will naturally cause a local disturbance of the surrounding bioluminescent organism population inducing them to emit light. The blue-green component of this light will propagate the greatest distance and may well be detectable beyond the ocean's surface. The intensity of blue-green light is attenuated by a maximum factor of approximately two for every seven meters it travels through water¹¹. At this rate, light passing upward through 50m of water will be attenuated by about 21dB; through 200m of water the attenuation would be around 86dB. It may be possible that a turbulent wake could rise to the surface bringing the bioluminescence with it, however it is more likely that the wake would collapse behind the submarine due to suppression by distinct ocean layers. Another possibility is that the emission of light by excited organisms at one depth may induce other organisms closer to the surface to emit light. While it has been reported that relays of such empathic responses have been observed, what is

not known is whether such a mechanism could reveal the location of a submarine¹². Furthermore, there appears to be very little knowledge at this time regarding the geographic, seasonal and depth distributions of such organisms. One major limitation for the detection of bioluminescence is the overpowering background noise contributed by the sun and the moon which would render a detection system useless during the day-time and possibly also under certain night-time conditions.

Light Scatterers. There are layers of organisms in the ocean which scatter light. The motion of these layers caused by vessel generated internal waves may be detectable. However, again the geographic, seasonal and depth distributions of such organisms is not well known.

Thermal Effects

All active submerged vessels generate heat which is dissipated through the seawater (conventional and nuclear submarines), as well as through the atmosphere (conventional submarines).

Thermal Transfer to Surrounding Seawater. Conventional and nuclear submarines draw in substantial quantities of seawater specifically for the purpose of cooling. In the case of a nuclear submarine producing about 190 MW of useful power, about 188 MW of heat energy is released into the ocean. While this appears to be massive, heat transfer calculations reveal that at a speed of about five knots, the temperature immediately behind the submarine only rises by about 0.2 degrees Celsius. This temperature differential will diminish rapidly as the submarine moves further away. In addition, this slightly warmer water, as it rises to the surface could, depending on the depth it was generated, eventually encounter water of the same density at which point it will rise no further and therefore not be detectable on the surface.

Thermal Transfer to the Atmosphere. Unlike nuclear submarines, diesel powered conventional submarines need to surface periodically in order to recharge their batteries. This process, known as snorting, requires two pipes to be raised near or above the surface. The first pipe, raised above the surface, is used to draw in fresh air to run the diesels. The second pipe is usually kept just below the surface and allows exhaust gases (and, therefore, heat) to escape.¹³ The heat emitted through the exhaust gases of a conventional submarine may be detectable above the normal sea temperature. The major limitation with this method of detection is that a conventional submarine in normal operation only needs to snort for about two hours in every 24¹⁴.

Detection Techniques

Direct Detection

The ability of Laser radar, or LIDAR (Light Detection And Ranging), to penetrate the water's surface, reflect from an object and then be detected remotely, makes this sensor a potential candidate for the detection of submarines. However, this technique is limited by the inability of LIDAR to penetrate clouds and other high attenuation effects caused by fog, haze and atmospheric pollutants¹⁵. Despite these limitations, it is reported that the Swedish have used this technique to detect submarines in national waters from an airborne platform¹⁶, although the effectiveness of this system is not known. In addition, the US Defense Advanced Research Projects Agency (DARPA) has developed and tested an airborne LIDAR system for the purpose of detecting mines at sea¹⁷. The system, known as the Airborne Laser Radar Mine Sensor (ALARMS), uses a pulsed blue-green laser operating at 510 nm. Trials of the system showed that the laser shadow cast by the object under inspection produced the best results at depths of up to 200m. An Australian application of LIDAR, the Laser Airborne Depth Sounder (LADS), uses the time difference between surface (blue) and the sub-surface (green) reflections of a 532 nm (yellow-green) laser, for sub-surface laser ranging.

To improve the accuracy of depth soundings using lasers, an understanding of effects such as turbidity (absorption and scattering) of the water is required. A number of techniques using low frequency electromagnetic pulses (Electromagnetic Bathymetry), used for airborne prospecting for mineral deposits, has the potential to measure sub-surface targets with no restriction due to turbidity. However, with all such measurements, some false targets are likely to be observed due to returns from other submerged objects such as whales.

Indirect Detection

Physical Surface Effects

The physical surface effects caused by a submerged vessel may be detectable either by accurate measurement of the ocean surface height or by imaging the ocean's surface. LIDAR is well suited for precision measurement¹⁸ and may be suitable for the detection of the Benoulli hump or Kelvin waves. However, the effectiveness of this technique will be severely limited by the depth and speed of a

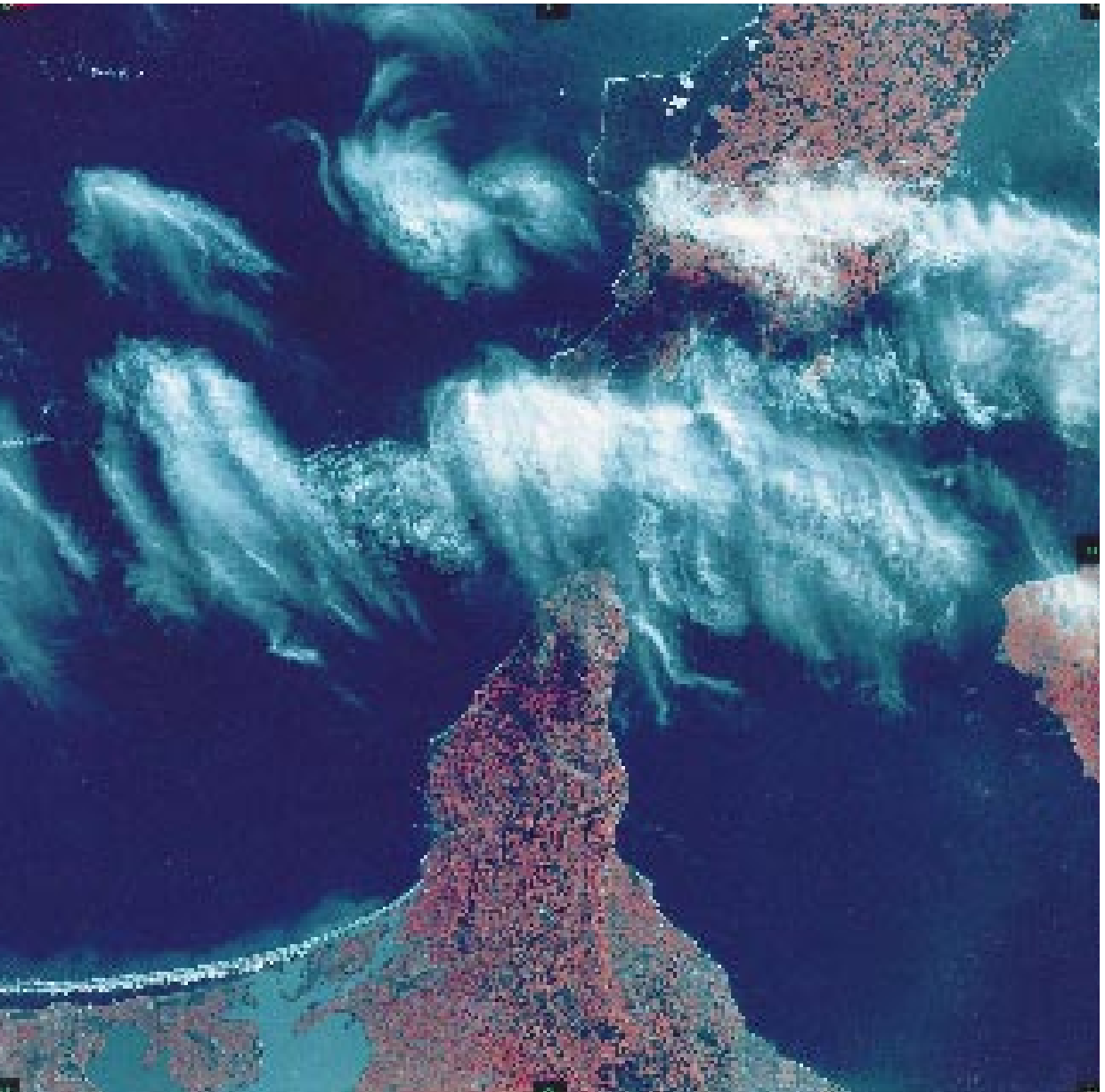
*Satellite imagery of*

submarine. Synthetic Aperture Radar (SAR) is well known for its ability to monitor wave patterns and determine sea surface roughness¹⁹, and has been shown to successfully detect internal waves.

Recent developments in Laser Doppler Velocimetry, a mature technology, may now permit the remote measurement of fluid parcel velocities in the ocean using the Doppler shift of a laser beam. However, a number of artefacts such as the effects of waves, and turbulence in the ocean, will also cause a

Doppler shift of the laser beam. Preliminary studies suggest that these artefacts can be eliminated, but further studies of the phenomenology and signal processing are needed to confirm the feasibility of the technique. The military application of this technology includes the detection of the propeller wakes, and possibly internal waves.

The Seasat satellite launched in 1978 effectively imaged ocean surface features such as internal waves and ship wakes using SAR²⁰. Subsequent reports



of a coastal region.

claim that Russian scientists have demonstrated a way of detecting submerged submarines using microwaves reflected from internal wave generated surface effects²¹. These claims were further investigated in July 1992 by an unclassified joint US/Russian experiment which clearly detected waves beneath the surface, although no submarines were used in the experiment²². The experiment made use of, among other things, SAR imagery from the ERS-1

satellite which was complimented by in situ and other remotely sensed data.

Optical Effects

The successful detection of bioluminescence will require visible spectrum radiometers with sufficient spatial and radiometric resolution to enable the low level of emitted light penetrating the surface to be detected. One major limitation of this technique, however, is that it is limited, at the best, to use at

night. Further investigation is needed to determine resolution requirements. The scattering of sunlight (or moonlight) from the movement of marine organisms or surface effects caused by internal waves has been observed using ship-borne optical sensors²³ and may be possible using elevated sensors.

Thermal Effects

Passive. Methods for remotely detecting localised increases in water temperature include the measurement of thermal infra-red and microwave radiation. The localised intensity of this radiation is highly dependent on submarine depth and speed. As previously discussed, the temperature increase due to the presence of even a large nuclear submarine is very small and would only provide a weak surface signature. However, the snorting of conventional submarines may be detectable as a localised point source on the ocean surface. Landsat 5 carries IR sensors with an instantaneous field of view of 120m x 120m²⁴ and some sensors have a 0.1°C thermal precision capability²⁵. Even at such resolutions it is unlikely that the average temperature rise over a 120m x 120m area would be detectable.

Active. Water, when irradiated with a laser beam, exhibits strong Raman scattering; the ratio of energies in the two strongest scattered lines is temperature dependent. Even though passive detection may be minimal, preliminary estimates indicate that a system based on LADS should have the capability to measure temperatures to an accuracy of at least 0.1°C to a depth of 50m in moderately clear water, with a depth resolution of about 1m.

Conclusion

Conventional detection of submerged vessels has involved both acoustic and non-acoustic techniques. Several contemporary oceanographic remote sensing techniques, ranging from direct detection of the vessel structure using laser light, to indirect detection using analysis of the effect the vessel has on the surrounding marine environment, have potential for application in this area.

The *direct* detection of submerged vessels using blue-green laser light appears to have merit based on airborne applications by the Swedish. US defence researchers have also successfully used this technique to detect underwater mines. Such successes indicate there is merit in investigating the feasibility of a space-based submarine detection systems based on LIDAR.

Submerged vessels also generate a diverse range of *indirect* effects on the surrounding marine environment; these are categorised as physical, optical and thermal effects. While such effects are highly variable, being dependent on submarine type and operational parameters, they do provide potential means of detecting submerged vessels using both airborne and elevated sensors.

Physical effects range from the production of a wake which may be detectable on the surface, to the generation of internal waves which manifest themselves through subtle surface effects. Of the physical effects, detection of internal waves is probably the most realistic approach; detection of Kelvin waves and the Benoulli hump is severely limited by submarine depth and speed. Indeed the detection of internal waves using SAR is an area where the majority of research seems to have focussed.

Optical effects range from the stimulation of marine micro-organisms to emit light (bioluminescence), to the scattering of light by the movement of organisms in an internal wave. The scattering of light from the surface effects of internal waves is perhaps the most promising detection phenomena of the optical effects. While this technique has been experimentally verified, it is probably only feasible during the day or in the presence of sufficient moonlight. The potential for detection of a submerged vessel via its bioluminescent wake requires more research to determine if this is even feasible. This technique will require highly sensitive electro-optical sensors to detect the relatively low levels of light produced. Furthermore, its restriction to night-time use makes its use impractical as a singular surveillance sensing technique.

The most significant *thermal effects* are caused through the heat sinking of nuclear submarines and the snorting of conventional submarines. A nuclear submarine's cooling water thermal discharge appears unlikely to be detectable unless the submarine is stationary and also at, or near, the surface; the most likely scenario is when the vessel is in port. The detection of a conventional submarine snorting may be more feasible, although the opportunities to observe this procedure are infrequent (two hours in 24) and not practical for some approaches to the Australian coast. Preliminary estimates indicate that an active system based on LADS should have the capability to measure thermal changes.

The detection of submerged vessels continues to be an area of active research interest, for both military and civilian applications. While current mission

proven methods use acoustic and non-acoustic techniques, advances in a range of technologies are continuing to make optoelectronic techniques more feasible. Several airborne platforms have demonstrated the viability of a number of these sensors. Their development into elevated sensors may provide an opportunity to satisfy demanding WAS and revisit time requirements.

One area in which the Australian Defence Organisation has extensive expertise and knowledge is laser transmission in the marine environment which has application to search, surveillance, and salvage missions; specific applications include the detection of mines, submarines and submerged unmanned vehicles.

NOTES

1. "Elevated" refers to conditions of altitude, endurance and operational safety which may be unsuitable for conventional air platforms.
2. Babbage, R., *A Coast Too Long: Defending Australia Beyond the 1990s*, Allen and Unwin, Sydney, 1990, p.71.
3. Gale, Squadron Leader W., *The Potential of Satellites for Wide Area Surveillance of Australia*, Air Power Studies Centre, RAAF Fairbairn, 1991, p.210.
4. Gale, Squadron Leader W., *The Potential of Satellites for Wide Area Surveillance of Australia*, *op cit*, pp.3-1 to 3-2.
5. An orbital inclination of 150 would cover the north and north-western maritime approaches.
6. Longer wavelengths (around 530 nm) are used for turbid water, while the shorter wavelengths are used for blue seas.
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Landmines: Weapons That Cause Unnecessary Suffering

By Major G. J. de Somer, RA Inf

Introduction

In keeping with its mandate to develop and promote International Humanitarian Law (IHL), the International Committee of the Red Cross (ICRC) has often called attention to weapons, the effects of which, threaten to undermine that law. Landmines have become a focus for much humanitarian attention, because they are indiscriminate, disproportionate to any military advantage they offer and because they continue to cause damage in post-conflict settings.¹ Protocol II of the Inhumane Weapons Convention placed some limits on the use of landmines, but its overall effect has been slight.² For example, the Convention was not formally applicable in internal armed conflicts until 1996. An international campaign to ban landmines was launched in 1992 and has been instrumental in developing public awareness and pressing governments to take action.³ The devastation in countries such as Cambodia, Afghanistan, Somalia, Angola, and Bosnia-Herzegovina began to receive widespread attention. There is now some evidence that international public opinion is compelling many governments to work towards a ban on landmines and that the problem extends from just arguing against landmines in principle to include the practicalities of negotiating a ban.⁴

Landmines are a global problem, they kill approximately 10 000 people each year and maim or injure another 8 000.⁵ Apart from the egregious nature of injuries sustained and the sheer number of fatalities, mines can cause the collapse of economies in the developing world, as they restrict access to otherwise productive land and accentuate the cycle of dependence and poverty.⁶ Currently more than 65 countries, most of them in the developing world, are in a state of crisis because of landmine infestation due to more than 340 types of landmines produced in 48 countries.⁷ The exorbitant cost of mine-clearing operations further perpetuates the problem. Whilst mines cost between \$US3 and \$US30 each, the cost of neutralising a single mine is between \$US300 and

\$US1000 and for every mine that is removed, 20 new ones are laid.⁸

Negotiations to ban, or even strictly limit, the use of landmines have floundered on the assumption that they are an essential weapon and that their military utility outweighs their human cost. The distinction between legitimate military uses of mines and the irregular terrorist or guerrilla use of mines is extremely difficult to sustain however. Case studies have shown that landmines have been used by both regular and irregular forces in direct contravention of IHL.⁹ Landmines do not have utility in the context of humanitarian considerations because they are cheap, accessible, prone to field expedient alternatives and easy to produce by unconventional forces that by definition tend to employ them irregularly and indiscriminately.

There are two interrelated problems; first, how to clear the millions of mines currently deployed and second, to ensure that the current landmine crisis does not deteriorate further. This can be done by controlling what mines are produced or by imposing a total ban on the production, stockpile, transfer and use of landmines.¹⁰ There is now a reasonable expectation of more progress in banning landmines. First, there is significant international outrage against landmines and the failure of the 1995 Review Conference of the Inhumane Weapons Convention. Second, due to the campaign to ban landmines, it is unfashionable to be associated with landmines and their indiscriminate effects. Countering this however, the sheer accumulation of mines deployed means that mine clearance costs, primitive technology, a widespread disregard for minefield mapping and economies of scale are so prohibitive that clearance alone cannot abate the crisis.¹¹

In October 1996, several countries led by Canada responded to the failure of the 1995 Review Conference.¹² The Ottawa Conference, represented by over 50 “pro-ban” countries, resolved to end the use of landmines and the production of a formal treaty to be signed by the end of 1997. In December 1996, the United Nations General Assembly voted 155 to nil for a resolution initiated by the United States, that urged countries to seek a way of banning mines.¹³ In January 1997, the Conference on Disarmament (CD) embarked on that search but no consensus on a complete ban is imminent in the foreseeable future as many of the CD’s 61 members either sell or retain the

option of using landmines. In a speech to the conference, UN Secretary-General, Mr Kofi Annan, called for a global ban on landmines production, trading and use.¹⁴ A principal focus of the address delivered by Australia's Minister for Foreign Affairs, Mr A. Downer at the conference was to call on the CD to deliver a treaty banning landmines, in a time frame commensurate with the scale and urgency of the problem.

International Humanitarian Law in Relation to Landmines

The purpose of IHL is to protect people's dignity and accord them the respect and care to which they are entitled as human beings during armed conflict.¹⁵ IHL puts limits on the means and methods of war, with the purpose of reducing the adverse effects of war on the victims, military and civilian, who do not or no longer take part in it.¹⁶ IHL has established fundamental principles to determine the legitimacy of a certain means of warfare. First, there should be a distinction between military and civilian targets in order to spare civilian population and property. Neither the civilian population nor civilian persons are to be the object of attack. Methods and means of warfare which are indiscriminate are incompatible with the principle of distinction. Second, weapons should not be used which can cause unnecessary suffering or superfluous injury. Under IHL, it is prohibited to employ weapons or methods of warfare of a nature to cause unnecessary losses or excessive suffering.¹⁷ Third, there should be some proportion between military gains from a method of warfare and the cost or damage that it causes. This article will demonstrate that anti-personnel landmines are incompatible with these fundamental principles and that military necessity does not outweigh humanitarian considerations.¹⁸

Two sources of international law regulate the use of landmines. The first is customary IHL which applies to all states irrespective of their treaty obligations.¹⁹ There is no doubt that the rules governing the use of landmines are based on the principles laid down in the 1977 *Additional Protocol I* to the *Geneva Conventions* of 1949. It is evident, however, that rules limiting the use of weapons that cause unnecessary suffering have little chance of being effective unless they are supplemented by rules specifying which methods of warfare are prohibited. Consequently, the second source of IHL is treaty law which applies only to states party to specific treaties.²⁰ It was not until the Inhumane Weapons Convention

(Protocol II) that IHL dealt directly with landmines, before that IHL addressed the issue by implication and analogy.²¹

There is some argument that customary laws of armed conflict may still permit the military use of landmines.²² Unless there is a direct intention to target civilians, it is unclear whether mines that are used in accordance with military objectives are forbidden under the principle of distinction. Historical evidence indicates, however, that during conflicts landmines are rarely used correctly and that their effects cannot be limited.²³ In all cases of armed conflict, it is taken into consideration that some civilian casualties are unavoidable. However, because of the delayed-action between when mines are laid and when they explode mines frequently strike civilians and are thus indiscriminate weapons or, at least, weapons indiscriminate in their effects.²⁴ Moreover, if viewed as weapons used against combatants in conflict, it is uncertain whether landmines cause any more suffering than do other forms of indirect weaponry such as artillery. If mines are laid within clearly demarcated areas and are equipped with self-destructing and self-neutralising devices, it may also be difficult, under customary IHL, to argue that landmines are illegal based on their disproportionate and indiscriminate effects. Practically however, the majority of mines that are used in modern conflicts are in violation of customary IHL as they are employed indiscriminately by unconventional forces resulting in injuries of a particularly egregious nature.

IHL currently does not regulate the production, stockpiling, transfer or export of landmines. However, the use of landmines is regulated by both customary and treaty IHL and provide numerous bases for a ban on landmines.²⁵ The main provisions of IHL that are violated by the use of landmines are:

- Customary and treaty laws protecting civilians from indiscriminate attacks;
- Customary and treaty laws mandating that parties to a conflict weigh the expected military utility of a particular weapon against humanitarian considerations; and
- Treaty laws regarding the protection of the environment.

The most relevant text on treaty law remains the *Inhumane Weapons Convention*. *Protocol II* of this treaty is entitled *Protocol on Prohibitions on the Use of Mines, Booby-Traps and Other Devices* (commonly referred to as *The Landmines Protocol*).²⁶ The main provisions of the Protocol are as follows²⁷:

- Mines may be directed only at military objects, indiscriminate use is prohibited and all feasible precautions must be taken to protect civilians;

- Remotely-delivered mines may not be used unless their location is accurately recorded or they are fitted with an effective neutralising mechanism;
- Records must be kept of the location of pre-planned minefields, and the parties to a conflict are also to endeavour to keep records on other minefields laid during hostilities; and
- At the end of hostilities, the parties are to try to agree either among themselves or with other states or organisations to take the necessary measures to clear minefields.

The *Landmines Protocol* provides no procedure for complaints, no mechanism for verification, no regulation for non-compliance and, until 1996, did not extend to internal conflicts. The efficacy of the relevant IHL ultimately requires answers to a number of questions: Is there a serious interest in respecting IHL? Is there a practical definition for vague terms such as “military object”, “endeavour” and “try to agree”? Is there acknowledgement of any legal or moral weight in the IHL? Do the belligerents know about IHL and whether its significance is comprehended? Even if IHL ban landmines is it likely that the deployment of landmines will be altered? The answer to these questions demonstrate that the application, and effect of IHL, cannot be confined to legal rhetoric alone.²⁸

Obstacles to the Development of Effective International Humanitarian Law in Relation to Landmines

Landmines raise the recurring dilemma of how armed forces can be persuaded to renounce a weapon considered to be of military advantage.

For example, the Australian Government’s announced policy is to suspend the operational use of landmines, but to retain a stockpile in case the strategic situation deteriorates.²⁹

The ICRC has repeatedly stressed the distinction between weapons whose use is essential for state security, in which case security concerns should outweigh humanitarian considerations, and those weapons which are only of military utility and thus humanitarian considerations should prevail.³⁰ Whilst UN agencies, the ICRC and several countries support a total ban on landmines, many countries are strongly opposed. The lack of broad support for measures to control the transfer of mines, to monitor the reliability of self-destructing devices, the reluctance of some governments to accept responsibility for mine contamination and to counter violations causes apprehension about the effectiveness of any proposed control regimes.³¹ For example, the 1995 *Review*

Conference did not address the problem of landmines broadly with a view to eliminating them, but took the limited perspective of adjustments to the existing control regime.

The 1980 *Inhumane Weapons Convention* has had little effect on the use of landmines in recent conflicts.³² This is because few countries have accepted it. For example, by the end of 1995, only 57 countries had adhered to the Convention whereas 186 countries had ratified the 1949 *Geneva Conventions* and 143 had ratified one or both of the 1977 *Additional Protocols* to the *Geneva Conventions*.³³ This low level of adherence can be attributed to factors such as the weakness of the Convention’s provisions and to the lack of mechanisms for follow-up and review of its implementation. Until 1996, the Convention only applied to international armed conflict at a time when most conflicts were internal.³⁴ These conflicts also tend to be guerrilla rather than conventional and most of the provisions are based on conventional warfare conditions. The Convention does not restrict proliferation and does not deal with manufacture and has no verification system to ensure compliance. The Convention needs to be amended to provide for automatic verification measures and to stipulate that sufficient resources be made available to ensure that measures can be carried out.³⁵ As will be discussed, by 1997 there have been significant attempts to improve the Convention.

IHL can contribute positively only if the political preconditions for regulation have been met. At present these preconditions have not been satisfied in the case of landmines because of the failure of IHL attributed to legalism and cynicism.³⁶ Efforts to regulate the operational imperatives of military necessity with moral concerns is often disregarded as excessive legalism and frivolous. IHL may also be dismissed with cynicism as a hopeless and naive pursuit. In the context of armed conflict, particularly in developing countries, IHL is often regarded as a moralistic charade and is not taken seriously in the context of weapons, tactics and belligerent practice. The reluctance of many governments, and militaries, to evaluate the issue seriously and to seek a solution may also have more to do with establishing a precedent regarding conventional weapons than the actual need for landmines themselves.³⁷ The argument being that the denial of an essential weapon, such as landmines, due to post-conflict humanitarian considerations would then threaten the use of a wide array of conventional weapons.

IHL tends to be effective when some preconditions are satisfied. First, there must exist a degree of perceived mutual interest to eliminate



Anti-personnel mine with trip wire in Cambodian jungle

Photographer: Major Andre Obradovic

reliance on a particular method or means of warfare, for example legal standards governing the protection of Prisoners of War. Second, the existence of a shared view that certain tactics and weapons are at odds with the basic dignity and self-esteem of the military profession, for example biological weapons.³⁸ The prospects for extending the application of IHL in relation to landmines, or imposing a total ban through international agreement or limited arms control measures, will remain difficult. To illustrate the difficulties, governments and their militaries often purport that the irresponsible deployment of landmines can be attributed to insurgents in developing countries and that governmental use of landmines tends to be responsible. Claims such as these are contemptible as these governments often supply insurgent forces, this was the case in Afghanistan for example. The landmine will probably remain one of the most accessible weapons for insurgent forces, and from their perspective, versatile, suitable for indiscriminate harassment and population control as well as being relatively cost effective.

A cynical view would contend that the entire course of warfare in this century has embraced indiscriminate tactics, as well as implicitly accepting the civilian population as a legitimate object of attack. In this context, customary IHL has not inhibited landmines despite their incompatibility with legal standards. The appalling use of landmines in recent years has been a reflection of the political consensus that landmines remain weapons of choice for various belligerents regardless of discriminate effects on civilians. The use of landmines is also integrated into military strategy and tactical doctrine and their characteristics do not challenge the professional military ethos in the same manner as biological munitions. The military profession considers the landmine as just another explosive device and believes it artificial and futile to regulate landmines whilst air power and artillery remain unrestricted. Humanitarian concerns have ultimately not been able to prevail over the military utility of landmines in practical terms.

Contemporary Efforts to Amend International Humanitarian Law to Make it more Effective in Relation to Landmines

As a result of public pressure to respond to the crisis caused by landmine contamination, the French Government took the initiative in 1993 to ask for a Review Conference of the *Inhumane Weapons Convention*. The UN General Assembly agreed to

establish a “Group of Government Experts” to prepare revisions and to make the necessary arrangements for a *Review Conference*.³⁹ The *Review Conference* was held in Vienna in 1995 to consider the amendments submitted by the Group of Experts. States participating committed themselves to regularly reviewing the Convention to ensure that agreed measures are implemented and encourage the strengthening of inadequate provisions. Russia, China and Pakistan were opposed to the more ambitious limitations based upon a fear that an export ban on landmines would create a precedent with possible repercussions for other types of weapons. The *Review Conference* ended in May 1996 amongst international criticism for a lack of progress.⁴⁰ The *Review Conference* did however focus attention on the long-term implications of the continued proliferation of landmines.

The UN General Assembly in December 1994 called for the eventual elimination of landmines.⁴¹ In late 1996, 155 countries in the UN General Assembly called for urgent negotiations for a global ban. Australia co-sponsored the UN General Assembly resolution calling for the vigorous pursuit of a landmine ban. In addition to moves to amend relevant IHL, many states have enacted a unilateral national moratoria on landmine exports and transfers of non-self-destructing mines to indicate their good intentions.⁴² For example, the United States adopted an export ban in the “Anti-personnel Landmine Moratorium Act” in 1992 which it subsequently extended in 1993.⁴³ Such expressions of good intentions need to be treated with caution as some countries, for example Italy, have licensed the production of landmines overseas whilst profiting from their manufacture and sale.⁴⁴

In May 1996, Protocol II of the *Inhumane Weapons Convention* was amended to extend its application to internal conflicts and prohibited the use of undetectable landmines. The amended protocol also assigned responsibility for mine clearance and the recording of minefield locations. The new provisions however are complex and can be delayed for up to nine years from the entry into force of the new Protocol. Australia intends to ratify the revised Protocol of the *Inhumane Weapons Convention* in 1997.⁴⁵

The 50 states that attended the 1996 Ottawa Conference agreed to a declaration calling for a global ban on landmines. This included a demand for a series of ICRC regional seminars involving political and national security experts. Canada also proposed another conference in 1997 to sign a new treaty prohibiting landmines. Australia was an active

participant in the Ottawa Conference of states and NGOs in favour of banning landmines. The final recommendation of the Chairman of the Joint Standing Committee on Treaties Report: "Restrictions on the use of Laser Weapons and Landmines", was that Australia should prepare for consideration at the 1997 meeting in Canada a proposal for the creation of an international timetable for the destruction of landmines and to encourage nations in the South East Asian and Pacific regions to sign the *Inhumane Weapons Convention* and all its Protocols.⁴⁶

The approach advocated by the United Nations, UNICEF, UNHCR, the UN's Department of Humanitarian Affairs, as well as various NGOs is that the *Inhumane Weapons Convention* should be extended to clearly apply the principles of the *Geneva Conventions* to landmines. This would result in the total prohibition on the production, sale, export, and deployment of landmines. Whilst this would have no effect on mines already deployed and activated, a legal prohibition on further production and distribution is a viable option as well as further stigmatising the landmine. This proposal is placed in relative context when the United Nations estimates that if the use of mines was to cease immediately, it would take 1100 years and \$US33 billion to detect and remove those mines deployed using current technology.⁴⁷

Relevance of International Humanitarian Law on Landmines to Mitigating Suffering during Armed Conflict

IHL really can only address the effects of a crisis such as landmines, not its causes. Addressing the causes is primarily the responsibility of governments. IHL dealing with landmines has potential for reducing human suffering caused by these atrocious weapons by compelling governments to act and determining necessary regulation. As international attention to the protection of civilians from landmines in armed conflicts grows it is accompanied by renewed debate regarding the regulation of parties to conflict through IHL.⁴⁸ IHL by its nature challenges prevailing conceptions of military utility and raises the broader question of whether civil control over military techniques can be established in accordance with the general mandates of IHL.

The relevance of IHL on landmines in mitigating suffering during conflict is explained by the key principles of customary IHL. Essentially, parties to a conflict and members of their armed forces do not

have an unlimited choice of the methods and means of warfare.⁴⁹ Any usefulness of landmines as a military weapon is outweighed by their long-term sociological consequences when the life span of the weapon and post-conflict impact are considered. The ICRC attempts to ensure that IHL which prohibits or limits particularly damaging weapons, such as landmines, are respected in practice and extended.⁵⁰

Examples from Bosnia, Cambodia, Angola and Mozambique illustrate the importance of IHL to mitigating suffering during armed conflict. In these countries landmine contamination is directed both intentionally, and indiscriminately, against civilians. Landmine infestation is used, in direct contravention of IHL, to spread terror amongst the civilian population and to stop the production of food.⁵¹ For example, by mid 1995 the World Health Organisation estimated that the conflict in the former Yugoslavia had caused at least 5 000 mine-related amputations.⁵² The ICRC highlighted an alarming increase in amputations, from four a month in January 1995 reported in Zenica to 238 in July 1995. Similarly, in Krajina monthly figures rose from 36 in January to 106 in June 1995. The return of civilians to former front-line areas and ethnically evacuated areas only heightened risks. Developments in the former Yugoslavia have shown that respect for IHL is difficult to ensure. For example, one side in the ethnic conflict is probably not too concerned about infesting the land of its ethnic enemy with landmines. Other examples of such disregard for IHL include Iraq's invasion of Kuwait and Iraq's offensive in Kurdistan.

In Cambodia, 300 persons are killed and twice that number are injured every month due to landmines. This equates to approximately one in every 236 Cambodians being an amputee.⁵³ It is estimated that there are 142 landmines deployed per square kilometre throughout Cambodia. Similarly, in Angola after more than 30 years of civil turmoil, the country has an estimated 76 000 amputees which equates to one person in every 334. The 15 million mines, 31 per square kilometre, has devastated arable land and infrastructure.⁵⁴ Also, in Mozambique, the amputation rate from mines stands at one person in every 1864 and does not reflect the 70 per cent of mine victims who do not require amputation or those killed.

The relevance of IHL to mitigating suffering during conflicts is directly aimed at providing greater protection for civilians and to lessen cruelty between combatants. The examples from Bosnia, Cambodia, Angola and Mozambique highlight the importance of IHL to mitigating suffering during armed conflict as the countries will be affected for decades with

contamination remaining a long-term obstacle to post-conflict stability, development and reconstruction.

Conclusion

This case study raises the broader question of whether civil control over warfare techniques can be established in accordance with the generalised mandates of IHL. The problem is more political than legal, yet the IHL in relation to landmines is insufficient and inadequate. Recent conflicts demonstrate that requiring belligerents to weigh anticipated short-term military advantages with long-term humanitarian costs has proved futile. The challenge that must be confronted is that IHL does not provide the necessary norms to deal with the existing threat of landmines. The principle that human suffering caused by a particular weapon must not exceed military necessity, or the proportionality principle, remains one of the oldest precepts of IHL. In contradicting such principles, landmines have shifted from being primarily a tactical battlefield defensive weapon to an indiscriminate area denial weapon deliberately aimed at civilians to empty territory, destroy food sources, create refugee flows and spread terror. As weapons landmines are indiscriminate, cause unconscionable harm and excessive injury to civilians and warrant the stigma of chemical and biological weapons. The cheapness of landmines, their ease of acquisition and the expense and difficulty associated with de-mining operations have all complicated legal regulation.

The approach of this article is that landmines are incompatible with the fundamental principles of IHL. The limited military utility of landmines is far outweighed by the appalling humanitarian consequences of their effects. The recommended approach to the problem of landmines is to insist that governments take immediate action in support of a total ban in addition to changes in military doctrine, and foreign policy. A complete prohibition of the production, sale and use of such weapons, although hard to enforce, would reduce the number of deaths and casualties. The upsurge in public opinion, and growing international concern about the production of landmines, could lead to an effective ban. Even if mines are banned, there will still be approximately 200 million deployed and unexploded landmines.⁵⁵ The increased recognition that the *Inhumane Weapons Convention* has not addressed the deteriorating landmine crisis has resulted in initiatives

to attempt to limit the proliferation, and indiscriminate, use of landmines. Strengthening IHL, enacting export bans and placing landmines in the same legal and ethical category as chemical and biological weapons as well as increased research into mine clearance technology and encouraging alternatives to landmines are all worthy initiatives.

NOTES

1. "Landmines" or "mines", as used in this article, refer to landmines, booby-traps, or similar explosive devices, rather than to anti-tank landmines or water mines. This terminology is adopted strictly for convenience in this article and carries no implications.
2. United Nations Convention on Prohibitions or Restrictions on the use of Certain Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects adopted in 1980 (commonly referred to as the *Inhumane Weapons Convention*).
3. S. Roberts; J. Williams, *After the Guns Fall Silent: The Enduring Legacy of Landmines*, Vietnam Veterans of America Foundation, Washington DC, 1995. The ICRC and the Vietnam Veterans of America Foundation (VVAFA) have been instrumental in raising awareness of the need to alleviate the civilian suffering caused by the proliferation of landmines.
4. A. Parlow, "Towards a global ban on landmines", *International Review of the Red Cross*, No. 308, July/August 1995, p.391.
5. P. Blagden, *Landmines: A Deadly Legacy*, The Arms Project of Human Rights Watch & Physicians for Human Rights, 1993, p.235. Also statistics supplied by the ICRC site on the Internet, March 1997.
6. *Ibid*, p.27.
7. S. Askin; & S. Goose, "The Market for Landmines - A Global Survey", *Jane's Intelligence Review*, September 1994, p.425. See also Blagden, *Landmines: A Deadly Legacy*, p.14.
8. Statistics supplied by the ICRC site on the Internet, March 1997. <http://www.icrc.ch>.
9. S. Roberts; J. Williams, *After the Guns Fall Silent*, pp.39-207.
10. K. Clements, "Banning the Production and Spread of Landmines" in Malley, W. (ed) *Dealing with Mines: Strategies for Peacekeepers, Aid Agencies and the International Community*, Australian Defence Studies Centre, Australian Defence Force Academy, Canberra, 1994, p.5.
11. Blagden, *Landmines: A Deadly Legacy*, p.11. See also S. Roberts; J. Williams, *After the Guns Fall Silent*, p.7.
12. *The Economist*, 25 January 1997, p.43.
13. "Landmines: Dual track", *The Economist*, 25 January 1997, p.42. Russia, Pakistan and China were among the 10 countries who abstained.
14. K. Suter, "Time to take steps to a safer world", *The Age*, Melbourne, 4 February 1997, p.11.
15. L. Doswald-Beck; G. Cauderay, "The development of new anti-personnel weapons", *International Review of the Red Cross*, No. 279, November 1990, p.572.
16. International Federation of the Red Cross and Red Crescent Societies, *World Disasters Report 1996*, Oxford University Press, 1996, p.141.
17. G. Best, *War and Law since 1945*, Clarendon Press, Oxford, 1994, p.295.
18. See also M. Aubert, "The International Committee of the Red Cross and the problem of excessively injurious or indiscriminate weapons", *International Review of the Red Cross*, No. 279, November 1990, pp.477-497, for the historical background to the development of IHL in relation to landmines.

19. There are two basic rules of customary IHL that apply to landmines. The first is *Article 51 of Protocol I (1977) additional to the Geneva Conventions of 1949*. Parties to conflict must always distinguish between civilians and combatants. Civilians may not be directly attacked and indiscriminate attacks and the use of indiscriminate weapons are prohibited. The second is *Article 35 of Additional Protocol I (1977)*. It is prohibited to use weapons which cause unnecessary suffering. Therefore the use of weapons whose damaging effects are disproportionate to their military purpose is prohibited. This principle of IHL dates back to the 1868 St. Petersburg Declaration. See also Article 23(e) of the annex to the *1907 Hague Convention IV, Respecting the Laws and Customs of War on Land* which prohibits employment of "arms, projectiles, or material of a nature to cause superfluous injury".
20. International Committee of the Red Cross, *Landmines: Friend or Foe*, A study of the military use and effectiveness of anti-personnel mines, ICRC, Geneva, March 1996, p.24.
21. Best, *War and Law*, p.301.
22. Comments provided by S.C. Campbell, Unit Chair, Human Rights/IHL, Faculty of Arts, School of Australian and International Studies, Deakin University, Geelong, 2 April 1997. Critique of AIP727 International Humanitarian Law Research Proposal.
23. ICRC, *Landmines: Friend or Foe*, p.7.
24. Blagden, *Landmines: A Deadly Legacy*, p.5.
25. S. Roberts; J. Williams, *After the Guns Fall Silent*, p.489.
26. *Landmines: Time for Action*, ICRC, Text updated for the Review Conference of the 1980 UN Weapons Convention, Vienna, September 1995, Chapter VII, p.1.
27. *Articles 3(3), 3(4), 5, 5(1)(a) and (b) of the Landmines Protocol*.
28. Best, *War and Law*, p.304.
29. Chairman of the Joint Standing Committee on Treaties, Mr W. Taylor, *Report on Restrictions on the use of Laser Weapons and Landmines*, Media Release, Parliament House, Canberra, 24 February 1997.
30. Aubert, "Excessively injurious or indiscriminate weapons", p.480.
31. ICRC, *Landmines: Friend or Foe*, p.69.
32. *Ibid*, p.25.
33. ICRC Statistics, January 1997. <http://www.icrc.ch>.
34. In May, 1996 *Protocol II of the Inhumane Weapons Convention* was amended to extend its application to internal conflicts.
35. Best, *War and Law*, p.308.
36. R. Falk, "Walking the Tightrope of International Humanitarian Law: Meeting the Challenge of Land Mines", in K. Cahill (ed) *Clearing the Fields: Solutions to the Global Land Mines Crisis*, Basic Books, New York, 1995, p.70.
37. J. Williams, "Landmines and measures to eliminate them", *International Review of the Red Cross*, No. 308, 1995, p.389.
38. Falk, "Walking the Tightrope", p.72.
39. ICRC, *Time for Action*, p.2.
40. Suter, "Time to take steps", p.11.
41. ICRC, *Time for Action*, p.3.
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43. B. Boutros-Ghali, "The Land Mine Crisis, A Humanitarian Disaster", *Foreign Affairs*, Vol. 73, No. 5, September/October 1994, p.12.
44. I. Buckley, "Landmines: The Hidden Killers", *Pacific Research*, Vol. 8, No. 3, 1995, p.9.
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46. Taylor, *Report on Restrictions on the use of Laser Weapons and Landmines*, Para 3.137.
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48. Parlow, *Towards a global ban on landmines*, p.391.
49. The term "means" regards the weapons themselves and the term "methods" as to how they are used tactically. See Aubert, *The problem of excessively injurious or indiscriminate weapons*, p.494.
50. P. Herby, "Mines and the 1980 Convention on Certain Conventional Weapons", *Meeting of National Society Legal Advisers and Persons Responsible for Dissemination*, ICRC Legal Division, Presentation Outline, Geneva, 1996. See also ICRC, *World Disasters Report 1996*, p.103.
51. Williams, *Landmines and measures to eliminate them*, pp.375-390.
52. ICRC, *World Disasters Report 1996*, p.103. This figure excluded deaths and fragmentations and did not include statistics for Serb-controlled areas.
53. Buckley, *The Hidden Killers*, p.9. Cambodia has the highest proportion of amputees per capita.
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JOINT STATEMENT

By

THE MINISTER FOR FOREIGN AFFAIRS, HON ALEXANDER DOWNER AND THE MINISTER FOR DEFENCE, HON IAN MCLACHLAN

17 November 1997

AUSTRALIA TO SIGN LANDMINES BAN TREATY AND DESTROY STOCKPILE

The Government has decided that Australia will sign the convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction – also known as the Ottawa Treaty – when it is opened for signature in Ottawa on 3-4 December 1997.

This was a difficult decision for the Government. Landmines represent an important tactical capability that has a well-established place in ADF plans for the conduct of military operations. Australia has no association with the irresponsible use of these weapons. Finding alternatives will involve a costly research and development effort.

The Government's decision means that the Australia Defence Force's stockpile of anti-personnel landmines will be destroyed, consistent with the provisions of the Ottawa Treaty.

But the battle is not yet over. The international community must now build on the norm established by the Ottawa Treaty. We owe it to the victims of landmines past, present and future to continue working through all possible avenues to ensure the major traditional producers and exporters of landmines are brought into the process of finding a lasting, effective solution to the landmines problem.

The next step will be to get negotiations under way as soon as possible in the Conference on Disarmament on an agreement to ban transfers and exports of landmines as a way of complementing the Ottawa Treaty and tightening the clamps on the global supply of landmines. Australia will redouble its efforts in this regard at the Conference's 1998 session.

At the same time, Australia will continue to play a major role in assisting countries such as Cambodia, Laos and Afghanistan to address the continuing deadly legacy of landmines. Since May 1996, Australia has pledged over \$19 million to de-mining and mine victim assistance programs. We will also continue to draw on the expertise and dedication of our ADF deminers and the talent and innovative thought which our scientists and our engineers have applied to the technological challenge of speeding up the rate at which these silent killers can be removed from the earth.

Causes of Mortality in Australian Regular Army Personnel, 1977-1991

By Lieutenant Colonel R.J. Thompson, Colonel P.G. Warfe and Lieutenant Colonel R.J. Lipnick

Introduction

The purpose of this article is to document the results of a study aimed at collecting and evaluating data on the major causes of mortality in the Australian Regular Army (ARA) during the time period 1977-1991. There were several objectives of this study. First, to examine age-specific mortality rates and their causes. Second, to examine age-specific mortality rates for specific calendar years. Third, to identify preventable causes of death. Fourth, to identify trends in preventable causes of death. Finally, to provide recommendations for future prevention strategies and contribute to National health goals. In an era of shrinking defence budgets, the information contained in this study assumes increasing importance in identifying priorities and determining the optimal allocation of occupational health and safety and medical resources.

Methodology

Data on the deaths of full-time Army personnel for calendar years 1977 through 1991 were obtained from the Army Health Records Office and National Archives. A database was established which contained date of birth, date of enlistment/commissioning, date of death, and cause of death as per the International Statistical Classification of Diseases, Injuries, and Causes of Death (ICD) for each mortality case. The data was then statistically analysed to determine age-specific, calendar-specific, gender-specific, and cause-specific mortality trends.

Results

An analysis of the database indicates that 615 ARA deaths were recorded among members of the ARA during the time period 1977-1991 (Figure 1).

Year	Number of Deaths
1977	45
1978	50
1979	52
1980	56
1981	53
1982	50
1983	47
1984	36
1985	41
1986	27
1987	36
1988	32
1989	27
1990	27
1991	36
TOTAL	615

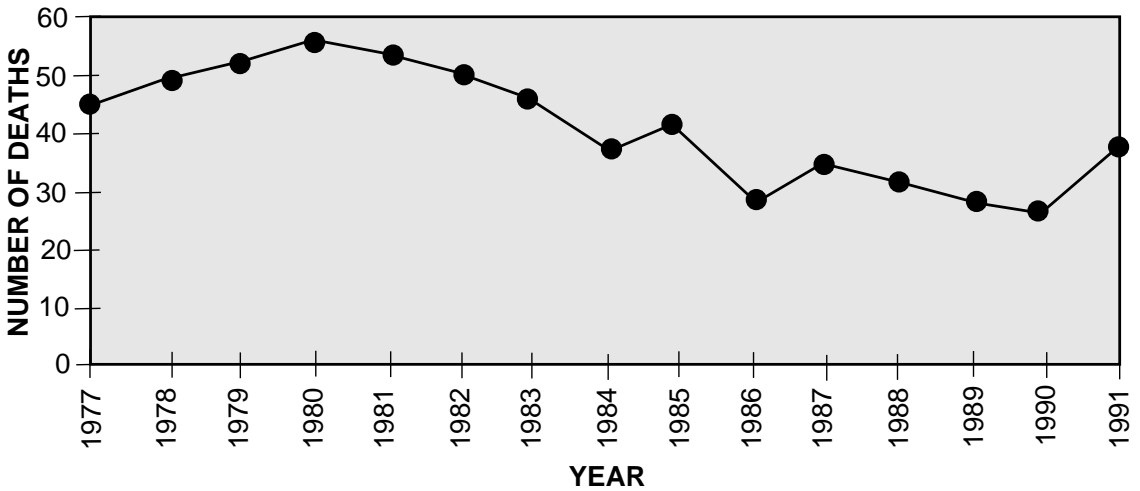


Figure 1. ARA Deaths by Year, 1977-1991

The average number of deaths *per annum* during this time period was 41 with the greatest number recorded in 1980 (56 deaths) and the lowest number recorded in 1986, 1989, and 1990 (27 deaths). After adjustment for the varying strengths of the Army during this time period, mortality rates (number of deaths/1 000 soldiers/yr) varied from 1.7 to 0.9 (Figure 2). The general reduction in mortality rates during the study period is probably related to the reduction in motor vehicle accident mortality in the community as a whole.

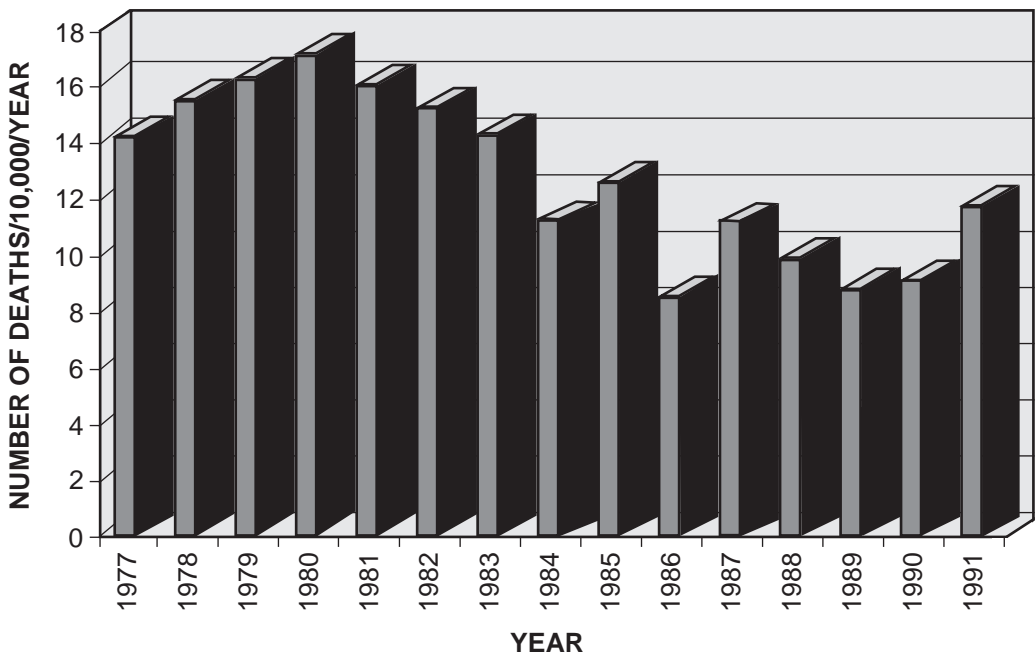


Figure 2. ARA Mortality Rate (Per 10 000), 1977-1991

Of the 615 deaths, 97 *per cent* (597 deaths) occurred among males and only 3 *per cent* (18 deaths) occurred among females (Figure 3).

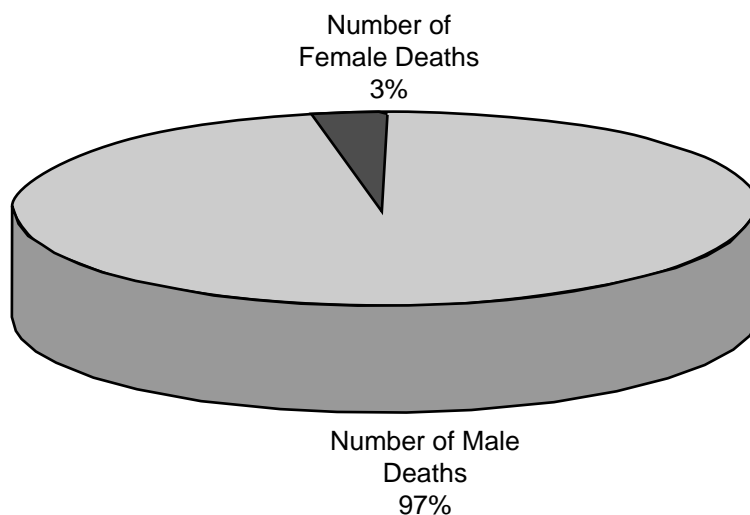


Figure 3. ARA Deaths by Gender, 1977-1991

The male mortality data by age group and by year is depicted in Table 1. During the time period 1986-1990, the youngest age category (<20 years) was found to have the highest mortality rate of 1.8/1,000/yr, followed by the 20-24 year age group with a mortality rate of 1.1/1,000/yr. Overall, the ARA male mortality rates were significantly lower than those of the male general population (Figure 4).

YEAR	<20	20-24	25-29	30-34	35-39	40-44	>44	Deaths by Year
1977	9	14	3	4	6	3	6	45
1978	12	13	4	2	7	3	5	46
1979	9	17	8	9	7		2	52
1980	9	16	5	8	2	8	6	54
1981	10	15	12	5	2	2	7	53
1982	10	13	12	8	2	3	2	50
1983	9	17	5	5	5	1	3	45
1984	5	13	4	4	3	2	4	35
1985	5	15	5	4	5	2	3	39
1986	4	7	5	5	3	3		27
1987	10	10	5	5	4	1		35
1988	6	9	4	3	5	1	2	30
1989	4	11	6		4	1		26
1990	10	7	4		3	2		26
1991	5	11	6	1	5	5	1	34
Total	117	188	88	63	63	37	41	597

Table 1. Male Deaths by Age Group by Year, 1977-1991

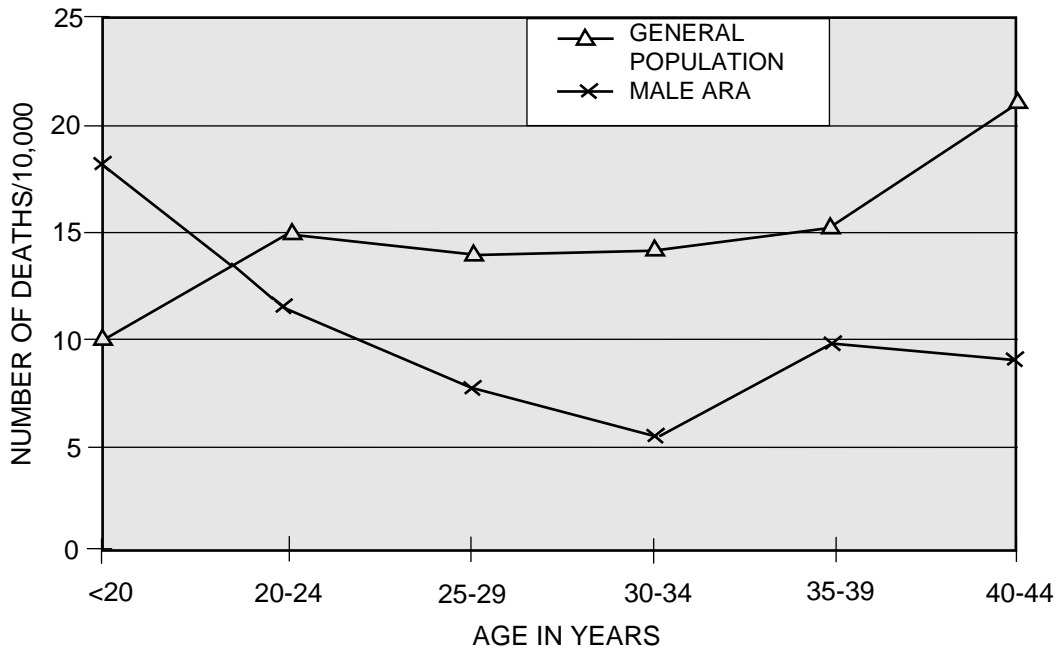


Figure 4. ARA and General Population (Male), Average Annual (1986-1990)

The female mortality data by age group and by year is depicted in Table 2. During the time period 1986-1990, the 20-24 year age group had the highest mortality rate of 8/1,000/yr. Overall, the ARA female mortality rates were significantly lower than those of the female general population (Figure 5).

YEAR	<20	20-24	25-29	30-34	35-39	40-44	>44	Deaths by Year
1977								0
1978		2	2					4
1979								0
1980	1		1					2
1981								0
1982								0
1983	2							2
1984			1					1
1985			1		1			2
1986								0
1987		1						1
1988		1	1					2
1989		1						1
1990		1						1
1991	1	1						2
Total	4	7	6	0	1	0	0	18

Table 2. Female Deaths by Age Group by Year, 1977-1991

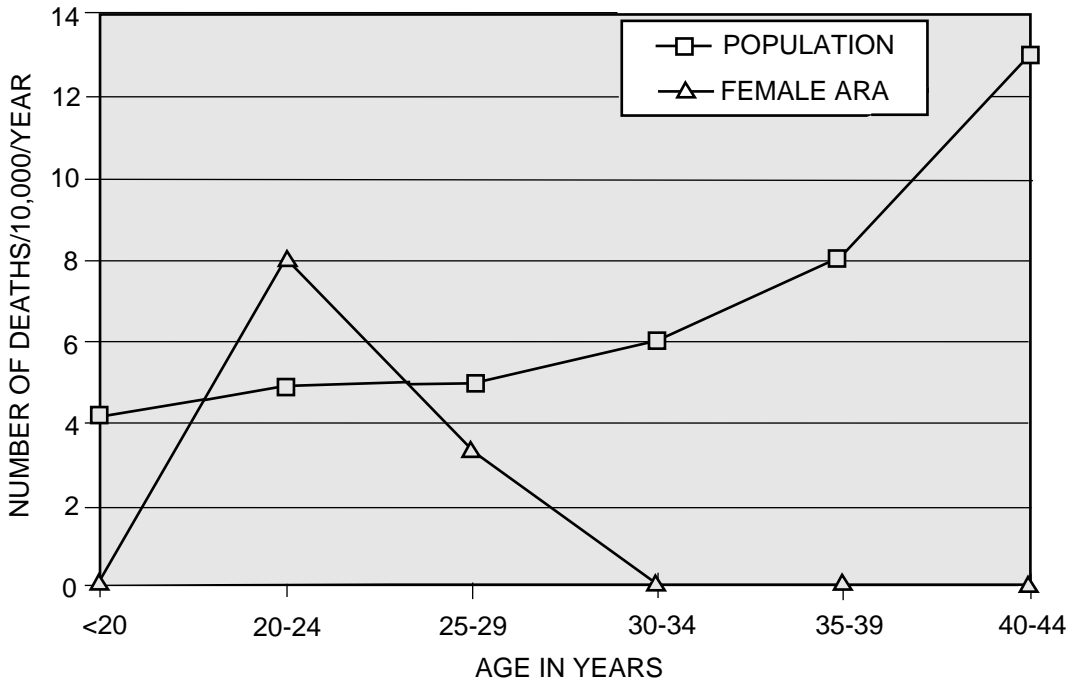


Figure 5. ARA and General Population Mortality (Female), Average Annual (1986-1990)

The ARA female mortality rates were also significantly lower than those of the ARA Male population (Figure 6).

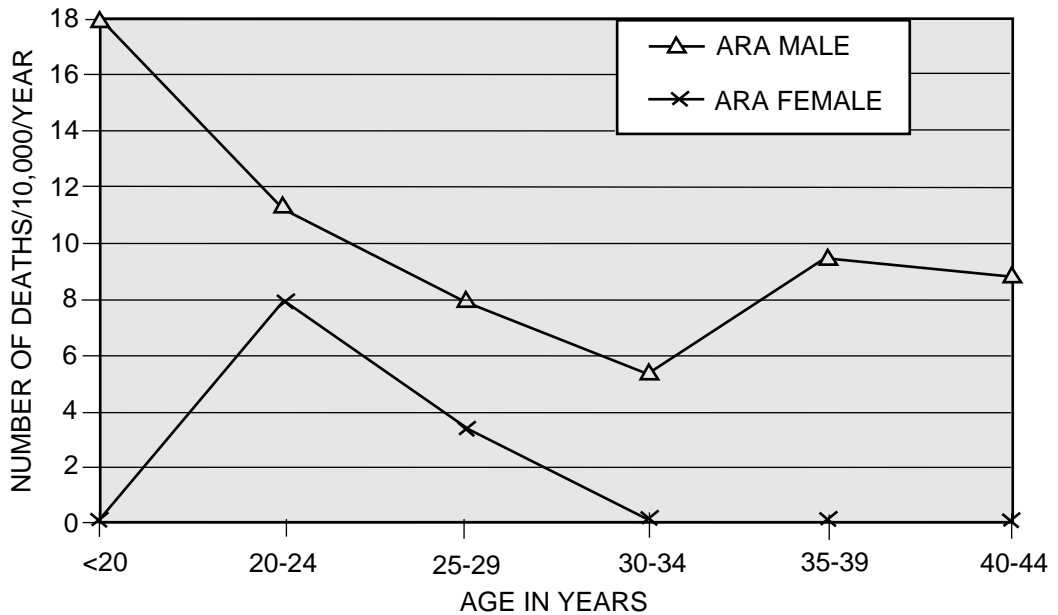


Figure 6. ARA Male and Female Mortality, Average Annual (1986-1990)

The cause of ARA deaths from 1977-1991 is shown in Figure 7. The ARA mortality data from 1977-1991 was divided into nine major causes of death. Motor vehicle accidents (MVA) were the leading cause of death. Fifty per cent (308 deaths) of the deaths were attributed to MVAs and approximately 23 per cent (70 deaths) of these involved motorcycles. Other leading causes of death included suicide (58 deaths), cancer (53 deaths) and myocardial infarctions (33 deaths). The cause of ARA females deaths from 1977-1991 is depicted in Figure 8 and reflects an alarming 82 per cent (15 deaths) of the deaths attributed to MVAs.

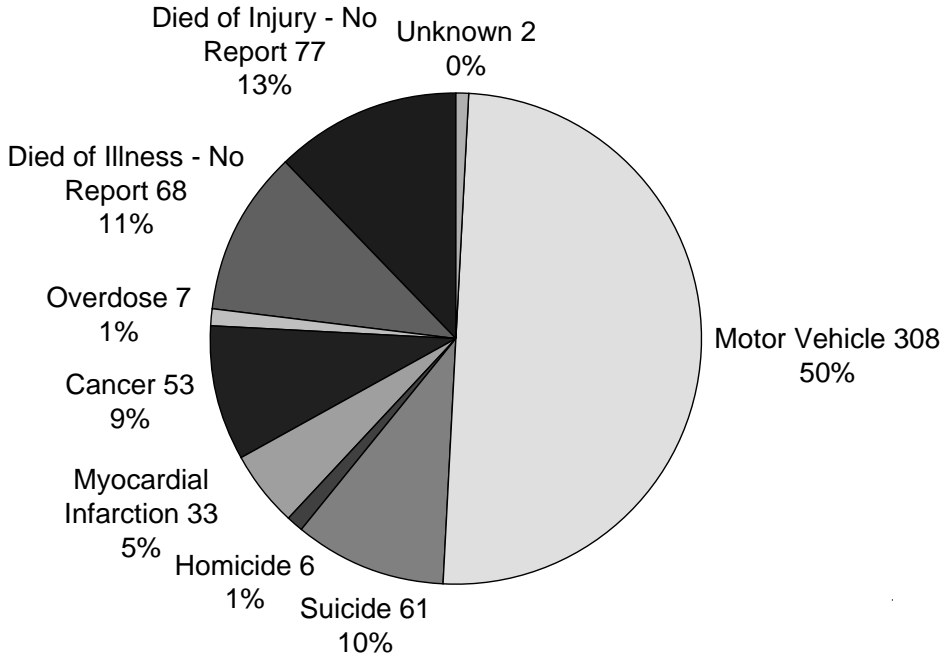


Figure 7. ARA Deaths by Cause, 1977-1991

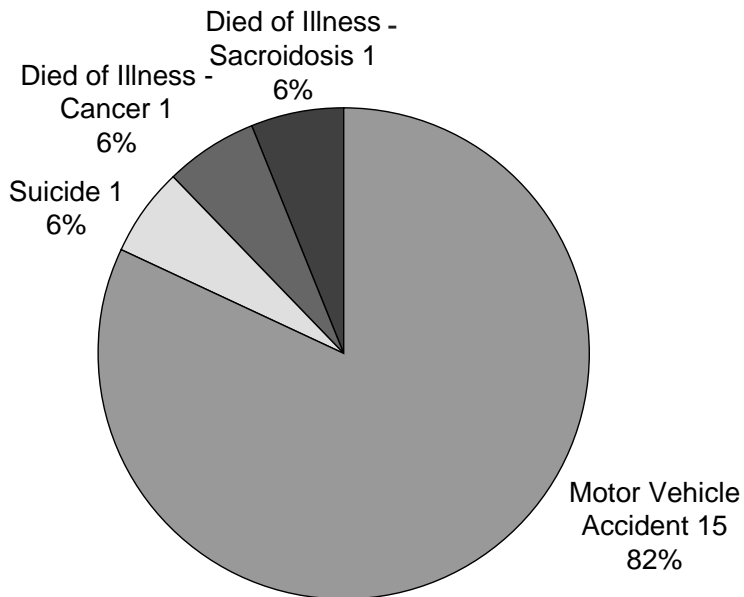


Figure 8. ARA Deaths by Cause (Female), 1977-1991

Figure 9 reflects the causes of death for the general population as reported by the Australian Bureau of Statistics (ABS) for the age range 15-44 years. The ARA causes of death depicted in Figure 10 were grouped to closely match those causes of death reported by the ABS for the general population. Approximately 75 per cent of the ARA mortality is attributable to accidents and violence as compared to approximately 50 per cent for the equivalent age range within the general population. The majority of deaths within the ARA Accidents/Violence category are attributable to MVAs. Suicides comprise only a small percentage. The male ARA suicide rate is significantly less than the reported rate in the general population. The very small number of female ARA suicides prevents valid statistical analysis. Figures 9 and 10 also reflect that cancer and disease were twice as likely to be the cause of death for the 15-44 year age group of the general population as compared to the ARA population.

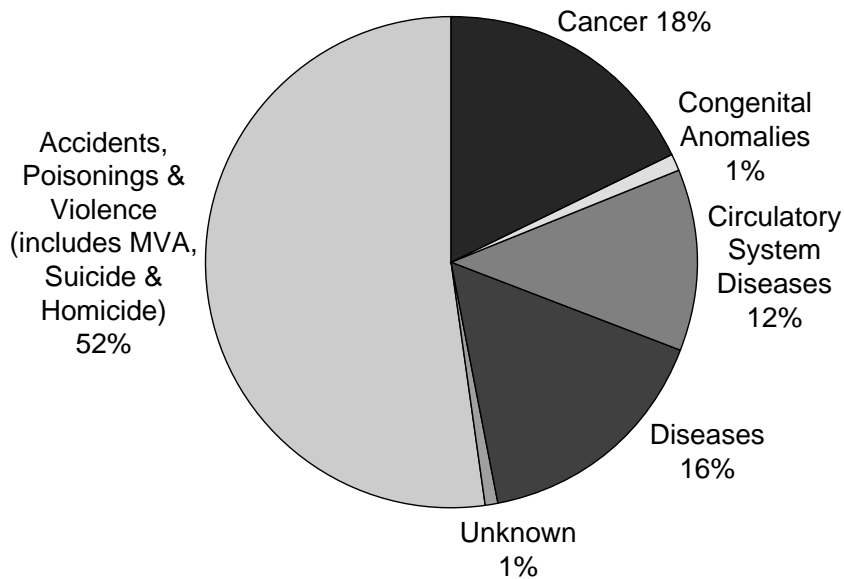


Figure 9. General Population Deaths by Cause, Age Group 15-44 (1982-1985 and 1987-1990; Figures for 1986 Unavailable for Inclusion in this Chart)

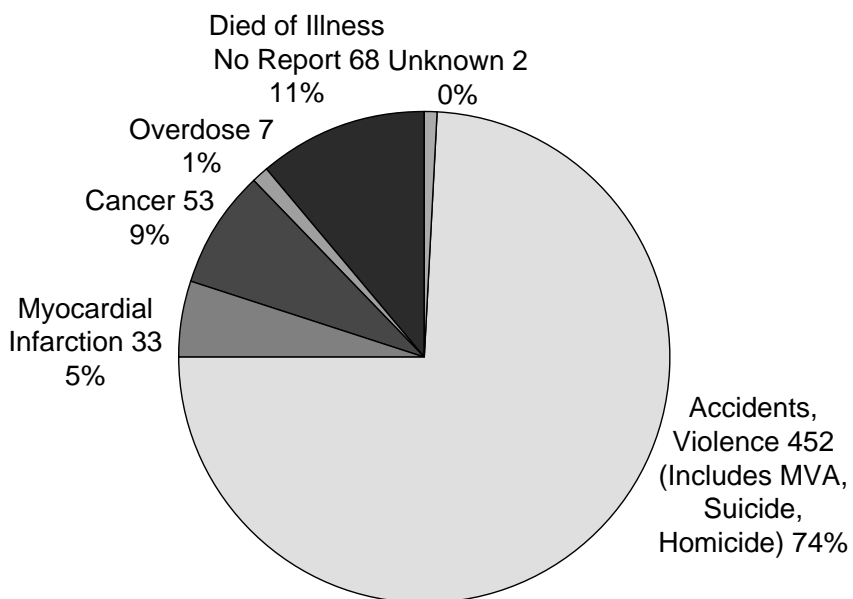


Figure 10. ARA Deaths by Cause, 1977-1991



Health and safety programs will produce a more productive army with an enhanced capability.

Discussion

The mortality data obtained from the Army Health Records Office and the National Archives for the time period 1977-1991 enabled a basic characterisation of deaths in terms of age groups, gender, and cause of death. The cause of death was categorised in broad groups such as MVA, suicide and cancer. The unavailability of certain statistical

data, such as total number of females by age group serving in the ARA throughout the time period of this study, restricted the scope of data analysis. Causes of death among the general population was obtained from the ABS. To facilitate the comparison of causes of death among the general population and the ARA population, only the 15-44 year age group of the general population was used. Additionally, the ICD

based categories of death used for the ARA population were grouped to better reflect the cause of death categories used by the ABS.

The ARA mortality rates reflect an overall decline during the time period 1977-1991. Males had a higher mortality rate than females and the highest mortality rates occurred for males within the youngest age group and for females within the 20-24 year age group. One of the major factors contributing to the gender and age group mortality findings may be the feeling of invincibility common among adolescence and young adults. This invincible feeling leads males and particularly young males to take greater risks and often unnecessary risks. Other contributing factors include experience, training receptivity, probability of exposure to dangerous situations, and lifestyles.

The predominant causes of mortality within the 15-44 year age group of the general population differed significantly from the ARA population. Accidents and violence were a more prevalent cause of death within the ARA population, whilst cancer and disease were a more prevalent cause of death within the equivalent age range of the general population. The initial entry health screening and the periodic health screenings required of the ARA population are significant factors contributing to the lower percentage of cancer and disease mortality. An individual inflicted with a life threatening form of cancer or disease would be denied entry into military service or medically discharged if diagnosed prior to their imminent death. Factors possibly contributing to the higher percentage of fatal accidents and violence amongst the ARA population as compared to the general population include the inherently dangerous nature of training a military force and the greater propensity for aggressive risk taking behaviour of young soldiers attracted to military service. The primary causes for deaths resulting from MVAs are excessive speed, driving while fatigued, driving under the influence of drugs/alcohol, and failure to use seatbelts.

The ARA mortality rates were overall lower than those of the general population. However, the major causes of mortality in the ARA population were due to factors other than innate biological conditions or inadequate medical care. Over 85 *per cent* of the deaths from 1977-1991 were caused by accidents, suicide, cancer, and myocardial infarctions. For the

females, 82 *per cent* of the deaths from 1977-1991 were caused by MVAs alone. Deaths resulting from these causes are best controlled through the development and implementation of sound safety, health promotion/preventive medicine, and suicide prevention programs. The safety program must be a proactive program that internalises the risk-management process and integrates it into all individual and unit activities. The health promotion/preventive medicine program must encompass lifestyle habits that significantly impact on health (physical fitness, nutrition, smoking cessation, stress reduction, and drug and alcohol abuse prevention), diagnostic screening (such as pap smears, mammograms, blood pressure checks and cholesterol level checks), assessment/control of occupational and environmental exposures to contaminants, and preventing/monitoring disease transmission. The suicide prevention program must focus on individual and sociocultural factors related to suicide, with special emphasis on organisational and community variables that provide emotional support or reduce stress. To achieve success, all three programs must become embedded in the Army culture.

Conclusion

The leading causes of death among ARA personnel during the time period 1977-1991 were accidents, suicide, cancer, and myocardial infarctions. Young males suffered the highest mortality rates during this time period. Improvements in ARA mortality rates are most likely to come through robust safety, health promotion/preventive medicine, and suicide prevention programs. In addition to reducing mortality rates, these programs will generate a healthier and more productive army with an enhanced capability to accomplish its diverse mission.

Acknowledgments

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Enunciating a Security Policy for Australia: A Holistic Approach to Defence Planning

By M.A. Ablong, Department of Defence

Introduction

The most recent Defence White Paper, *Defending Australia 94*, states that our strategic environment will become more demanding over the next 15 years, and that the challenge for our defence policy will be to ensure that we can continue to maintain Australia's security in these more demanding circumstances.¹ *Defending Australia 94* goes on to state that one of the Government's major objectives is to establish Australia's place within the global and regional environment and to shape this emerging strategic environment to meet Australian interests.²

In stating, so explicitly, the challenge to be faced by Australian defence policy over the coming decades, the Government has placed a large task before the Department of Defence. The key elements of that task, found in the policy statements highlighted above, can be expressed as:

- a. maintain Australian security in the face of a more complex environment;
- b. set Australia's place in the newly evolving strategic dynamic; and
- c. shape the environment to permit the development and maintenance of Australian interests.

Superficially, this would appear to be a clear and unambiguous task. *Defending Australia 94* bravely attempts to define the key policies, roles and capabilities the Department and the ADF must undertake to fulfil this task. Defence planning focuses on refining the Government's guidance into policies and plans aimed at ensuring adequate capability to meet the stated objective. Yet this very process – the Department refining Government policy into Defence plans and capabilities – highlights a major flaw that may ultimately result in the failure of Defence to meet the stated aim. For in undertaking this analysis in isolation, plans can only encompass the “defence” requirement and seek to set the “defence” agenda. Fulfilment of the three elements expressed, will ultimately require

more than ADF capabilities and assets; more than the capabilities that have been developed for a military defence of Australia.

Undertaking the task of providing security for Australia is, in essence, a far larger and more encompassing task than providing for the military defence of Australia. Threats to Australia, its people and their interests can no longer be defined only within a military contingency continuum. Threats to the stability of Australia from the narcotics trade, from economic predation, and from misinformation are becoming more prevalent. The utility of the Defence Organisation to meet these new challenges can only be determined through the analysis of these emerging threats, and the development of policies and plans to combat them.

It is axiomatic that ADF capabilities are effective only if used as a tool of power. Defence planning, in undertaking analysis into the optimisation of that power, has traditionally focussed on military force and military activities. While the need for such analysis has not passed, it forms only a sub-set of a far wider paradigm, that of securing the interests of Australians, in both war and peace.

Meeting the New Challenge

The Australian community... is entering on a new experience and, as never before, it must shape its own ambitions, and further its own interests by its own efforts.

W.J. Hudson³

The policies and actions of states and their relations with each other are determined by the synergy of their interests and power.⁴ Influence, or power in action, is determined by the assessment of the capabilities and assets that may be deployed moderated by the constraints that stand in the way of the application of that capacity. Australia's capacity to demonstrate influence is limited by our size, location and strategic environment. However, our capabilities, the assets we may deploy to demonstrate our influence, are significant in relation to our size.

The prime interest of any country is the maintenance of physical integrity⁵ and sovereignty⁶.

The policy through which a government gives substance to this prime interest and by which it assesses appropriate responses to perceived or actual threat is known as a National Security Policy. This policy provides the framework through which a nation interacts with the international community and provides its citizens with a favourable environment for the pursuit of their individual goals.

A state's national security policy is a multi-dimensional mix of foreign and defence policies, as well as policies concerning immigration, education and many other areas of government activity. Fundamentally, it involves military capability to deter, and defeat, attacks against defined national interests, and diplomatic and other policy tools to maintain a positive security and strategic environment.⁷

It should be stated from the outset that military force remains a factor in international affairs. It continues to be one of the ways in which influence can be asserted and national interests pursued. The use of military forces, however, is not constrained to purely military operations against an adversary. Military forces are also used for constabulary⁸ and benign⁹ functions. The use of military forces in these three roles – the military, constabulary and benign roles – is determined by a state's national security policy. The Australian Defence Force plays a key role in maintaining Australia's international policies and relationships in ways that help ensure the security of Australia and its interests.¹⁰

Australian security planners must still address contingencies of major threat. Planning for this threat, including the issues of military force structure and force development, is still of paramount concern. However, there is an increasing need to consider a range of circumstances under which actions or operations against Australia, having more political than military objectives, might occur. A recognition that security is not merely a product of military strength or derivative of international security arrangements, but is also dependent on the effective projection of the nation's political, economic and cultural strength is required.

Increasingly, a significant number of issues, not traditionally associated with security policy, are impinging on the policy dilemma. These include such diverse areas as the 1982 *Law of the Sea Convention*, the environment, communications, national resources, energy, refugees, human rights, food, illicit drugs, technology transfer, and intellectual property rights.¹¹ Consideration of the potential impact of non-military threats to Australia's national interests has been slow in developing. The recognition of these other-than-

war factors, and the adaptation of Australian policy to ensure an appropriate and effective response to these issues must become a prime focus of Australian security planning.

An Australian security policy must therefore represent a defence against threat and from the constraints on independent national decisions that may be imposed by actual or potential threat. Threat in this context is not isolated to armed attack or aggression, but includes economic constraint, political coercion, and intimidation of the Australian community or of the Australian character. Threat must also consider regional or global challenges that may impact either directly on Australian interests or indirectly on global or regional stability.

The location of this threat is not exclusive to Australian mainland territory, but must encompass: *Australian sovereign territory* throughout the world, including Australian flagged ships at sea, and Australian lines of communication; and *Australian interests overseas*, including expatriate communities, Australian business interests and foreign flagged vessels carrying Australian product.

Currently, Australia has no clearly defined national security policy with which to meet this challenge. As a result, there are no fundamental linkages between foreign and defence policy, nor the other government tools available. This lack constrains defence planning to solely "defence" of Australia in military fashion. This may ultimately weaken the ability of government to best protect Australia, its people and their interests. For the Government, and the Department of Defence, to derive the most appropriate defence policies to meet the challenges outlined in *Defending Australia* a national security policy is essential. Without such a policy, there is no certainty that the defence policies enacted by Government will best serve the national interests, nor that they will combine with the other tools available to Government in the most appropriate manner.

Deriving a National Security Policy

I'd invoke anything, if national security is at stake.

Anonymous

A National Security Policy is composed of the following key elements:

- a. an understanding of the needs and aspirations of the population that a National Security Policy serves;
- b. an assessment of the "National Interests" that a National Security Policy protects; and

- c. an analysis of the threats that a National Security Policy will protect against.

While a comprehensive National Security Policy cannot be articulated here, due to the sensitivity of the threat analysis necessary to give substance to such a policy, a model of the policy can be developed. This model will provide the foundations for the development of a true National Security Policy for Australia. This model can be developed from an assessment of the national character and intents, and hence its fundamental national interests. From these national interests, a national security policy can be formed, composed of National Security Policy Aims and Objectives.

The Australian National Character and National Intent

That ... national character that depicts them as practical, sporting, fair-minded, and egalitarian. For these are a people proud of their pragmatism, sceptical of speculative and abstract schemes, wedded to "common sense".

Hugh Collins¹²

A national security policy is shaped by both foreign and domestic influences. It is the domestic influences, however, that give a security policy its uniqueness. An Australian security policy must perforce reflect the needs and aspirations of the Australian people, and maintain the fundamental principles upon which the Australian society is founded. The needs and aspirations of Australians can be viewed through an examination of the Australian national character and national intent.

The Australian national character is a constantly changing amalgam of influences and expectations. New racial characteristics are brought into the melting pot through migration, cultural influences and the media. As each new characteristic impresses itself on the Australia psyche, however, it is also modified by the existing Australian traits and norms. As a result, there is no single dominant characteristic representative of all Australians: neither British, Asian nor European; but a broad mix of the best and worst of each of these. Yet beneath the many cultural and sub-cultural expressions of character there exists a common theme, with which a majority of Australians can identify. This theme personifies the traits and norms that all Australians seek of this country, and therefore is the underpinning of Australia's expression of character.

Australia's image and reputation in the international arena are also founded upon, and our actions constrained by, certain assumptions of the

"national intent". The national intent describes those beliefs to which Australia, as a nation, subscribes. These beliefs fix the boundaries for Australia's interactions with other nations. Governments act upon the expression of the national intent through their foreign and domestic policies. These policies, when based on the expression of national intent, reflect the constituency's views and aspirations, their character and their goals, both individually and as a nation. Should a government fail to act within the bounds of the national intent, its long term political survival must be considered questionable. As an example, the Identity Card debate during the late 1980s and early 1990s demonstrated the national intent regarding individual liberties and freedoms.

These fundamental expressions of character and intent can be thought of as the basic principles upon which the Australian society is founded and, as seen from a security policy perspective, include:

a. **Character:**

- i. respect for individual freedoms of speech, association and religious belief;
- ii. equality of opportunity;
- iii. equality of treatment under the law;
- iv. the right of individual ownership of property;
- v. a government responsible to the people; and
- vi. democratic values.

b. **Intent:**

- i. an acceptance of the law that prevails between states;
- ii. our fellowship of, and submission to, the world-wide diplomatic system whose forms and customs we are content to follow;
- iii. the peaceful resolution of conflict;
- iv. the protection of the weak against the strong;
- v. the free exchange of ideas, people and goods; and
- vi. a sensitivity to world opinion.

While these statements are not all-encompassing, they reflect those aspects of the national character and intent through which Australians derive their sense of nationhood and national purpose. Indicatively, these statements demonstrate the way in which Australians view themselves, and wish to have others view them. These expressions of national character and intent assist Government in determining how its citizenry wishes it to respond to international pressures and hence provide the basis for our foreign policies. Actions outside this set of guiding principles are typically seen as inimical to the Australian will, and therefore not to be countenanced. As such, these

principles can provide the key to the nature of Australian national interests.

Australian National Interests

Throughout history, individuals and groups have appealed to the national interest to justify the policies that they preferred.

Papp¹³

National interests are the basis of military and diplomatic objectives, and they lead to the formulation of a national security strategy and the evaluation of the power necessary to support that strategy.¹⁴ From the enunciation of national interests, national security policy can be optimised, in the context of: the national values and interests identified; the threats to those interests, both real and perceived; and the resources available to meet those threats.

Security policy is directed by the protection and advancement of the national interest. However the elements that make up our national interests, and our capacity to advance them, are not self-evident. National interests are a constantly changing set of ideals, goals and ethical considerations set within the bounds of the current strategic and geopolitical environment. Australia's national interests may be defined in three broad categories: geopolitical or strategic interests; economic and trade interests; and national interest in being.¹⁵

Geopolitical or strategic interests concern the defence of Australian sovereignty and political independence. They reflect Australian concerns to ensure that nations remain stable, secure and well disposed (or at least neutrally disposed) towards us. Economic and trade interests are aimed at securing a free and liberal international trading regime, including the global financial system, investment and technology flows, transport links and communications. They are concerned with the complex of bilateral and multilateral arrangements that help or hinder economic flows. National interests in being reflect Australia's good international citizenship. They are aimed at maintaining our sense of worth, extending the Australian community's basic values, or intents, into our foreign relations, maintaining international stability, and enhancing our overall standing in the world.

From these broad categories of national interests, Australia's enduring national interests, as seen from a security policy perspective, may be broadly represented as:

- a. to preserve Australia from attack or threat of attack and to safeguard Australian sovereignty and independence as a nation;
- b. to ensure and advance Australia's economic and social well-being;
- c. to uphold the Australian people's freedom to order and govern their society according to their will;
- d. to build a particular image and reputation for Australia which reinforces influence, heightens understanding of our national interests, and establishes our claim to be heard in world councils and have some input into global decision-making; and
- e. to bring about a more ordered international environment.

While not all Australians would agree with this set of national interests, they represent a balanced set of judgements that best reflect the majority of interests and views of the Australian people, derived from the assessment of Australia's character and intent. By enunciating these interests, the derivation of a model for a National Security Policy is possible. This model will comprise a set of Australian National Security Policy Aims and Objectives: the principles through which the National Security Policy is enunciated.

A Model for an Australian National Security Policy

It is now widely understood that defence planning in Australia must be based on a coherent national strategy. It is also widely understood that such a national strategy cannot be defined in a political and economical vacuum. Strategy which cannot combine the wider objective reality with a high level of political perception is doomed to be shortlived as a basis of defence planning.

Kim Beazley¹⁶

The dilemma for Australian security policy makers has always been to attempt to ensure the pursuit of Australia's national interests with maximum effectiveness, in a way that makes as positive a contribution as possible to a more peaceful and prosperous world. While security policy can preserve and protect Australian interests, it cannot directly advance Australian interests. However, security policy assists in the fulfilment of the national interests by preparing and maintaining a secure and stable environment in which other government and private industry activities can flourish.

A national security policy that reflects these issues must comprise the following elements:

- a. the defence of Australian territory and society from actual or perceived threat;
- b. the protection and promotion of Australian interests throughout the world;
- c. the maintenance of a favourable strategic situation in our nearer region and the promotion of a sense of strategic community; and
- d. the maintenance of global stability.

In developing a security policy, both domestic and foreign policy tools can be utilised. The foreign policy tools that can be used to effect a National Security Policy include:

- a. military capability;
- b. politico-military capability (military diplomacy);
- c. diplomacy;
- d. economic links;
- e. development assistance;
- f. “non-military threat” assistance¹⁷; and
- g. exchange of people and ideas.¹⁸

Each of these tools provides a valuable instrument of policy, providing mechanisms by which the Government can attempt to shape the strategic environment to permit Australian interests to develop and flourish. These tools provide both the carrot (economic, non-military threat assistance and the exchange of people and ideals) and the stick (military, politico-military and diplomatic capabilities).

Domestically, the Government effects a National Security Policy through the Federal Bureaucracy, Legislation and through shaping the domestic agenda. The Federal Bureaucracy provides the major tool by which Government policy is enacted. For example, through the development of such policies as *Purchasing Australia* and various other industry development tools, the Federal Bureaucracy assists Australian industry to become world competitive. Through legislation, the Government maintains law and order, and provides a safe environment in which Australians can express themselves. It also provides penalties for those who would seek to subvert Australia from within, for example: the illegal drug trade, organised crime and racial vilification. The Government also shapes the domestic agenda by informing the population of events, activities and issues that directly affect their ability to thrive and prosper. Information on health, education, environmental and safety issues are the more prevalent forms of information exchange.

Given the wide variety of tools at the disposal of Government, a method of coordinating and controlling them would appear to be necessary. From the perspective of the security planner, this

coordination tool is the National Security Policy. The National Security Policy modelled above provides the base elements only. The method by which substance is given to the overarching themes of the policy is known as National Security Policy Aims and Objectives.

Australian National Security Policy Aims and Objectives

Identifying the core values of the community has always posed a dilemma for Australians in formulating a “security package”, mainly because our inherited values were so casually planted on alien ground, and so impossibly far away from their cultural source.

A.C. Palfreeman¹⁹

National Security Policy Aims and Objectives provide the key guiding principles for the implementation of the National Security Policy, and a set of criteria against which that Policy may be evaluated. They expand upon the national interests to form a set of measures that give substance to the “will of the people”, in terms of Government responses to perceived or actual threat. Derived from the statement of our national interests, and within the current geopolitical setting, the National Security Policy Aims and Objectives may thus be derived as:

- a. **Preserve the Integrity of Australia**, through:
 - i. protection of our national territory;
 - ii. protection of Australian human and natural resources;
 - iii. preservation of our political and economic systems; and
 - iv. preservation of our inherited social and cultural aspirations.
- b. **Maintain the Security of Australia**, by ensuring:
 - i. physical safety from attack and invasion;
 - ii. protection from economic, financial and other forms of aggression; and
 - iii. safety of the culture and value-base of the Australian community against damage or absorption.
- c. **Preserve and Promote the Economic Well-being of Australia**, through:
 - i. protection, and if possible, advancement of the standard of living;
 - ii. protection, and if possible, advancement of international competitiveness; and
 - iii. protection, and if possible, advancement of trade and economic links in the region and throughout the world.

d. Project Australian Interests into the Global Community, through:

- i. promotion of a sense of strategic community between Australia, the region and the rest of the world;
- ii. contributions to global security; and
- iii. contributions to the cause of good international citizenship, including contributions to the resolution of global-scale problems such as the environment, human rights and refugees.

These National Security Policy Aims and Objectives thus provide the substance by which government policy can best serve the nation. They give clear and unambiguous guidance to policy formulators, defining and delimiting the elements of a security policy.

Linkages between National Security Policy and Defence Policy

The government of the day should set national security goals and objectives ... the defence establishment should concentrate more on determining the means of achieving the overall goals that are set for it.

JCFADT²⁰

The capability of the Australian Defence Force in assisting in the fulfilment of the National Security Policy Aims and Objectives, must be based on more than just the use of military power in conventional warfare. The use of defence forces in “operations other than war”, in the constabulary and benign functions are beginning to gain prominence. The ADF can, and should, assist in the fulfilment of the National Security Policy Aims and Objectives modelled. This contribution stems not merely from the military capability of the ADF to fight and win a conflict, but the key role the Defence Organisation plays in:

- a. maintaining Australian sovereignty over territory and resources;
- b. conducting diplomatic and trade related missions on behalf of the Australian Government and business;
- c. assisting in disaster relief efforts in Australia and abroad;
- d. supporting international institutions;
- e. negotiating and implementing international regimes on weapons exploitation and control;
- f. exporting Australian defence goods;
- g. importing technology and intellectual property;
- h. supporting and maintaining an Australian industrial base; and

- i. assisting domestic agencies in providing and promoting those security arrangements within their responsibilities.

The National Security Policy Aims and Objectives derived above provide a sound and formalised set of criteria against which to assess Defence policy, and determine the appropriate mix of policies, capabilities and expertise required to provide for the security of Australia. By examining the National Security Policy Aims and Objectives, within the context of the current, and perceived future, international environment, defence planners can assess the requirement for activities, developments and plans within a national context, and prioritise the implementation of these developments. To demonstrate the necessary linkages, the following paragraphs will briefly give examples of additional activities that should be considered by the Department in Defence planning.

The first aim is the preservation of the integrity of Australia. Current defence policy and practice fulfils much of this aim, however this task is not the sole responsibility of the ADF. Coordination of the many non-military aspects of preserving the integrity of Australia is a necessary step. While Defence of Australia planning, conducted within the current geostrategic environment, is well advanced within the Department of Defence, other departments and agencies are not so well advanced. As an example, it should be remembered that preserving the integrity of Australia encompasses more than *physical* attack or threat of attack. New technologies, including information technologies, make it easier to attack Australian economic systems, for instance, with greater impunity. Currently there is no organisation holding the responsibility for coordinating all aspects of this first aim. This inability to coordinate can have a detrimental effect on the conduct of the task, in both peace and war.

The second aim is the maintenance of the security of Australia. Again, *physical* safety from attack and invasion is the core role of the ADF and the Department of Defence, yet coordination with other agencies would also be required for the ADF to fulfil this role. Once again, as an example, protection from economic aggression, will require an in-depth analysis of economic and social factors that can affect the security of Australia. Factors to be considered would include the presence of Australian corporations and personnel in conflict zones throughout the world, predatory business practices against Australian companies, and potential for information warfare against the Australian financial system. In a similar manner to the first aim, Defence is not responsible for

coordinating policies for all the aforementioned factors. The Government of the day would be remiss should it not consider the impact of threats to these factors in planning for the security of Australia and its people, and charge the appropriate agencies accordingly.

The third aim is the preservation and promotion of the economic well-being of Australia. While many Government departments are involved in advancing Australia's economic standing, such as Foreign Affairs and Trade, Primary Industry and Energy, Science and Tourism, there is no overarching policy to coordinate these efforts. For example, the ADF and the Department of Defence can, and should, assist the Government in the protection and advancement of the standard of living, international competitiveness and trade and economic links. This can occur on a number of different levels, from the development of indigenous technologies and industries that provide for both defence and civil equipment requirements, the promotion of Australian defence manufactures in overseas markets, and the expenditure of Government monies within Australian markets. The inability to coordinate these efforts sub-optimises the resources expended to fulfil this aim.

The fourth aim is the projection of Australian interests into the global community. The Department of Foreign Affairs and Trade has carriage of a number of policies related to this aim. In a similar manner, the Departments of Immigration and Primary Industry are also responsible for certain elements of foreign policy. Similarly, international policies developed and implemented by the Department of Defence can, and should, promote and project Australian interests. These policies may take the form of personnel exchanges, training assistance, ship visits, Defence Co-operation projects and other Government-to-Government, Military-to-Military and official-to-official exchanges, discussions and interchanges. Without a coordinating policy, or agency, these efforts can be fragmented or even counter-productive.

From the preceding discussion, it is apparent that Defence plays a significant role in the achievement of National Security Policy Aims and Objectives. It is also clear that the threat environment comprises more than the traditional military capabilities typically used as a basis for planning. The benefit for the ADF and the Department of Defence in the enunciation of a National Security Policy would appear to be great. Indeed, the Joint Committee on Foreign Affairs, Defence and Trade, in its 1987 review of the management of Australia's defence went so far as to suggest that 'the Government inquire into Australia's existing national security planning and policy-making

processes with a view to: identifying alternative structures and procedures; and recommending the most appropriate approach for Australia both in peacetime and in times of defence emergency or war'.²¹ This recommendation arose from the Committee's consideration of the benefits of a National Security Policy, and an independent organisation to coordinate such a policy.

Conclusion

When people ask me for ... what is called a policy, the only answer is that we mean to do what may seem to be best, upon each occasion as it arises, making the Interests of Our Country one's guiding principle.

Palmerston²²

While defence policy has, in the past, acknowledged the necessity for consideration of the national interest, it has not progressed this assessment beyond the strictly military defence of Australian territory, and the Regional Engagement philosophy of the 1987 *Defence White Paper*. Peacekeeping activities, national sovereignty protection, and other-than-war operations should now force a re-assessment of this narrow Defence interpretation of the national interest.

By analysing the national interest in more detail, and explicitly modelling a National Security Policy Aims and Objectives, this article has demonstrated that defence policy should take the step from "Defence of Australia" to "Security of Australia" and encompass those activities which contribute to the national interests but which, for the time being, remain outside the military conflict-resolution debate.

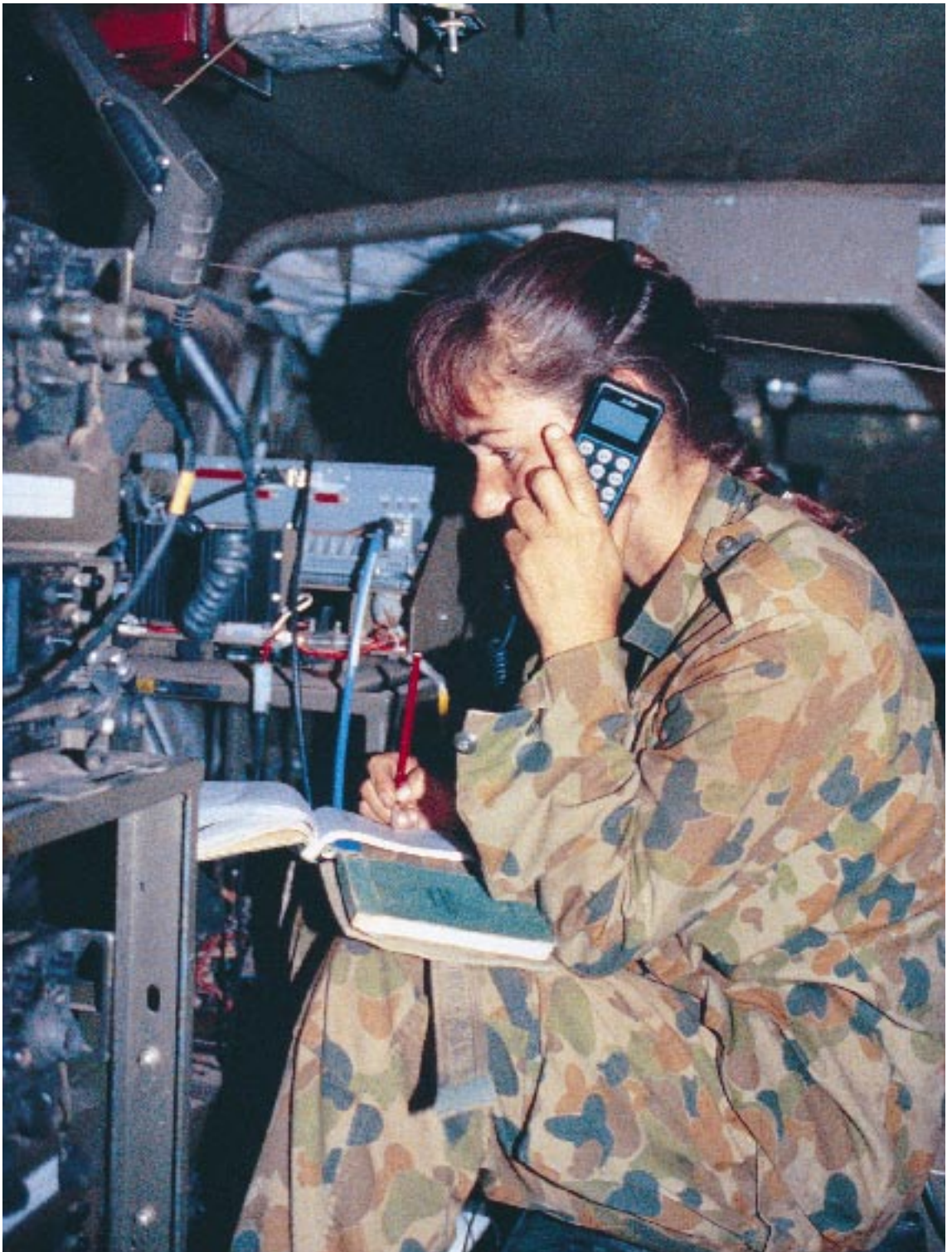
To optimise the Departmental contribution to national security, however, this step cannot be taken in isolation. Without a broad and defining National Security Policy, coordinating all arms of foreign and domestic policy, the Defence effort will yield only marginal returns. The responsibility thus rests with Government to espouse, develop and coordinate a National Security Policy, to the benefit of the Australian nation, the Government itself, and the Department of Defence.

NOTES

1. *Defending Australia 94*, AGPS, 1994, para 2.21.
2. *Defending Australia 94*, AGPS, 1994, para 3.1
3. Hudson, W.J., *The Australian People and Foreign Policy*, in Mediansky and Palfreeman, *In Pursuit of National Interests: Australian Foreign Policy in the 1990s*, Pergamon Press, 1988, p.14.
4. Thucydide's treatise on the Peloponnesian War.
5. Defined as protection of territory, including maritime areas,

- from perceived or actual threat or armed attack.
6. Defined as protection of the independence of basic political decision-making and the free evolution of the society without external duress.
 7. *Australia's Regional Security*, Ministerial Statement by the Minister for Foreign Affairs and Trade, Dec 1989.
 8. Constabulary functions include EEZ sovereignty protection, and activities associated with illegal immigration, piracy, narcotics and smuggling.
 9. Benign functions include disaster relief, aid to the civil power, and diplomatic and trade missions.
 10. *Defending Australia* 94, paras 1.2, 1.10.
 11. Dupont, A., *Australia and the Concept of National Security*, SDSC Working Paper No. 206. Research School of Pacific Study, ANU, 1990.
 12. Collins, H., "Political Ideology in Australia", in *Deadalus*, Winter 1984, pp.156-157.
 13. Papp, D.S., *Contemporary International Relations: Frameworks for Understanding*, Macmillan College Publishing Company, 1994, p.43.
 14. Roskin, M.G., *National Interest: From Abstraction to Strategic Studies Institute*, US Army War College, May 1994.
 15. Dupont, A., *Australia and the Concept of National Security*, SDSC Working Paper No. 206, Research School of Pacific Study, ANU, 1990.
 16. Beazley, K.C., Foreword to *Security and Defence: Pacific and Global Perspectives*, Allen & Unwin, 1990, p.xxi.
 17. Assistance with issues such as environmental degradation, international health problems, the international narcotics trade, and unregulated population flows.
 18. *Australia's Regional Security*, Ministerial Statement by the Minister for Foreign Affairs and Trade, Dec 1989.
 19. Palfreeman, A.C., *The Political Objectives* in Mediansky and Palfreeman, *In Pursuit of National Interests: Australia Foreign Policy in the 1990s*, Pergamon Press, 1988, p.86.
 20. Joint Committee on Foreign Affairs, Defence and Trade, *The Management of Australia's Defence*, AGPS, 1987, p.207.
 21. Joint Committee on Foreign Affairs, Defence and Trade, *The Management of Australia's Defence*, AGPS, 1987, p.207.
 22. Palmerston to Clarendon, July 20, 1856, quoted in Temperley and Penson, *Foundations of British Foreign Policy from Pitt (1792) to Salisbury (1902)*, Cambridge University Press, 1938, p.88.

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Modern warfare requires reliable tactical communications systems

Photographer: Major Andre Obradovic

The Development of the Tactical Communications System

By Lieutenant Colonel M.J. Ryan, RASigs

Introduction

The pace and intensity of modern warfare requires that commanders and staffs are supported by flexible, mobile, reliable tactical communications systems that provide sufficient capacity to cope with increasingly high traffic loads. Tactical communications systems have a similar form in all modern armies. To understand such systems and to plan effectively for their future development, it is important to understand how tactical communications systems have developed and why they exist in their current form. This article provides a brief overview of the development of the tactical communications system from early courier and optical-based techniques to the high-capacity data networks deployed on the modern battlefield.

Early Communications Techniques

In most early armies, communications were provided by courier or dispatch rider. Although the means of transport has changed considerably over the years, dispatch riders still provide a very valuable service in transmitting bulky information around the battlefield. Several types of information such as map overlays and photographs still cannot be passed efficiently over many communications links. Other information does not need to be transmitted urgently and can therefore be passed by hand, freeing communications links for more urgent traffic.

Over the years, large scale use has also been made of visual signalling with the Romans, Incans and Persians providing networks of beacons along main roads. Early armies often used smoke and fire signals, and built many towers so that they would carry as far as possible. By day, coloured flags and other devices were often used instead of fire and smoke signals. Although transmission times were reduced by the invention of the telescope in the early 17th century, there was little real development in optical communication techniques until military communications requirements began to expand as fronts became wider, weapons became more

sophisticated, and logistic tails became longer. To attack successfully, to deploy reinforcements, to commit reserves and to ward off counter-attacks, commanders had to be informed instantly of events on distant battlefields – more swiftly than was possible by courier.

In 1792, Claude Chappe invented the “Radiated Telegraph” machine which had arms that could be placed in many different positions, allowing 196 unique signals to be sent. On a line from Paris to Leipzig, a short message could be transmitted in 15 minutes over 1 000km – a distance that a courier would take several days to cover. Many other countries developed various types of optical telegraph. In 1831 the longest optical telegraph line was built in Russia with 48 stations over 1 500km. From 1797 a mobile version, the Gamble Telegraph, was employed by the British Army in forward areas. However, optical telegraphy was soon made largely obsolete by the invention of the electric telegraph, although some elements of visual signalling remain in use today. Heliographs, signalling lamps and flag drill were all used in armies up until World War II, and are still used in various forms in most navies.

The Electric Telegraph and Telephone

The first military use of the electric telegraph was during the Crimean War (1853-56), where it was used strategically; with a submarine cable laid from Varna to Balaclava; and tactically, with the deployment of a telegraph troop with two telegraph wagons, a cable cart and a plough. In 1859, the electric telegraph was used by the Spanish during their war with Morocco and by the French during the Franco-Austrian War. In these campaigns both civilian equipment and civilian operators were used. In 1860 the Italian Army made use, for the first time, of purpose-built military telegraph equipment and military operators. During the American Civil War, both armies made use of electric telegraphy.

In the late 19th century, as telephones became more common in civilian life, staff officers began to demand them to complement the telegraph. The Japanese made wide use of telephony during the Russo-Japanese War of 1904-05 and their experience heavily influenced the Germans, who entered World War I planning to use the telephone as their sole means of communication. However, after their advance on Paris in 1914, they decided to re-adopt

telegraphy since long-distance telephony still had a number of major engineering problems.

Up to this time, most armies had developed a convention in which communications were provided from superior to subordinate headquarters. However, Germany had originally developed their system in the opposite order but, with the re-adoption of telegraph, followed suit. This convention for the provision of communications from higher to lower has continued to modern times.

Telegraphy was the major means of communication during World War I and by the end of the war, tens of thousands of kilometres of cable had been laid by all sides. Most lines were laid as earth circuits; that is, they were single wires that used the earth as the return path for the current. Wherever possible, these wires were normally laid about three metres below the surface to protect them from the effects of artillery. To cope with the large number of buried cables, communicators developed a systematic method of laying based on a grid system of main arteries into which units and formations could connect. Each divisional area had a main artery with switching and testing centres, each of which was connected to the main arteries of the division on either flank, thereby forming a grid. Tactical circuits were then connected to strategic telegraph circuits.

Early telegraph signalling used high-voltage AC which meant large currents leaked into the ground and could be monitored from enemy trenches. This problem was solved by the introduction of sheathed twisted-pair cables that did not use earth currents as part of the circuit. Twisted-pair had the additional advantage that it could be laid aerially on poles or in tubing along the sides of trenches. Signalling also moved away from high-powered AC to low-powered DC, which considerably reduced any opportunity for interception.

Telephony also became very popular during World War I since it gave staff officers timely, personal contact. So, in addition to line testing centres, many telephone switching centres appeared on the battlefield.

More Recent Developments

Radio

At the beginning of the 20th century, line communications were complemented by the new technology of wireless communication. Marconi had developed his first mobile wireless telegraphy set in 1901 and the first British Army wireless telegraphy

set was introduced in 1905. However, it was not until 1915 that a reasonably reliable set (the BF set) was introduced. Although the BF set was replaced by the more mobile loop-wireless set, both were still inefficient spark sets. The introduction in 1917 of the vacuum tube allowed for the production of CW sets that had, for the same power, greater selectivity, smaller antennas, and longer ranges.

Radio telegraphy was not readily accepted during World War I, as Marconi had only just achieved practical results. However, even early radio communications proved much more flexible than cable and it was not long before previously difficult tasks such as gun registration were being conducted by radio instead of line. Still, radio telegraphy was generally inefficient, mostly due to a poor understanding of the physical processes involved and the low frequencies used. Consequently, for the first few decades of the 20th century, radio was looked upon by communicators as a supplementary means of communication, with line being the primary means.

Between the Wars

The period between the wars saw a number of developments in communications technology. The vacuum tube was perfected allowing the consistent amplification required for amplitude modulation and the first voice radio sets. The teletypewriter or the printer telegraph was developed, as was the field telephone set and the first small field switchboard.

During the 1930s, radio sets were developed to meet the necessary mobility, range and reliability required by the infantry, artillery, armour and aviation corps. In 1934, the US developed the first ‘walkie talkie’ which was used until replaced in 1943 by radios using the newly developed technique of frequency modulation (FM). These new crystal-controlled FM radios provided noise-free communications without the requirement to dial-tune, allowing the user to communicate at the push of a button.

World War II

During World War II, radio was used extensively at the tactical level for the first time. In addition to command, independent radio systems were developed for intelligence, air support, artillery, engineers, supply and other services. At the beginning of the war, radio was only used to provide formation command links, as well as a small number of nets for divisional artilleries and for internal use in armoured and artillery units. By the end of the war, all essential tactical and administrative communications was conducted by radio, mainly due to the inability of line

to keep up with highly mobile, widely dispersed forces often operating in inhospitable terrain.

However, line communications continued to be used during World War II, mostly for telephony work. Large amounts of line were laid, particularly in those areas where radio communication was poor. Land-line systems were normally built with a main artery following the axis of movement of the formation headquarters. Subordinate formations were interconnected by spurs from the main artery, unless time allowed separate arteries to be built. When operations stabilized, laterals were constructed between formations at each level and a grid system was developed to reduce vulnerability and increase flexibility. In addition to inter-formation lines, all formations and major units required local line systems within their headquarters.

Although there were very few major advances in technology during World War II, by the end of the war military communications doctrine had changed considerably. Whilst line was still an important medium, the mobility and dispersion of the battlefield had reversed World War I doctrine so that radio was the primary means of communication and line was generally only used as a secondary means when time allowed it to be laid.

Two distinct battlefield communications needs had developed. The first type required high-capacity links to connect formation headquarters with units by line, radio or the signal dispatch service (SDS). Together, these infrastructure links became known as *trunk communications* in line with the terminology used for their civilian equivalents.

The second type of communications developed to allow units at battalion and below to perform tactical tasks. These links had to be flexible and responsive and under the direct control of the commander. Links were established using half-duplex, single-frequency, all-informed radio nets allowing the commander maximum flexibility to command a number of sub-units. These types of communications became known as *combat net radio*.

Modern Tactical Communications

Doctrinally, these divisions of the Tactical Communications System still exist on the modern battlefield, *albeit* in more sophisticated forms:

- **Trunk Communications Sub-system.** Trunk communications link headquarters and provide the majority of the communications required by commander and staff with facilities for voice, data, video, facsimile and telegraph. Within the Trunk Communications Sub-system there are three major types of means by which information

is passed: *radio* (including satellite communications); *line* (including fibre optics); and *hand carriage* (by SDS using motorcycle, vehicle and aircraft).

- **Combat Net Radio Sub-system.** Trunk communications are complemented by highly mobile and flexible combat net radio systems used by fighting troops to provide lower-capacity circuits, both from headquarters to combat units, and within combat units.

Combat Net Radio Sub-System

There has arguably been little change in the employment of combat net radio since World War II. Most in-service systems, including the current Australian system, RAVEN, are very similar in architecture and employment to original CNR systems. Although the radios themselves have been dramatically improved, they are still single-frequency, half-duplex radios employing an analogue modulation technique (AM for HF and FM for VHF). However, the next five to ten years will see a dramatic change in CNR systems. The improved US SINGARS and the UK BOWMAN radios will maintain voice communication, but will also provide high-capacity data networks. BOWMAN appears likely to make a significant technology jump by utilising digital modulation techniques. The US programme for the Future Digital Radio (FDR) will make a further quantum leap in CNR capabilities.

A number of key factors will determine the architecture of a future CNR system.

- CNR is currently the primary means of exercising command and control below brigade. Whilst the trunk communications sub-system will become more available at levels, CNR will continue to be the primary means of exercising command within battlegroups and units. However, CNR must be integrated into the trunk network to facilitate seamless transmission of data from the lowest tactical level to the formation level.
- Whilst there will be a continuing requirement for “all-informed” voice communication, the ability to pass data efficiently over CNR is essential. This effectively requires that radios be digital, internetted and intergrated into the trunk network.
- The introduction of new command, weapons and real-time sensor systems will dramatically increase the capacity required from CNR systems.

- The threat to communications will increase so that effective, flexible Electronic Protective Measures (EPM) are essential to ensure reliable communications at all levels.
- The electromagnetic environment is severely congested, requiring CNR to operate using smaller bandwidths or spectrum-efficient techniques such as direct sequence spread spectrum.

Trunk Communications Sub-System

Whilst combat net radio architectures are about to undergo major changes, major developments have already occurred in trunk communications.

First-generation Networks

As illustrated in Figure 1, communications in early trunk networks followed the chain of command and therefore had the serious drawback that each headquarters was required to act as both a tactical base and a large communications node.

This dual role created serious conflict between the communications requirement to have access to sufficiently high terrain, and the headquarter's desire to conceal its location. The inclusion of the communications elements with the headquarters also seriously hampered mobility and increased vulnerability to both visual and electronic detection. Additionally, any movement of the headquarters or damage to the network caused disproportionate disruption to communications. Finally, because analogue transmission techniques were used, secure speech was impractical and only telegraph signals could be encrypted. For these reasons, few modern trunk communications systems are developed as chain-of-command systems.

Second-generation Networks

Figure 2 provides an example of a second-generation trunk network, which alleviated earlier difficulties by displacing communications from the chain-of-command. The tactical and communication roles of the headquarters were separated by creating a separate communications centre (COMCEN) to which the headquarter had access via short links.

As a result, the COMCENs became the nodes of the communications network, allowing tactical and communications sites to be planned with a higher degree of independence. However, the headquarters was still constrained by having to be near its COMCEN. The advent of data transmission also permitted encryption of each link to provide a secure

speech network. Examples of this type of network include the early networks deployed after World War II, particularly the BRUIN network deployed by the British Army in north-west Europe until the mid 1980s.

Third-generation Networks

The next logical step was to remove the fixed relationship between the headquarters and its COMCEN, allowing a headquarters to deploy as required and the communications planners to provide one or more COMCENs that were able to serve the complex. Figure 3 illustrates an example of this third-generation, *expanded chain-of-command network*.

This configuration has an additional advantage of being able to provide duplication (redundancy) so that headquarters could move without disrupting the network. The network could also be manually reconfigured without disrupting communications, thereby improving network reliability. Perhaps the best example of a third-generation network is the US Army's Army Tactical Communications System (ATACS), which was deployed until the mid 1990s.

Fourth-generation Networks

The logical extension of these developments is the fourth generation, *area trunk network* illustrated in Figure 4. Most modern trunk communications systems have been developed as fourth-generation networks: for example: Australia's PARAKEET; UK's PTARMIGAN; US's Mobile Subscriber Equipment (MSE); Germany's AUTOKO; The Netherlands' ZODIAC; Italy's SOTRIN; and France's and Belgium's RITA.

An area trunk network provides a grid of switching centres (or nodes) laid out to give area coverage. Nodes are interconnected by multi-channel radio relay bearers, which are normally point-to-point UHF or SHF radio links. Increasingly, however, links between nodes are provided by satellite communications since trunk networks are required to cover larger areas. Within the area network, headquarters can move about as required, connecting themselves electronically to the most convenient node. Each node will also normally provide access for individual mobile subscribers (Single Channel Radio Access (SCRA), as well as provide an interface to the combat net radio sub-system (Combat Net Radio Interface (CNRI)).

An area network can take much more damage before it fails because of the alternative routes available. It also allows much more freedom of movement for the nodes, which is increasingly important on the modern electronic battlefield to avoid the effects of electronic warfare.

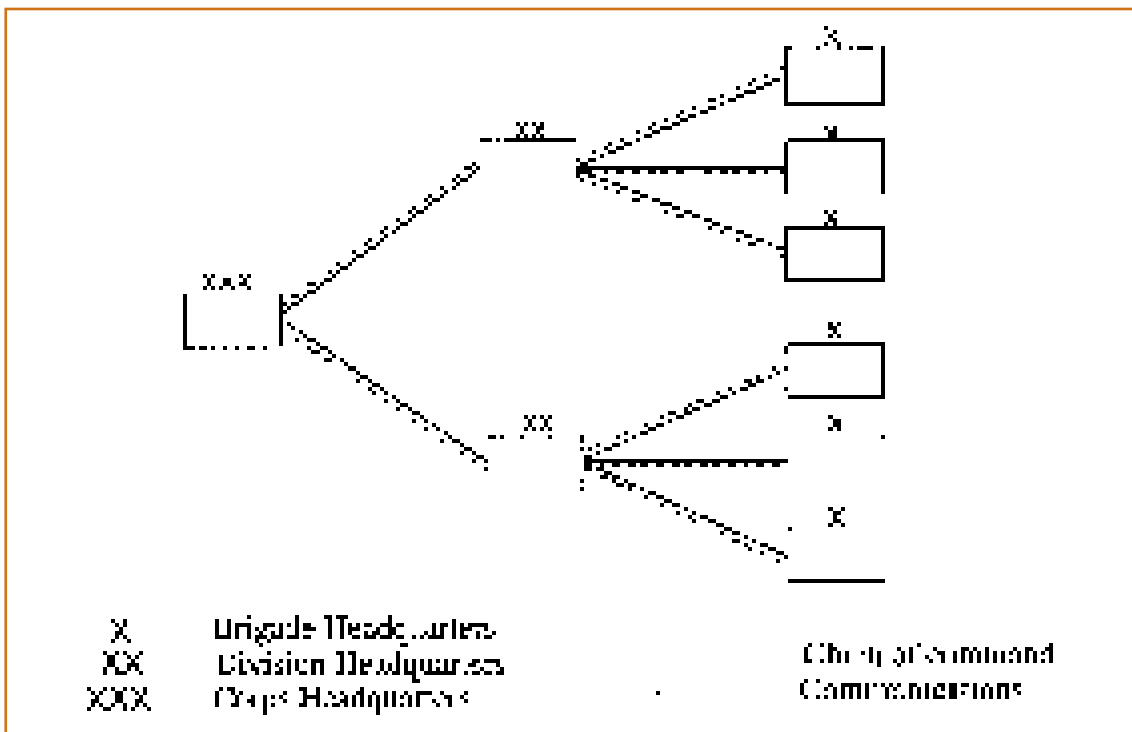


Figure 1. Direct chain-of-command trunk network.

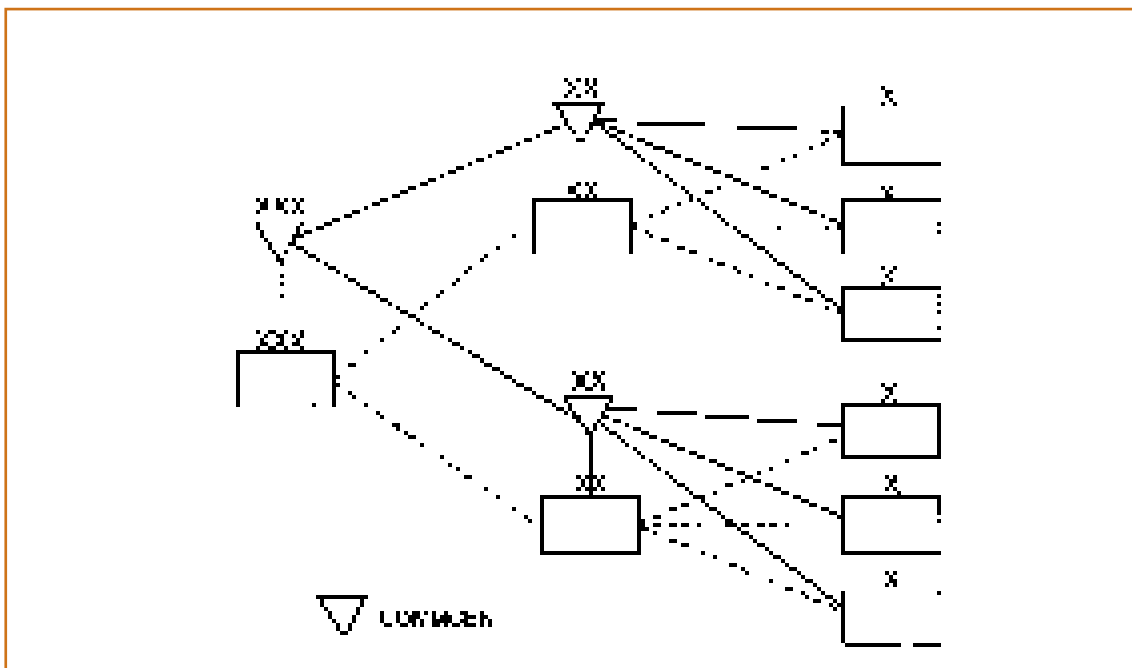


Figure 2. Displaced chain-of-command trunk network.

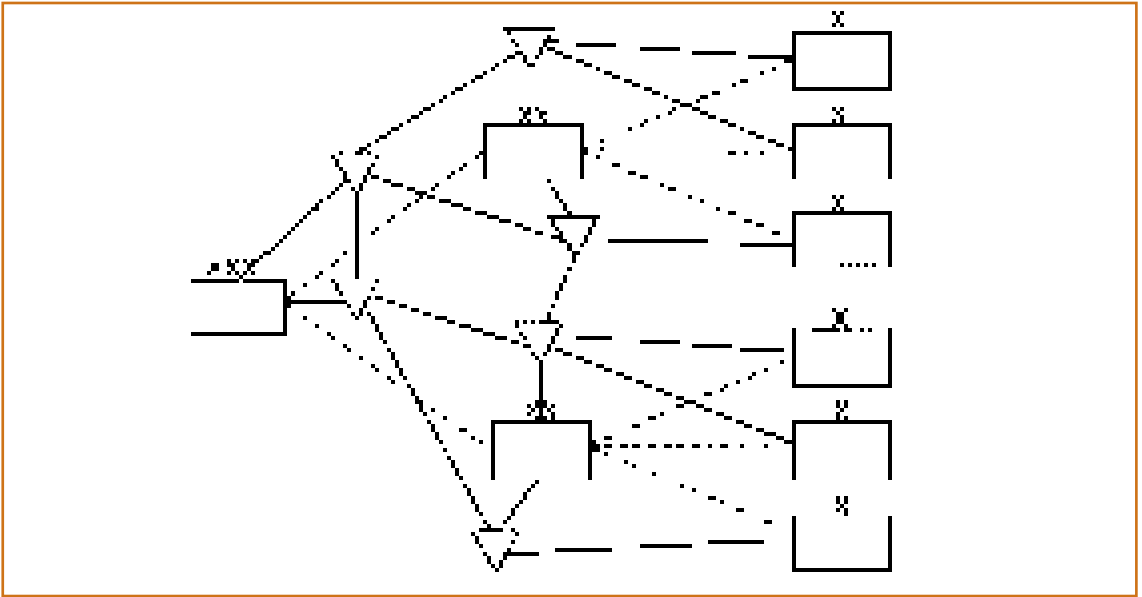


Figure 3. A simple expanded chain-of-command trunk network.

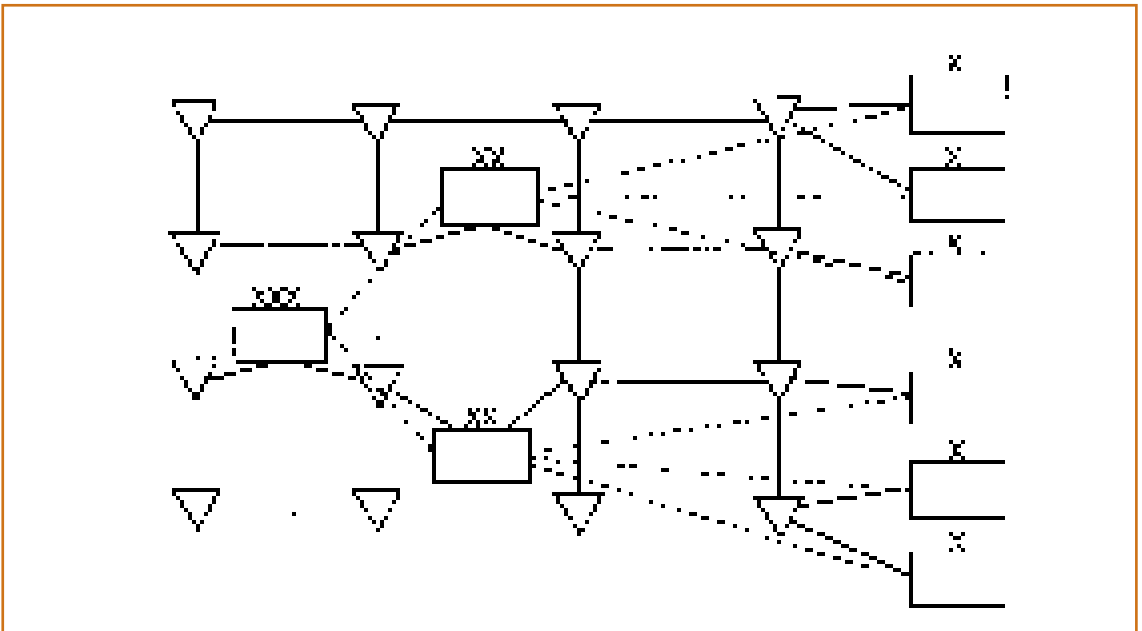


Figure 4. A simple area trunk network.

The network generally has two main advantages: transmission is digital, providing a much more efficient network; and the network is capable of automatic re-configuration to cope with movement of subscribers or network outages.

The obvious disadvantage of an area networks is the significant amount of equipment and manpower required to establish the large number of nodes. These disadvantages are by far outweighed, however, by the greatly improved flexibility, reliability, survivability and capacity that an area trunk system provides.

The flexibility of modern area trunk networks is dramatically illustrated when operational circumstances dictate deployments outside the context of the Cold War environment in north-west Europe, for which they were designed. In the Gulf War, both PTARMIGAN and MSE were often employed as linear communications systems to keep up with the rapid rate of advance of the land battle. In the Gulf, and in recent operations in Europe, the large scale of deployments and the wide separation of small pockets of troops has forced communications planners to provide smaller "islands" (called *enclaves*) of area network interconnected by satellite communications. Since the end of the Cold War, this architecture now appears likely to be the norm, rather than an exception.

PARAKEET has been developed as a fourth-generation network. However, due mainly to the basis of provisioning of equipment, the Australian trunk communications sub-system will be deployed fundamentally as a second-generation, displaced chain-of-command network to support current operational scenarios. Where sufficient equipment is procured PARAKEET will be able to deploy as an area trunk network.

Characteristics of Future Trunk Networks

Area trunk communications networks provide adequate grades of service to meet current requirements. Whilst the basic physical architecture of trunk networks is unlikely to change significantly in the foreseeable future, their capacity must increase dramatically since bandwidth requirements are predicted to double every three or four years. Several basic characteristics will therefore distinguish the next generation of military trunk systems from earlier generations.

Convergence. In older systems, specific channels can handle only one type of communication. For example, one channel may be used for telegraphy, one channel to carry data and others dedicated to telephone users. This reduces the grade of service offered to remaining users since a number of channels will not be available for general use. It is far more efficient if all channels could handle any type of traffic with none being dedicated. This is known as *convergence*. With all types of user sharing a larger number of channels there is statistically a better chance of any one user making a successful call. This process has begun in fourth-generation networks, but will be complete when the concept of channels disappears and the entire bandwidth between nodes will be able to be shared without the constraint of having to aggregate channels of a particular fixed size.

Voice, Data and Video Integration. Although voice and data are both transmitted as a digital stream in modern trunk networks, the two types of transmission have different requirements. Voice transmission is best handled by circuit switching; packet switching is most efficient for data transmission. Video has different requirements again and can only be handled in current systems by setting up a circuit-switched channel for the duration of the video transfer. In future trunk networks, a single switch will be required to handle efficiently voice, data, telegraph, facsimile and video. This is the great promise of asynchronous transfer mode (ATM), which will be fielded within the next 10 years as mid-life improvements to modern networks such as the US Army's MSE. Then, bandwidth can be allocated dynamically and managed on a priority basis, and all forms of users can be accommodated efficiently. This capability is also essential for PARAKEET, especially when deployed with its currently planned topology. The reality of convergence and integration is that channels are no longer physical entities as they are in most current systems, but are virtual portions of the overall trunk bandwidth allocated, on a priority basis, to a particular user for a particular period of time.

Capacity. The provision of sufficient capacity has always been a significant problem in the deployment of a tactical communications system. However, the current rapid growth in communications requirements (particularly data and video) has meant that tactical networks are under increasing pressure to provide the large bandwidths required. For example, most in-service trunk communications systems can only cope

with low-speed video transfer due to current fixed channel configurations. The drive to provide additional capacity will therefore be assisted greatly by the convergence and integration described above.

Upgrade Path. Until now, most military communications equipment has had at least a 10-year gestation period from conception to introduction into service. The technology implemented is at least five, and more often, 10 years old when the equipment is fielded. The life-of-type of such equipment is approximately 20 years so that, at the end of its life, the technology employed by a radio system may be 30 years old. That was barely suitable in the last generations of equipment, but it is totally unacceptable for the next. A new approach to equipment procurement is required. Equipment must be specified, designed and procured in a modular fashion so that multiplexers, modems, amplifiers, etc can be replaced individually to meet new requirements without having to dispose of the whole system. Systems must be designed and fielded with the expectation that they will undergo many minor modifications and at least four or five major upgrades during their in-service life of 15 to 20 years.

Conclusion

The development of tactical communications systems has been driven by the need to provide commanders and staffs with the support required to cope with the considerable changes in warfare over the years. Modern headquarters are currently well served by area trunk communications networks that provide flexible, mobile, reliable communications with sufficient capacity to cope with current traffic loads. However, these requirements are about to change as the bandwidth required to be provided by networks in the near future is predicted to double every three or four years. Convergence and the integration of voice, data, telegraph and video traffic will combine to provide the capacity required in the next generation of trunk communications systems. These characteristics, together with modular procurement, will ensure that fifth-generation communications systems will continue to provide the support required by commanders and staffs on the modern battlefield.

Lieutenant Colonel Ryan is currently posted as one of the Directing Staff for the Australian Technical Staff Officers' Course (ATSOC). He is a graduate of the Telecommunications Engineering Management Course (UK) and of Command and Staff College and has held appointments in 6 Signal Regiment, 7 Signal Regiment, 72 EW Squadron, Materiel Division, General Staff Division and as an Honorary Visiting Fellow at the Australian Defence Force Academy. He holds Bachelor, Masters and Doctor of Philosophy degrees in electrical engineering.

Book Reviews

THE WAR DIARIES OF EDDIE ALLAN STANTON Edited by Hank Nelson. Allen & Unwin, St Leonards, 1996. 374 pages \$29.95 (Paperback)

Reviewed by Major Darren Kerr

"*The War Diaries of...*" has become a very popular title in Australian publishing in the last decade or so. A diary is usually the repository of someone's fears, hopes and honest observations – both prejudiced and insightful. There is a sense of being able to reach out and touch the past, particularly the horrors of war, which makes reading many of these published war diaries so compelling. Weary Dunlop's published diaries, for example, captured both the brutality of life in the Japanese POW camps as well as the essential essence of Weary himself in a way that no biography ever could. *The War Diaries of Eddie Allan Stanton* do not deal with a man so great as Weary or a subject so harrowing as POW experiences. And yet this book is worthy of a place on the bookshelf because of what it reveals of Australia as a nation in the 1930s and 40s.

Eddie Allan Stanton, or just Stan to his friends, having just arrived in New Guinea was inducted into the Australian Army and sent to Murray Barracks, Port Moresby, on 27 January 1942; he was 26 years old. Stanton was an intensely private, but very intelligent man, who had trained to be a stage magician before the war. His war service was spent in the Australian New Guinea Administrative Unit (ANGAU) which took over the functions of the civilian administration in New Guinea during the war.

Stanton served 1477 days in the Australian Military Forces and never fired a shot in anger, although the war did rage all around him. During this time he maintained a frank, daily record of his experiences, observations and assessments of life around him. Hank Nelson writes that "Stanton, an unusual man, caught in extraordinary circumstances, reveals much about himself and his times."

In a preface Stanton wrote in 1946, he admitted to being shocked by much of what he had written:

"... one's opinions change with the passage of time, very often shocking the writer, who wonders how he ever could have said, let alone written, such a thing."

While we cannot know to what he was actually referring, there is much in the diaries which show Eddie Stanton to have been a racist, a misogynist and

a bit of a prude. Yet for all that, he was merely a reflection of his times and I am left with the uneasy feeling that much of my response is shaped by the "politically correct" times I live in. Stanton is brutally honest in his observations and reflects that "it is the hardest thing in the World to be honest."

Stanton spent much of his war service in Milne Bay, surrounded by Japanese in the opening years of the Pacific War. His service involves holding local courts, undertaking villages censuses, rescuing downed pilots and collecting the flotsam and jetsam of war which drifts onto the various islands he is working on. Nothing startling and yet the book makes compelling reading, probably because Stanton is able to capture so well the essence of life during the war.

Stanton's relatively peaceful, although anxious, war is suddenly interrupted by the arrival of large numbers of Americans. This brings him "the finest food in the World" but also new problems as "the American bugger up the natives. They started off handing out packets of cigarettes, then underpants, singlets, hats and boots. Piles of food are simply thrown at the poor, stone-age savages." Sex rears its head throughout the diaries as Stanton shakes his head sadly at the wanton behaviour of both white and black men and women.

Stanton is not your typical bronzed-Aussie of the ANZAC legend, and yet in him I found a much closer sense of what it was to be an Australian in that time. He is an anti-hero full of prejudice and cynicism, however, he is also intelligent, humourous and insightful. While he is never really threatened by the war, his diary records familiar events such as the Battle of the Coral Sea from a unique perspective.

The War Diaries of Eddie Stanton is a worthwhile read and one which is highly recommended.

THE LAW OF WAR CRIMES: National and International Approaches, edited by Timothy L.H. McCormack and Gerry J. Simpson. Kluwer Law International, The Hague, 1997. 262 pages.

Reviewed by Air Commodore Geoff Skillen

The 1990s has seen a remarkable resurgence in public interest in the prosecution of war crimes, driven partly by national and partly by international factors. In Australia, at a national level, we have seen the enactment of the War Crimes Amendment Act 1988, which allows the prosecution in Australian courts of crimes allegedly committed in Europe

during World War II. Subsequently, we have seen three prosecutions (all unsuccessful) under this legislation. At the time of writing, there is the prospect of a fourth, against Konrad Kalejs, suspected of mass murder in Latvia. Internationally, tribunals have been created by the UN Security Council to try war crimes committed in both the former Yugoslavia and Rwanda. In 1997, in the case of Dusko Tadic, the Yugoslav tribunal concluded the first international war crimes trial since the Nuremberg and Tokyo tribunals in the immediate aftermath of World War II.

Into this highly charged arena step two Australian academics, Tim McCormack and Gerry Simpson, who both edit and contribute to this volume. This timely work assesses, as the title suggests, efforts at both national and international levels to deal with crimes which shock the conscience of humanity.

Gerry Simpson of the ANU offers a critical insight into some of the theories behind the conduct of war crimes trials, including that they variously represent a record of historical events (Nuremberg) or perhaps an exercise in legitimisation of past events (Eichmann, Barbie). Melbourne University's Tim McCormack traces the evolution of an international criminal regime, finding its first evidence in Sun Tzu's *The Art of War*. Other contributors provide thoughtful accounts of national war crimes trials since World War II, notably those conducted in Europe, Israel, Canada and Australia. These chapters feature discussions of a number of notorious cases, including those of Adolf Eichmann, Klaus Barbie and John Demjanjuk (the alleged Ivan the Terrible). Gillian Triggs provides an excellent account of the Australian experience in the wake of the War Crimes Amendment Act 1988.

Other chapters deal with the only international tribunals ever to have tried war crimes, namely Nuremberg, Tokyo and the International Criminal Tribunals for the former Yugoslavia and Rwanda. The book closes with a joint contribution by McCormack and Simpson on what might be the ultimate conclusion of the history earlier described, namely the creation of a permanent International Criminal Court.

The historical accounts tend to leave the reader with a sense of depression, and quite justifiably so. The ineffectuality of national regimes are dramatically portrayed. Generally, states have been unwilling to prosecute their own nationals for war crimes, a notable exception being Germany, which has tried some 91,000 persons since the end of World War II. The German experience stands in stark contrast to most others, including most recently, that in the former Yugoslavia. Most national efforts have

been characterised by selectivity, partiality and inconsistency.

Equally valid criticisms can be made of the international tribunals. Most military historians would be familiar with the argument that the Nuremberg and Tokyo tribunals meted out "victors' justice". Indeed, the defence at Nuremberg argued that some allied transgressions were at least as serious as those alleged against the defendants. Simpson tellingly concludes that war crimes trials have only taken place where defeat and criminality coincide. It is probably too early to judge the Yugoslav and Rwanda tribunals, although it has already been argued that their validity is diminished by reason of their creation by the elite interests represented on the Security Council. It is difficult to answer criticisms that events in other conflicts merit similar action, and that the Security Council's responses are characterised by selectivity and partiality.

Against this background, it is hardly surprising that a number of the authors refer with approval to the need for a new international criminal regime, and specifically for a permanent International Criminal Court. In view of the currency of this initiative, this work is a timely contribution to the debate.

In conclusion, the book is well worthy of the attention of a variety of audiences, including military historians, lawyers and those with an interest in international affairs. McCormack and Simpson are to be commended for their initiative, which fills something of a vacuum on a subject of great historical and contemporary significance.

AIRCRAFT CARRIERS OF THE ROYAL AND COMMONWEALTH NAVIES: by Commander David Hobbs, MBE, RN.

Reviewed by Vic Jeffery

Described as "The Complete Illustrated Encyclopedia from World War I to the Present" this 264 page book by Commander David Hobbs, MBE, Royal Navy, is truly one of the most comprehensive ever published on British and Commonwealth aircraft carriers.

I feel the cover, "HMAS *Sydney* in Korean Waters, 1951" a reproduction of the superb oil on canvas painting by Ray Honisett, which hangs in the Australian War Memorial, sets the standard for this commendable book.

This encyclopedia includes ships from the Royal Navy, the Royal Australian Navy, the Royal Canadian Navy/Canadian Armed Forces and the Indian Navy, as well as escort carriers which originally served with the United States Navy before their transfer.

Some 124 ships from HMS *Hermes*, the first ship

in the world to be designed, ordered and built as an aircraft carrier, through to today's *Invincible*-class carriers are included.

The book is divided into four parts, being: Part One: Aircraft Carriers, (covering 85 carriers and escort carriers); Part Two: Seaplane Carriers (16 ships); Part Three: Helicopter Support and Training Ships (three ships, Australia's recent additions, *Kanimbla* and *Manoora* along with the RN's *Lofoten*); and Part Four: Merchant Aircraft Carriers (20 ships).

Seven interesting appendices support this encyclopedia. They are: 1. Aircraft Carriers Ordered but Not Completed; 2. Other Vessels Requisitioned for Use as Balloon Carriers; 3. Vessels Requisitioned for Use as Balloon Carriers; 4. Aircraft Carrier Flight Deck Recognition Letters; 5. Endurance Figures for Selected Aircraft Carriers; 6. Details of Selected Carrier-Borne Aircraft; and, 7. Sample Flying Programs.

Comprehensive technical details of all the ships are included, with extensive service histories (it was interesting to note that outside of Australian waters, HMAS *Melbourne* made the most port visits to Singapore, followed by Manus, Manila, Subic Bay, and Hong Kong, in that order.

Included also are conventional hull and armament facts, details of aircraft operating equipment such as catapults, arrestor wires and lifts, details of which are rarely included. The author also lists the aircraft fuel capabilities and weapon capacities of every ship.

Published by Greenhill Books of London and recently released in Australia by Peribo Pty Ltd of 58 Beaumont Road, Mount Kuring-Gai, NSW 2080, "Aircraft Carriers of the Royal and Commonwealth Navies" is a worthy edition to any naval bookshelf or library.

Destined to become a collectors' item, the one draw-back with this highly commended work is the recommended retail price – \$105.00. Cost is always a hurdle for extensively researched and limited print run quality reference books. I have always found it is worth asking your bookseller for a discount before you place your order. Shop around if necessary.

Fully illustrated, this book contains 170 good

quality black and white photographs with every ship included, many photos never before published. This is one of those books where colour would somehow have detracted from the finished product.

Australia features well on the photographic side with two views each of HMAS *Melbourne* and HMAS *Sydney*, and singles of HMAS *Vengeance*, HMAS *Albatross* and HMAS *Kanimbla* (prior to conversion). A line drawing of HMAS *Manoora* showing how she and *Kanimbla* will appear with their modified appearance is also included.

Other photos with Australian links include HMS *Albion* in Sydney Harbour in 1960, HMS *Centaur* in the Brisbane River during Centenary celebrations in 1959, and HMS *Formidable* in the Captain Cook Graving Dock in Sydney in 1945.

There are some poignant photos, such as the Royal Navy's incomplete *Majestic*-class *Leviathan* laid-up in Fareham Creek in 1966 two years before she was broken-up; HMS *Ocean* laid-up awaiting disposal in the Tamar River; and the only carrier to be lost in World War I, the seaplane carrier HMS *Ben-My-Chree* on fire and sinking after being hit by Turkish shore batteries whilst anchored off Castelorizo Island in 1917.

It is generally known that the *Colossus* and *Majestic* classes (HMA Ships *Melbourne* and *Sydney*) of light fleet carriers were built to Lloyd's specifications up to the hanger deck to speed construction and enable shipyards not used to warship construction to build them. However, it was not, as has sometimes been supposed, intended to enable them to be converted to merchant ships as they became surplus after the war.

It was interesting to note also that many carriers had two or more flight deck recognition letters during their careers. HMS *Illustrious* – L (1940), Q (1945), D (1946) and A (1947), along with HMS *Victorious* – P (1945), S (1945), G (1946) and V (1958), both boasted four.

This book surveys all aspects of the development of the aircraft carrier and compares British and United States designs and operating techniques. Now and again a book comes along that helps fill a void in *Naval History*. I consider this one of them.



ANZDoD News



Australia and New Zealand Defence on Disc

ISSUE 1: 97-3

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McLaughlin, Lieutenant R.J., RAN	122 Jan/Feb	5
McNamara, Brigadier P.J.	123 Mar/Apr	9
May, Squadron Leader D., RAAF	127 Nov/Dec	9
Moor, Major R.C., RA Inf	123 Mar/Apr	45
Murray, Captain J.H., RASigs	126 Sep/Oct	29
Orme, Lieutenant Colonel C.W., RAAC	123 Mar/Apr	21
Orme, Lieutenant Colonel C.W., RAAC	126 Sep/Oct	45
Oswald, Major B., AALC	122 Jan/Feb	13
Oswald, Major B., AALC	126 Sep/Oct	19
Phelps, Lieutenant Colonel M.L., RAA	123 Mar/Apr	37
Robinson, Lieutenant Commander J. P., RAN	125 Jul/Aug	47
Rogers, Lieutenant F., RAN	126 Sep/Oct	5
Roggeveen, S., Deakin University	126 Sep/Oct	50
Rudzki, Lieutenant Colonel S.J., RAAMC	122 Jan/Feb	33
Ryan, Lieutenant Colonel M.J., RASigs	124 May/Jun	7
Ryan, Lieutenant Colonel M.J., RASigs	127 Nov/Dec	43
Shiels, Corporal, N.	124 May/Jun	17
Stevens, D., Department of Defence	125 Jul/Aug	55
Tamsitt, Lieutenant Colonel G. M., RFD	123 Mar/Apr	25
Thompson, Lieutenant Colonel R.J.	127 Nov/Dec	25
Tully, S.	125 Jul/Aug	25
Ware, Lieutenant Commander G.T., JAGC USN	126 Sep/Oct	5
Warfe, Colonel P.G.	127 Nov/Dec	25
Welburn, A.C.G., Department of Defence	124 May/Jun	25
Wren, Squadron Leader G.G., RAAF	127 Nov/Dec	9