

Australian Maritime Issues 2010

SPC-A Annual

Edited by Rhett Mitchell

SEA POWER CENTRE - AUSTRALIA



AUSTRALIAN MARITIME
ISSUES 2010
SPC-A ANNUAL

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AUSTRALIAN MARITIME ISSUES 2010 SPC-A ANNUAL

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Rhett Mitchell
Sea Power Centre - Australia

The Sea Power Centre - Australia was established to undertake activities to promote the study, discussion and awareness of maritime issues and strategy within the Royal Australian Navy, the Department of Defence and civil communities at large. Its mission is:

- to promote understanding of sea power and its application to the security of Australia's national interests
- to manage the development of RAN doctrine and facilitate its incorporation into ADF joint doctrine
- to contribute to regional engagement
- contribute to the development of maritime strategic concepts and strategic and operational level doctrine, and facilitate informed force structure decisions
- to preserve, develop, and promote Australian naval history.

A listing of Centre publications may be found at the back of this volume.

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Foreword

The key mission of the Sea Power Centre – Australia (SPC-A) is to promote discussion on maritime and naval issues that concern Australia. One way we do this is by providing the factual underpinnings to many of the issues through our publications – information that allows debate and discussion to occur in as informed a manner as possible. *Australian Maritime Issues 2010: SPC-A Annual* is an important part of the SPC-A’s publishing schedule. It includes papers written on naval and maritime issues during 2010. Many of these appeared originally as *Semaphore* and *Hindsight* newsletters, others are articles from a variety of sources that caught our interest or that we considered worth reprinting in our annual collection.

The first article is the text of a speech given by Commodore Richard Menhinick, RAN, examining ‘sea-blindness’; one of the most enduring maritime issues confronting Australia throughout its history. Put simply, ‘sea blindness’ describes our national reluctance to acknowledge the importance of the sea to our economic and strategic security. The next paper, by Lieutenant Will Dehnert, RAN, looks to the future and examines how unmanned systems may change the conduct of war at sea. Three historical papers follow; each, however, quite different. Captain Bill Owen, RAN (Rtd), looks at how Australia came to purchase the six *Oberon* class submarines in the 1960’s which re-established the Australian submarine service after a hiatus of almost 40 years. Dr Alex Kallianitis uses modern analytical tools and leadership models to cast a fresh light on one of the most famous and discussed 20th century sea battles – Jutland. Finally, Ms Kelly Christopherson gives an account of the contribution the Women’s Royal Australian Naval Service made throughout their history.

As in previous years, our *Semaphore* and *Hindsight* cover a diverse range of topics - from examinations of mine warfare and patrol combatant capabilities to doctrinal issues and how ship’s designators came to be. Looking to our past, there is an examination of one of Australia’s most successful ship design and build projects, the Australian corvette, little known vignettes of Australian naval action during World Wars I and II, and a review of the Royal Australian Navy in the Korean War.

Australian Maritime Issues 2010: SPC-A Annual contains a rich and varied collection of speeches, articles and papers. I hope you enjoy reading it and that you find it interesting, thought provoking, and deepens your understanding of the many complex issues both past and present that the sea has imposed upon our island nation.

Captain Gordon A Andrew, RAN

Director
Sea Power Centre – Australia
October 2011

Editor's Note

Semaphore Issue 1 of 2010 has been omitted from this volume. The first issue of *Semaphore* published each year is used to promote the Sea Power Centre - Australia's publications, conferences and other activities coordinated by the centre. *Semaphore* which do not identify a specific author were developed collaboratively with the participation of a number of subject matter experts.

All information contained in this volume was correct at the time of publication or, in the case of papers being reprinted, was correct at the time of initial publication. Some information, particularly related to operations in progress, may not be current. Minor editorial amendments have been made to papers to correct errors and to apply a standardised format.

I would like to acknowledge Commodore Richard Menhinick, CSC, RAN, and Captain Bill Owen, FCIL, RAN (Rtd) for allowing us to reprint their work. I would also like to thank the remaining contributors, named and un-named for their efforts. This publication is the direct result of the extensive research and writing efforts of this group of people.

Contributors

Captain Gordon Andrew, RAN

Captain Gordon Andrew joined the Royal Australian Naval College in 1979 and graduated in 1981 with a Bachelor of Arts degree. After a range of training and junior officer postings in both patrol boats and destroyers, he completed his Principal Warfare Officers course and was posted as the gunnery officer of HMAS *Stalwart*. In 1989, he commenced his first posting in the intelligence community at the Defence Signals Directorate in Melbourne. He also has completed postings with Naval Intelligence policy, the Maritime Intelligence Centre, as the Officer in Charge of Shoal Bay Receiving Station, and as the SO2 Current Intelligence (J23) at Northern Command. In 2001, he assumed command of HMAS *Coonawarra*, Darwin. In 2004, he was selected as Australian Defence Intelligence Liaison Officer to the Australian Defence Staff, Washington DC. From 2007-08 he was Director of Intelligence Plans at Headquarters Joint Operations Command. He assumed his current position as Director, Sea Power Centre - Australia in January 2009.

Petty Officer Peter Cannon

Petty Officer Peter Cannon is an electronics technician currently serving at HMAS *Creswell's* School of Survivability and Ship's Safety as a CBRND instructor. Peter joined the navy in 1993 and has served at sea in HMA Ships *Perth*, *Hobart*, *Brisbane*, *Manoora* and *Kanimbla* including operational deployments in the Arabian Gulf (2002-03), Solomon Islands (2003) and disaster relief in Indonesia (2009). Peter regularly contributes naval history articles to many publications including the Navy League of Australia's magazine *The Navy* and the Naval Historical Society's *Journal of Australian Naval History*.

Vice Admiral Russ Crane, AO, CSM, RAN

Vice Admiral Russ Crane was appointed Chief of Navy in July 2008. He was promoted to star rank in March 2000 and posted to the Director General Intelligence Surveillance Reconnaissance and Electronic Warfare before being appointed as the Commander Australian Naval Systems Command in October 2001. He was promoted to Rear Admiral in May 2004 and assumed duties as Director General Coastwatch and subsequently was appointed as Deputy Chief of Navy in June 2006.

Ms Kelly Christopherson

Ms Kelly Christopherson joined the Department of Defence in February 2010 through the Graduate Development Program after completing a Bachelor of Arts degree at Melbourne University and a Bachelor of Laws degree from Victoria University. Since completing the Graduate Development Program, Kelly has settled in Defence Force Recruiting, currently working on the procurement of the Recruiting Services Contract.

Lieutenant William Dehnert, RAN

Lieutenant William Dehnert joined the RAN in 2006 as a seaman officer and completed specialisation training in July 2008. He is presently posted to the RAN Dive School where he is undertaking Mine Clearance Diving Officers Course. Prior to joining the navy he completed a Bachelor of Arts degree at the University of Melbourne and presently he is studying a Master of Defence Studies degree at the University of New South Wales.

Mr Petar Djokovic

Mr Petar Djokovic joined the Department of Defence in 2007 having spent a number of years in ministerial, cabinet and community liaison positions in the Australian Capital Territory government. After working in the Air Power Development Centre, where he wrote historical articles on extensive subjects, he joined the Sea Power Centre - Australia as a historical officer in 2007 with a particular interest in naval aviation.

Dr Gregory P Gilbert

Dr Gregory P Gilbert previously worked as a naval design engineer with the department of Defence (Navy) between 1985 and 1996 and was a Defence contractor until 2002. He has broad research interests, including military strategy and history, the archaeology and anthropology of warfare, Egyptology, and international relations in the Middle East.

Rear Admiral James Goldrick, AM, CSC, RAN

Rear Admiral James Goldrick joined the RAN in 1974 as a 15-year-old cadet midshipman. A graduate of the Royal Australian Naval College, he holds a Bachelor of Arts degree from the University of New South Wales and a Master of Letters degree from the University of New England. A principal warfare officer and anti-submarine warfare specialist, he has seen sea service around the world with the RAN and on exchange with the Royal Navy. He has served as Executive Officer of HMA Ships *Tarakan* and *Perth*, and as Commanding Officer of HMA Ships *Cessnock* and *Sydney*. Shore postings have included serving as Aide to the Governor-General of Australia and as Research Officer to the Chief of Navy. In 2006, he was promoted to rear admiral, and has been

both the Commandant of the Australian Defence Force Academy and Commander of the Australian Defence College in Canberra.

Dr Alexander Kalloniatis

Dr Alexander Kalloniatis is a Canberra-based senior analyst with Joint Operations Division of the Defence Science and Technology Organisation (DSTO). He completed his PhD at the University of Adelaide in 1992 in theoretical particle physics and undertook research in that field in institutes across Germany and the United States. Since coming to DSTO in 2005 he has conducted research into command and control (C2), using modelling, simulation and organisational science to contribute both to the Australian Defence Force's new Headquarters Joint Operations Command and the international C2 research literature. His interest in a range of periods of military history has led to a number of papers fusing methods from mathematics and physics with the insights of historical analysis in a deepening understanding of C2.

Commodore Richard Menhinick, CSC, RAN

Commodore Richard Menhinick joined the RAN in January 1976. After graduating from the RAN College in 1980, he undertook sea-training culminating in the award of his Bridge Watchkeeping Certificate in 1982. Postings as Aide-de-Camp to the Governor of Tasmania, Assistant Warfare Officer in HMAS *Derwent* and Air Intercept Controller in HMAS *Perth* followed. As a principal warfare officer, he served on exchange in the RN for two years in HMS *Cardiff*. On return to Australia, he served in HMAS *Brisbane* in the 1990-91 Gulf War. After this, he spent two years as Fleet Direction Officer at Maritime Headquarters in Sydney, prior to being appointed as Executive Officer of HMAS *Hobart* in 1993. He served as Commanding Officer of HMA Ships *Warramunga* and *Anzac* in 2000-02 and 2003-05 respectively. Promoted to commodore in 2006, he has served as Director-General Military Strategy, Director-General Navy Transformation and Innovation, and Commander Task Force 150. Since May 2010 he has been Commandant of the Australian Command and Staff College. He holds a Bachelor of Arts degree, majoring in international relations and strategic studies, and a Masters degree in maritime studies.

Captain Bill Owen, FCIL, RAN (Rtd)

Captain Bill Owen was born in the United Kingdom in 1927 and graduated from the Royal Navy College, Dartmouth, in March 1945. He specialised in submarines and went onto command HM Ships *Subtle*, *Anchorite* and *Opossum*. In 1954, after qualifying as a naval interpreter in German, he was elected Fellow of the (later Chartered) Institute of Linguistics in 1964. After transferring to the RAN, he commanded the new squadron of British-built *Oberon* class submarines from 1967-70 and again from 1976-79. As

Director of Submarine Policy in Canberra from 1971-76, he initiated a series of projects to upgrade the six RAN *Oberons*, re-equipping them with a new digital combat-system, a new passive range-finding sonar and re-arming them with Sub-Harpoon missiles and Mark-48 torpedoes. Since retiring from the navy in 1983, he has been a consultant in the fields of government liaison, defence and German translation.

Lieutenant Commander Michael Paes, RAN

Lieutenant Commander Michael Paes joined the RAN as a legal officer in 2004. Since then, he has served as a legal advisor at both fleet bases and in various command headquarters. He has also served at the Royal Australian Naval College, HMAS *Creswell* as the lead history and maritime doctrine instructor in addition to divisional officer duties for new entry officers. He holds post graduate qualifications in both law and strategic studies. In 2011 he served as the staff officer to the Australian Defence Force Judge Advocate General and Chief Judge Advocate.

Mr John Perryman, CSM

Mr John Perryman joined the RAN in January 1980 as a 16-year-old junior recruit. During a career spanning 25 years he attained the rank of Warrant Officer Signals Yeoman and later commissioned as a lieutenant. Throughout his service he saw much of the world and participated in numerous exercises and operations that included operational deployments to Somalia, Bougainville and East Timor. He transferred to the Naval Reserve in November 2004 when he took up a position in the Australian Public Service as the Senior Naval Historical Officer at the Sea Power Centre - Australia. He is the co-author of *Australia's Navy in Vietnam* and has made numerous written contributions to a wide range of historical publications. In February 2008 he was appointed as the official Commonwealth observer and historian on the successful search for the wrecks of HSK *Kormoran* and HMAS *Sydney* (II). He was awarded a Conspicuous Service Medal in 2009.

Dr David Stevens

Dr David Stevens has been the Director of Strategic and Historical Studies, Sea Power Centre - Australia, since retiring from full time naval service in 1994. He graduated from the Australian National University with a Master of Arts (Strategic Studies) degree in 1992, and in 2000 received his PhD in history from the University of New South Wales at the Australian Defence Force Academy.

Commander Greg Swinden, RAN

Commander Greg Swinden joined the Royal Australian Naval College in 1985 and graduated from Australian Defence Force Academy (ADFA) in 1987 with a Bachelor of Arts degree majoring in politics and history. He commenced Supply Officer training at HMAS *Cerberus* in 1988 and subsequently served in HMAS *Swan*, Navy Office, HMAS *Creswell*, HMAS *Melbourne*, Naval Support Command and as a divisional officer at ADFA. He was promoted to lieutenant commander in 1998, and was the RAN Liaison Officer at Defence National Storage and Distribution Centre Moorebank from 1998-2001, which included a three-month posting to East Timor as the RAN Liaison Officer. In 2001, he became the Supply Officer of HMAS *Kanimbla*, and saw operational service in the Solomon Islands, Middle East and border protection patrols. From 2003-04 he was the RAN Liaison Officer in Singapore, followed by completion of the Australian Command and Staff Course in 2005. From 2006-07 he was the Deputy Fleet Support Officer in Fleet Headquarters, and upon promotion to commander in 2008, became a member of the directing staff at the Australian Command and Staff College. In 2010, he returned to sea as the Supply Officer of HMAS *Kanimbla* prior to proceeding overseas to the Middle East as the J4 in Headquarters Joint Task Force 633 for six months.

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Abbreviations

ACNB	Australian Commonwealth Naval Board
ACPB	<i>Armidale</i> Class Patrol Boat
ADF	Australian Defence Force
ADFA	Australian Defence Force Academy
AMP	Assisted-Maintenance (and leave) Periods
AMS	Australian Minesweeper
AO	Area of Operations
AS	Anti-Submarine
ASEAN	Association of Southeast Asian Nations
ASW	Anti-Submarine Warfare
AUV	Autonomous Underwater Vehicles
AWAS	Australian Women's Army Service
AWD	Air Warfare Destroyer
AWM	Australian War Memorial
BCF	Battle Cruiser Fleet
BCOF	British Commonwealth Occupation Force
BPC	Border Protection Command
CA	Chief of Army
CAF	Chief of Air Force
CDT	Clearance Diving Teams
CinC	Commander in Chief
CMF	Coalition Maritime Forces
CN	Chief of Navy
CO	Commanding Officer
CTF	Combined Task Force
C2	Command and Control

DDG	Guided Missile Destroyer
DDGH	Guided Missile Destroyer Helicopter
DSC	Distinguished Service Cross
DSMP	Director of Submarine Policy
DSMR	Director of Submarine Maintenance and Repair
DSTO	Defence Science and Technology Organisation
EOD	Explosive Ordnance Disposal
FAA	Fleet Air Arm
FCPB	<i>Fremantle</i> Class Patrol Boat
FFG	Guided Missile Frigate
FOSM	Flag Officer Submarines
GDP	Gross Domestic Product
GFBO	Grand Fleet Battle Orders
HMAS	Her/His Majesty's Australian Ship
HMS	Her/His Majesty's Ship
HSF	High Seas Fleet
HSK	<i>Handelstörkruezer</i>
IEDD	Improvised Explosive Device Disposal
ISR	Intelligence, Surveillance and Reconnaissance
LCS	Littoral Combat Ship
LHD	Amphibious Ship
LOSC	<i>United Nations Convention on the Law of the Sea 1982</i>
MCM	Mine Countermeasures
MFU	Major Fleet Units
MGDST	Maritime Geospatial Deployable Support Team
MHC	Coastal Minehunter
MS	Minesweeping
MWV	Minor War Vessel

NATO	North Atlantic Treaty Organization
OCV	Offshore Combatant Vessel
OODA	Observe-Orient-Decide-Act
OPCON	Operational Control
RAAF	Royal Australian Air Force
RAN	Royal Australian Navy
RANNS	Royal Australian Navy Nursing Service
RANR	Royal Australian Naval Reserve
RANVR	Royal Australian Naval Volunteer Reserve
REA	Rapid Environmental Assessment
RIN	Royal Indian Navy
RN	Royal Navy
Rtd	Retired
SAR	Search and Rescue
SFCS	Submarine Fore Control System
SM4	Fourth Submarine Division
SPC-A	Sea Power Centre - Australia
SSGN	Submarine - Nuclear Guided Missile
SSN	Submarine - Nuclear Attack
STUAV	Small Tactical Unmanned Aerial Vehicle
TGMCM	Task Group Mine Countermeasures
VTUAV	Vertical Take-off and landing Tactical Unmanned Aerial Vehicle
UAS	Unmanned Aircraft Systems
UAV	Unmanned Aerial Vehicle
UK	United Kingdom
UN	United Nations
US	United States
USN	United States Navy

USNS	United States Naval Ship
USS	United States Ship
USV	Unmanned Surface Vehicle
UUV	Unmanned Underwater Vehicle
WAAAF	Women's Australian Auxiliary Air Force
WESC	Women's Emergency Signalling Corps
WNEL	Women's National Emergency Legion
WRANS	Women's Royal Australian Navy Service
WWI	World War I
WWII	World War II
5thBS	5th Battle Squadron

MARITIME ISSUES: PAST, PRESENT AND FUTURE



HMAS Melbourne supports HMS Montrose recover a Lynx helicopter in the Gulf of Aden as part of Combined Task Force 150 (Defence)

Australian Sea-Blindness: An Inconvenient Truth!

Commodore Richard Menhinick, CSC, RAN

On 20-22 February 2011, the Lowy Institute for International Policy and the US Naval War College held a conference at the Naval Heritage Centre, Garden Island, on Indo-Pacific Maritime Security in the 21st Century. The paper below is an edited version of a dinner speech given on 21 February and is reprinted with the permission of the Lowy Institute.

Firstly good evening and thanks to Michael Wesley, Andrew Shearer and the Lowy Institute for this opportunity and invitation to speak. I also acknowledge Tom Mahnken from the US Naval War College whom I have known from his time as Deputy Assistant Secretary of Defence for Policy Planning when I was in Strategic Policy Division. Tonight I wish to talk to you from both the heart and the head. I will talk at the strategic and operational level as I have spent much time at sea on all oceans and many seas of the world. I am very aware that it is always dangerous doing an after dinner speech, especially in front of such an august audience after a day of excellent discussion. Thus I thought I would start with a joke - also a somewhat dangerous thing to do, but this one actually relates to much I have to say - it sets the theme so to speak. So here we go:

The Lone Ranger and Tonto are camping in the desert; they set up their tent and are asleep.

Some hours later, the Lone Ranger wakes his faithful friend. 'Tonto, look up at the sky and tell me what you see.' Tonto replies 'Me see millions of stars'. 'What does that tell you?', asks the Lone Ranger.

Tonto ponders for a minute and replies:

'Astronomically speaking, it tells me that there are millions of galaxies playing hosts to billions of stars and planets.

Astrologically, it tells me that Saturn is in Leo.

Time wise, it appears to be approximately 3:15 am.

Theologically, it's evident the Lord is all powerful and as small insignificant beings, we pale in his presence.

Meteorologically, we're in for a clear and beautiful day tomorrow with a light easterly breeze in the morning.

What it tell you Kemo Sabi?'

The Lone Ranger is silent for a moment, looking at Tonto in amazement, then says 'Tonto you idiot ... Someone has stolen our tent!'

How pertinent this is! We all too often fail to see the simple truths in front of us while searching for complicated answers and nuanced twists to the simple realities that confront us. And for Australia our relationship, or non-relationship, with the sea is one.

In a few, hopefully, entertaining minutes tonight I hope to build on the theme of the conference and to explore some issues that are most relevant to us all with a focus on the Indian Ocean.

So, why choose the Indian Ocean as a subject for tonight? Because like Tonto's tent it is our most neglected ocean, but it is vital to us.

As a two-year-old I first crossed it en route to Australia from England as an immigrant (as have many new Australians). And of course, I - like many of my peers in the RAN - have spent much of my career in the Indian Ocean.

Most recently from December 2009 until April 2010 as Commander Combined Task Force (CTF) 150 within the Combined Maritime Forces (CMF), I worked across some 3.3 million square miles of seas and oceans in the Middle East, including the Indian Ocean and such key spots as the Red Sea, the Bab el-Mandeb Strait, the Gulf of Aden, the Gulf of Oman and the Strait of Hormuz.¹ I have had the pleasure of commanding a ship based out of the Indian Ocean naval base of HMAS *Stirling*, and whilst in command of that good ship HMAS *Anzac*, have crossed the Indian Ocean in two directions - north west to Goa and then the Red Sea and ultimately the Suez Canal and Alexandria, retracing, in essence, the route the first ANZACs took from Albany to Egypt, and then six months later I returned to Australia from Capetown, South Africa, via Reunion Island to Perth. In both my commands, HMA Ships *Warramunga* and *Anzac*, I traipsed extremely often from Perth to Christmas Island and back on border protection duty, over the top of the resting place of HMAS *Sydney* and HSK *Kormoran*.

Even as a more junior officer, I crossed the Indian Ocean to go and fight the 1990-91 Gulf War in HMAS *Brisbane* and earlier I spent time there with the Royal Navy and also in our old and venerable guided missile destroyers (DDGs) conducting Cold War anti-Soviet patrols off the coasts of Kenya and around India and the Seychelles. Yes, in the 1980s we used to deploy to the Indian Ocean - it was not just a transit area to other places - it was a focus of our operations. The DDGs actually had a gold 'Indian Ocean Camel' that was exchanged between task forces on arrival in the operational area, and we were often there with more than a single ship. As an example, in 1980 we were there for four months with an aircraft carrier, tanker, destroyer tender and two destroyers - quite a symbol of our interest *vis-à-vis* the Soviets and Indians.

Earlier today I listened to a statement that there is a thought that the Pacific has better beaches than the Indian Ocean as a tongue in cheek way to explain perhaps our absence for the last few decades. Now I have to disagree and note that there is a reason to love the Indian Ocean: the Seychelles, heaven on earth - what a paradise - who has been there? I have twice, courtesy of two navies. Of course, with the RAN we spent only three days there, but with the British I spent a heavenly seven; I suppose the British have been doing sea power for longer!

Now is time for an anecdote that exemplifies perfectly the diplomatic power of navies and simple interaction. Back in 1985 I visited the Seychelles in HMAS *Perth*, in company with HMAS *Canberra*. The Seychelles was ruled by President France Albert Rene, in a socialist one-party system with a statue of a worker breaking his chains on or near the wharf in the capital Port Victoria. You might recall a failed coup in 1981, supported by South African intelligence. This was followed by other coup attempts in 1986 and 1987 - so it was an interesting place politically to visit at the time. We were in port with an Indian frigate as they tended to ensure they were there if we were. Also in the bay was a Soviet *Krivak* frigate, anchored for a six month period, observing the US space and satellite installation on the hills whilst the US observed them! You will remember 1985 was a heated period of the Cold War era. So what do a group of young Australian officers do? We invite the Soviet officers to our cocktail party and along they came.

So imagine the scene: US, Indian, Seychellois and Soviet officers all mixing with Australians in American-built Australian ships - the party was great, as was the after party and we all drank toasts to peace in the Indian Ocean and showed photographs of wives, girlfriends and families. The political commissars were most disturbed and could be seen running in circles to ensure that their officers were not corrupted by having fun, but I like to think that today in Russia there are a couple of senior Russian officers who remember a simple friendship with other mariners with a smile! Great times, great diplomacy, and a great example of the sea as a leveller. And it was our senior officers, after all the work we junior officers had done, who took the tour of the *Krivak* the next day - so not too much has changed!

Back to reality, though, in preparation for tonight I did what more naval officers should do; I read some maritime strategy and history. I am very conscious that Rear Admiral James Goldrick, RAN, is in the room tonight. Working as I do with him and having known him my entire career, I am all too aware that there is hardly a book on maritime strategy and history that he hasn't either read, authored or commented on and therefore he is, of course, exempt from that remark. And as such, I am living in fear of a note being passed in my direction during this speech.

One of the books I looked at was the recent book called *A History of Australian Strategic Policy Since 1945*.² I was immediately struck, but not surprised, by the lack of focus and little mention of the Indian Ocean. The focus is and has been on North and Southeast Asia, the Indonesian archipelago and to a lesser extent the Pacific Ocean. The Indian

Ocean gains the most mention in relation to the threat of the Soviet Fleet operating there and some concern as to the Soviet relationship with India.

How can this be? As is often the case with the sea it is 'out of sight and out of mind' and the Indian Ocean suffers a little more than the Pacific does in this case, but there is a common theme. I stated years ago, in a presentation I gave when Director of the Sea Power Centre, that Australia is not 'girt by sea' as our national anthem states, but that it is 'girt by beach'. Australians rarely consider the sea and its importance to Australia any further than they can see from a beach lying on the sand - and that is about 3nm.

During the presentations today it was stated that there is sea-blindness caused by the sea - not in Australia there isn't - we would be so lucky to have even a little of this. The sea-blindness I refer to is towards the sea and it is inculcated in our history, our teaching at schools and our culture. Now like many I had to be analysed when I reached star rank in the RAN - one of the development tools that was used was called 'Strength Finder'. From this I learned that amongst other things I am contextual and strategic - I certainly hope the latter is the case for tonight, as no doubt you all do too. Now, being contextual is about looking at the past to determine trends for the future and thus I will now look a little at history.

Modern Australia has trouble understanding its history and why it was settled in the first place. Australia was settled by the British in 1788 and established not primarily for the purpose of being a convict colony, as is most often misreported, but because the British saw the maritime strategic importance of this great southern land, bridging three great oceans - the Indian, Pacific and Southern - and sitting in the convergence of the Asia-Pacific. The reality is that convicts were used to settle here as a means to an end as, for some odd reason, no one was volunteering to go and thus forced settlement was the only way to achieve this maritime strategic requirement.

One could say it was a convenient solution, if not an inconvenient truth!

Moving to today, the dearth of Australian manned and owned merchant shipping impacts even more on the sea-blindness of Australians - even fewer Australians than ever work at sea. The sea, it could be argued, is now less our natural domain than it ever was. On the weekend I was profoundly disappointed with the response of the Australian Business Council and the Australian Industry Group, as reported in *The Australian*, to the government's report on Australian manning and ownership of coastal shipping.³ Although there is probably good business reasons for this response it does beg the question as to where Australia is going to get the next generation of harbour pilots, engineers and logisticians to run our ports and operate them if no Australians are employed at sea? We perhaps need a fuller debate and dialogue on this issue.

Looking now at the current strategic plan it is heartening that the 2009 White Paper, *Defending Australia in the Asia-Pacific Century: Force 2030*, actually got what a maritime strategy is.⁴ The problem, however, remains that the Australian military ethos, born

from the sacrifices of so many men in land warfare, still finds it somewhat alien, a sideshow so to speak to what all too many see as the real game.

This gets me to another anecdote. It was mentioned today that *Sydney-Emden* was an example of Australia's early focus on the Indian Ocean. This is well documented in the Australian War Memorial (AWM), but bluntly speaking it was just a battle; no real strategic effect. I contrast this with the treatment in Australian history and the AWM to the World War I (WWI) battlecruiser HMAS *Australia*. Now there was a ship that had the most significant strategic effect for Australia of any platform in the entire war. Last time I was in the AWM all that ship had was a banner, noting that she had spent most of the war in the North Sea, and missed the Battle of Jutland due to a collision at sea. No mention of the fact that due to her presence, her very existence, the German Admiral Graf von Spee cancelled the German battle plans to bombard the great cities of Australia's east coast and instead sailed his German Pacific Fleet across the Pacific to meet its doom at the Falkland Islands.⁵ Thus, the only direct military threat to Australia in WWI was averted due to a single ship and the investment in sea forces, yet no mention is made, and Australians remain largely ignorant and uninformed.

It was *Australia* that did the strategic heavy lifting and made the difference when it mattered most.

The sad truth is that at best for many, the sea is merely a necessary geographic obstacle to fly or sail over so they can get to the real fight in lands distant or not so distant. Perish the thought if the threat itself comes from the sea - and I am not talking of Al Gore's inconvenient truth, that of rising sea levels either!

As I have stated already, the history of Australia has been one where the importance of the sea is often not well understood and to many of our countrymen the sea is merely the fringe to the beach - basically they don't notice it. The tent scenario for Tonto! As we look to the world stage today and the fight against terrorism, extremism and international crime this also is often the case.

This, however, is a modern trend, particularly in the western world, as the media which intrudes into everyone's houses via the internet, social media, TV, radio and even for some newspapers, is based on the land. The people who are journalists and commentators, almost all of them, have no experience of the sea, they just know the land and the air, so that is the perspective that they bring.

In short nations just do not get the sea. Britain, the island - and that is a key point - that brought us Nelson, Raleigh, Drake and Cook and, as recently as 1982, Woodward, it seems has recently forgotten as well.

Now where does all this ignorance and disinterest lead us? Does it really matter? Well I think it does, and also that from and in the sea lays some real danger for us all. The sea remains a strange, alien and fascinating domain - and this is the dilemma we face.

Maritime law uses the term 'the high seas', but increasingly it is challenged by coastal jurisdictions and the competition for resources. Today, however, the sea remains the last of the global commons - not the province of any single nation and is subject to international agreements and laws, underpinned by a common mariner focus on the omnipotent danger of the sea.

However, the nature of the sea as a global commons provides those who wish to influence the land in a way dangerous to the peace and prosperity of the world, and those who do not value the sanctity and importance of every human life, numerous opportunities to export and exploit their crimes and ideologies under the cover of the sea and immune in many ways from interdiction. The sea is their friend since, as I have already stated, the focus of the world is predominantly on the land or air threat.

It may not be fashionable to say but the maritime command positions in the region, as exemplified by CTF 150, are arguably (and I am always happy to argue it) our most strategic command.⁶ It is the one command that covers the broad canvas of the Middle East and Indian Ocean, outside of Afghanistan. Direct interaction, visits, exercises and high level diplomatic talks occur with senior people and operational personnel of countries such as the Kingdom of Saudi Arabia, Kuwait, Oman, the United Arab Emirates, Bahrain, Yemen, Jordan and Pakistan. My team was working every day side-by-side within the 24 nation CMF and US 5th Fleet Command. We were making significant gains in working with the nations of the region to assist them to counter the dangers presented by a tense and dynamic strategic, operational, cultural, religious and legal environment. We were engaged on a personal basis with chiefs of navy and senior parts of government and all our interaction occurred with the relevant Australian ambassador and Defence attaché present - now that is strategic effect and access.

This is helped by the cooperative nature of sea operations and the fact that interoperability comes very naturally to navies who have a tradition of working closely together. After all the sea is the common enemy first and foremost of every sailor of every nation, creed and culture. This is a powerful ingredient that is not well understood by landmen, including many politicians and strategic commentators. Working effectively on the surface of the sea, in ships, is a strategically powerful message; it always has been and always will be - perhaps another inconvenient truth. It still sends a message of how a nation really thinks of itself on the world stage. A failure to send that message in the Indian Ocean and Middle East would be a bad thing for Australia. This is why the contribution to the CMF mission in the Middle East and Indian Ocean is a vital activity.

Thinking a little about surface ships and with due reference to those in the audience, it has always surprised me that there is a view amongst some that surface ships, especially high-end surface combatants, are no longer relevant. From my point of view and experience they are the most effective platform in a strategic sense in 99 per cent of what we do. I mean, how do you measure deterrence? How do you analyse the prevention

of a course of action or an incident or a war? And when it comes to war, surface ships have always been in the thick of it and they expect to be hit. Think of Trafalgar, Jutland and the great battles, they are hit and fight back and sail through or sink. The fact that many will be sunk is the nature of fierce warfare, but that is war at sea - it is bloody and brutal and you either win big or lose big. Perhaps we should be building ships that can take some punishment, rather than ones that need to avoid being hit to survive.⁷ Other nations don't seem to have this debate or this commentary on them about surface ships and they are not islands and depend less on sea control than we do.

And that gets me to submarines. There are many oft used photographs from submarine periscopes of aircraft carriers and destroyers and even navy videos of old surface ships, moored and being sunk by torpedoes. What is missed far too often, I think, is the fact that in peacetime exercises, surface ships and submarines are brought together on purpose to create training opportunities and interaction. Surface ships are required to transit certain areas at certain times or to loiter close to choke points and submarines are forced to do the same. This is artificial to maximise interaction, but the party line for some is palpable.

It seems to me that much of the commentary in Australia is based on the fact that submarines are some sort of super weapon. They are very, very effective and necessary, but as part of a balanced force. One never mentioned Achilles heel is that they are crewed, after all, by humans. In this era of guided weapons their only defence is not to be detected. Once detected, either by other submarines, aircraft, bottom sensors or surface ships, they will be sunk, basically 100 per cent; modern guided anti-submarine weapons don't miss, unlike the depth charges of World War II. So put yourself in the psyche of submariners; it is not a nice place to be, under the sea at 200 odd metres as the ping of a torpedo approaches. An aggressive action and subsequent localisation will in all probability mean they are detected, and their demise will follow, so perhaps the ball isn't in their court as much as commentators who do not sail, either above or below the sea's surface, believe. Time will tell.

Now back to the subject and the region of the Middle East and the Indian Ocean. Just consider for a moment the complexity of the region:

- Sea lines of communications and choke points vital to the world economy- the Strait of Hormuz and the Bab el-Mandeb Strait.
- Areas which are a breeding ground for violent extremism.
- Failed and failing states which constitute a security challenge.
- Illegal destabilising or terrorist related activities such as drug smuggling amongst others, human trafficking and piracy.
- A delicate political situation.

- A complex environment with massive shipping throughout, more than 33,000 vessels transit the Bab el-Mandeb Strait and Gulf of Aden per year. Further, about 40 per cent of the world's total shipments of oil also pass through the Strait of Hormuz.
- Fragile maritime infrastructure and seasonal weather patterns which greatly affect the maritime environment.

As such the main focus of our operation in CTF 150 was to:

- prevent or disrupt attacks
- intercept or deter the smuggling of illicit cargo such as narcotics, contraband and fuel which fund the terrorist activities
- intercept weapons and ammunition
- intercept or deter the movement of terrorists themselves by sea or even people smugglers and their activity, especially into Yemen.

Despite the very real successes and terrorist attacks that have been directly prevented by our operations, the focus in Australia, and indeed in much internal RAN reporting itself, has been on piracy issues. There was an article in *The Weekend Australian* on it again. Even the TV show *Pirate Patrol* is misnamed.⁸ Australian major surface combatants in the Middle East and Indian Ocean spend 70 per cent of their time doing the anti-terrorist and maritime security tasks, not counter-piracy, but the misreporting back here and the lack of interest from the media and strategic commentators on this role is palpable. There is little mention of the real threat to maritime trade and security posed by terrorists in the region. Yemen sitting astride major sea-going choke points remains the first Arab nation that will run out of oil, not a good look given all the other issues in that country.

This brings me to my key point, that a lack of attention to the sea will inevitably result in a reactive, not a proactive deterrence to the next attack or threat. The attitude of nations and their interpretation of maritime law is a key factor in this. In attempting to operate at sea and to counter the transnational threats posed, nations who have depended upon or utilised the sea to exploit and garner wealth, tend to understand the fluid nature of the sea and the notion of freedom of the seas. Conversely, nations who have not historically had a tradition of sea faring tend to have experienced invasion or coercion from the sea in their near past and wish to expand their control as far from the coastline as they can.

My observation over many years of strategic work is that in countries where armies shape and determine the political power, a continental strategic mindset exists, regardless of the country's geography. This includes nations such as China and many in the Middle East such as Iran, Pakistan and even India. These countries view the sea much as they view their land - an area from which others should be excluded, basically as an extension of

sovereign territory. It is a philosophy that must be challenged. This misunderstanding of the sea is embodied in the *United Nations Convention on the Law of the Sea 1982* (LOSC). Professor Martin Tsamenyi, one of our pre-eminent experts in the maritime law arena, told me once that the reason that 161 countries have ratified LOSC is that it can be interpreted 161 different ways.⁹ My experience tells me how true a statement that is.

This impacts heavily on the nature of irregular warfare at sea and often puts navies at a disadvantage when interacting with countries that have a land-focused, or continental strategic mind-set and history. It makes conducting irregular warfare at sea in the vicinity of land a very complex issue. Today in the Indian Ocean and Middle East the maritime power is in good supply, but the legal framework and national understanding underpinning the use of the maritime power is absent and this is the issue.

Despite the many United Nations Security Council resolutions relating to combating terrorism, the Security Council has placed the onus on states to repress terrorism within the bounds of their own national laws and jurisdictions. Thus these resolutions do not provide any further guidance or authorisation to member states in relation to countering terrorism at sea.

Therefore, in the Indian Ocean and Middle East, we continue to operate using international law under LOSC, other treaties and customary international law as the legal basis for conducting operations. There is no treaty that provides powers for a warship to stop, board or search a foreign flagged ship in order to disrupt or detain a suspected terrorist or those supporting terrorism on the high seas.

The real issue is that those who wish us harm have the upper hand at sea as governments are focused elsewhere. The nations of the world with just-in-time economies totally dependant on the sea, ours included, would do well to make a sustained effort within the United Nations and other multinational regional fora to highlight this fact.

The reality is, therefore, that unless there is a renewed focus and debate on maritime legal issues and a proactive stance taken by some significant players my fear is that we will one day be reactive again following an attack at sea that we did not see coming, or we were powerless under law to prevent.

That is probably enough from me on an evening following an extensive day of listening and debating. I will finish by saying that conferences like this are an essential first step in investigating these issues and furthering knowledge and debate in Australia on maritime realities. I thank the Lowy Institute and the Naval War College for arranging such an important event and for giving me the opportunity to speak tonight. I hope it has been illuminating. I am not sure if I was the appetiser or the dessert, I suppose I will find out now, and now with no doubt much relief you can all enjoy dessert at least during the question and answer period.

Thank you very much.

Notes

1. More information can be found on the Combined Maritime Forces website <<http://combinedmaritimeforces.com/>> (15 April 2011)
2. Stephan Frühling, *A History of Australian Strategic Policy Since 1945*, Department of Defence, Canberra, 2009 <www.defence.gov.au/strategic_basis> (15 April 2011).
3. Ewin Hannan, 'Business against Shipping Changes Proposed by Federal Government', *The Australian*, 21 February 2011 <www.theaustralian.com.au/national-affairs/business-against-shipping-changes-proposed-by-federal-government/story-fn59niix-1226009091587> (15 April 2011); for further information on the proposed reforms and the two submissions, see Department of Infrastructure, *Reforming Australia's Shipping - A Discussion paper for Stakeholder Consultation*, Canberra, 2010 <www.infrastructure.gov.au/maritime/shipping_reform/files/Position_paper_shipping_reform_final.pdf>, <www.infrastructure.gov.au/maritime/shipping_reform/files/Business_Council_Of_Australia.pdf>, <www.infrastructure.gov.au/maritime/shipping_reform/files/Australian_Industry_Group.pdf> (15 April 2011).
4. Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, Canberra, 2009 <www.defence.gov.au/whitepaper/docs/defence_white_paper_2009.pdf> (15 April 2011).
5. In fact he described the Royal Australian Navy's flagship, the battlecruiser HMAS *Australia*, as being superior to his entire force by itself. Consequently, to avoid being trapped at Tsingtao, von Spee planned a return of his squadron to Germany, sailing through the Pacific, rounding Cape Horn and then forcing his way north through the Atlantic.
6. See the Combined Task Force 150 website for more information <www.cusnc.navy.mil/cm/150/index.html> (15 April 2011).
7. Gregory P Gilbert, 'Warship Survivability', *Semaphore*, Issue 10, 2008.
8. This was a four-part series by National Geographic of life onboard HMAS *Toowoomba* while involved in counter-piracy operations.
9. It should be no surprise then that the *United Nations Convention on the Law of the Sea 1982* (LOSC) and the customary international law of the sea, which underpins maritime operations, can be interpreted in different ways by nations depending on their position. To date LOSC has been ratified by 161 countries, Niue, Cook Islands and European Union; 19 countries have signed but not ratified (including the United States, Iran and the United Arab Emirates); 16 countries have not signed (including Turkey and Israel), see <www.un.org/Depts/los/reference_files/status2010.pdf> (15 April 2011).

Unmanned Systems in the Australian Maritime Environment: A Survey of the Future Unmanned Fleet

Lieutenant William Dehnert, RAN

The past decade has dispelled any doubts about the military value of unmanned systems. Recent technological advances and operational success has led to a growing awareness of unmanned systems broader utility and potential for more diverse and complex missions. As a consequence the number of missions advocated for unmanned systems has expanded considerably in recent years.

Despite recent advances, the pace of introduction of unmanned systems into the maritime domain has to date been slow. Not driven by urgent operational demand, the RAN is taking a more cautious approach to incorporating unmanned systems into the fleet. At present major unmanned systems are being tied to new classes of ships and submarines. This paper examines the advantages that unmanned systems can provide to the operations in the maritime environment, the potential future missions that unmanned systems will be expected to undertake in the Australian maritime environment and considers some of the implications of integrating unmanned systems into the RAN.

Why Unmanned

The fundamental advantage that an unmanned system has over its manned equivalent resides in its ability to be placed in a high-risk environment without risk of casualty to the human operator. This presence helps commanders to peel back the fog of war and greatly decrease the firing chain from sensor to shooter. The ability to strike further and quicker, with greater precision and proportionality greatly expands the reach and speed that military operations can prosecute an opponent. The advantage of having persistent surveillance was demonstrated in the hunt for Iraqi scud missile launchers in the 2003 Iraq War.

During the 1990-91 Gulf War, the length of time it took to locate, identify and target missile launchers often allowed them to 'shoot and scoot', evading allied aircraft. In 2003 the persistent intelligence, surveillance and reconnaissance (ISR) capabilities provided by unmanned aircraft systems (UAS) allowed commanders to guide their ground attack aircraft onto mobile targets. If an immediate response was not possible, UAS could monitor targets until an attack could be achieved.¹

The performance characteristics of an unmanned system, namely: persistence (and consequently responsiveness), pervasiveness, penetration (into a high threat, denied or dirty environment) and precision make them attractive for missions that are inherently dangerous, dirty, dull or even too different to be supported by a manned platform. To elaborate:

- Dangerous missions involve an elevated risk of injury or death to the human operator.
- Dirty missions involve an operating environment that would otherwise expose a human to dangerous levels of a chemical, biological, radiological or nuclear material.
- Dull missions are those associated with tasks that are repetitive and boring, and thus well suited to automation. Where human operators are still required, having the operator back at a control station makes it easier to rotate crew and manage fatigue.
- Different missions are those that were previously unachievable by manned platforms primarily because an unmanned system is not limited by human performance or physiological characteristics. To start with, the size or design of the vehicle is no longer constrained by the requirement to host a human operator. This in turn, allows commanders and units to have access to previously unimaginable capabilities. For instance, a platoon can now deploy with unmanned airpower carried in a backpack, allowing them to see what is waiting for them on the next block or what is over the next hill.

The Australian Context

Australia, in particular, stands to benefit from unmanned technology. Excluding Antarctica, Australia has the world's third largest maritime claim with over 16 million km². Our population by contrast is tiny and concentrated in the south-eastern corner of this continent; additionally outside the major population centres there is limited infrastructure. Monitoring our long coastline and vast maritime territory has always proven challenging, if not impossible.

At least ostensibly, unmanned systems present a solution to the challenge of patrolling and monitoring vast areas. The ability to remotely operate unmanned systems presents the opportunity to leverage a technological solution to augment our numerical inferiority and geographic isolation. The force multiplying potential of unmanned systems can enable a mission-capable force with fewer personnel, making the Australian Defence Force capable of more rapid deployment to remote parts of Australia's territory.

Proposed Roles

The RAN has tied its development of unmanned systems to its new ship classes. Every future vessel outlined in the 2009 Defence White Paper, *Defending Australia in the Asia Pacific Century: Force 2030*, and the *Defence Capability Plan* has some form of unmanned system embarked. Specific capabilities outlined include seven maritime UAS which will be acquired by the Royal Australian Air Force to augment traditional manned maritime patrol aircraft. An organic mine countermeasures (MCM) capability, embarked in amphibious ships (LHDs) will also be primarily provided by unmanned systems. Looking further forward unmanned systems will be integral to achieving hydrographic and MCM effects in the offshore combatant vessel (OCV), which will also potentially embark an UAS to bolster patrol capabilities. Although not role specific, the 2009 White Paper also states that both the future frigate and submarine must be capable of embarking an UAS and an unmanned underwater vehicle (UUV) respectively.

Hydrography

Knowledge of local environmental conditions (depth, bottom type, topography, obstacles, sound velocity profiles, currents) is essential for navies that increasingly seek to operate in the littoral. In addition to determining appropriate sites for landing craft to beach, hydrographic data is used to determine where ships can safely navigate as well as assisting anti-submarine warfare (ASW) and MCM operations, helping determine where these threats are most likely to occur.

While previous route surveys, existing charts and other archival information all contribute to the picture, the RAN cannot always rely on this data being to a sufficiently accurate, or required, level of detail needed for amphibious operations. A review by the International Hydrographic Organisation revealed that 70 per cent of the world's coastal waters and adjacent sea with water depths of 50m or less has not been adequately charted.² In response to this, most navies have established hydrographic teams that deploy with or in advance of a task force to conduct an area of operations rapid environmental assessment (REA).

NATO doctrine, also used in Australia, delineates four categories of REA operations.³ Category 1 occurs before or during the planning phase of an operation. This typically relies on existing sources of information and on remote sensing such as data from radar satellites. Categories 2 and 3 takes place prior to the arrival of the main force in the area and involve the collection of in situ environmental data. The difference being that Category 2 is overt while Category 3 is conducted clandestinely. Finally, Category 4 involves the continuous collection of environmental data while the operation is unfolding; this is primarily concerned with dynamic data such as oceanographic and meteorologic data.

Presently hydrographic services are provided by dedicated survey ships and deployable teams for REA. In the future dedicated survey services will be provided by a module to be embarked onboard the OCV. The embarked module will likely rely on a combination of manned and unmanned systems to undertake traditional hydrographic tasking.

Hydrography, in particular bottom mapping and oceanography, is one of the UUV success stories. Many of the sensors required for hydrographic tasks exist in the commercial market. Various autonomous underwater vehicles, operated by civilian oceanographic institutions, have been proven to operate for months without human intervention.⁴

Unmanned systems could make a significant contribution to many hydrographic missions, apart from those falling within Category 3. The requirement to conduct these operations in a high threat area demands levels of autonomy for obstacle avoidance and threat detection and avoidance that is beyond the capacity of the present generation of unmanned systems and projected near term capabilities.

Given the maturity of sensors, a way forward in the near term is examining ways that small hand launched UUVs can contribute to data collection required for Category 3. This could dramatically decrease the amount of time a person would have to spend in a high threat environment thus increasing probability of survival and also the quality of data collected.

Mine Countermeasures

Crude, cheap, simple to deploy, hard to detect and very effective over the spectrum of water depths, mines represent one of the most challenging anti-access threats for navies operating in the littoral.

MCM involves detecting, classifying, identifying and neutralising an enemy's sea mines in areas ranging from deep water through to the beach zones against bottom, moored, floating, stealthy, contact and influence mines.

Typically, MCM is regarded as dull and dangerous work, making it ideally suited for unmanned systems. Further, the potential offered by an unmanned systems approach to reduce the sensor to shooter chain also means that the pace of MCM can be conducted at the speed required of an expeditionary force.

In step with developments in other modern navies, the RAN's dedicated MCM force is undergoing a transformation. Later this decade, an organic MCM capability will be embarked onboard the LHDs and by the beginning of the next, the present dedicated MCM platform, the *Huon* class coastal minehunters, will be replaced by a module that will be embarked as required onboard an OCV.

Organic Mine Counter Measures

The scope for an organic MCM capability, as defined by the *Defence Capability Plan*, is to provide forward deployed naval forces the capability to accomplish time sensitive mine detection, classification, identification, avoidance and limited neutralisation. This capability will be complemented by a dedicated MCM force, which will consolidate the MCM effort within the area of operations, initially provided by the present *Huon* class before being replaced in the next decade by the OCV.

Unmanned systems for MCM are better developed than for most other missions. Unmanned surface vehicles (USVs) have a well-established record of accomplishment in sweeping operations, and remotely operated vehicles are deployed in most advanced navies for MCM classification, identification and neutralisation. Even autonomous underwater vehicles (AUVs) have recently demonstrated an ability to conduct surveys and neutralisation in support of MCM missions.

It is apparent that the mission payload required for MCM reconnaissance and REA will likely be able to be fulfilled by the same AUV, which has the potential to greatly reduce the MCM timeline. Thus, the technical risk for undertaking overt MCM operations with a combination of unmanned systems can be considered low.

However, the same technical challenges associated with REA preclude unmanned systems from being viable candidates for clandestine operations, such as clearing a landing area ahead of the task force. In addition to obstacle and threat avoidance, the problem is compounded by the requirement for regular operator interaction to classify and identify mine-like objects. Endurance limitations mean that the vehicle would also have to be deployed relatively close to the area being surveyed.

The OCV and MCM Module

The MCM module to be embarked onboard an OCV is still a decade away from realisation. The final capability will be informed by the lessons garnered from the organic MCM force, as well as efforts by other Western navies such as the Royal Navy and the US Navy, who are also reshaping their MCM forces in a similar manner.

There are two distinct parts to the OCV; the ship itself and the mission package. The ship itself will most likely be designed to meet speed, endurance, weight, manning and cost parameters. This breaks with traditional dedicated MCM platforms, which were specifically designed to minimise magnetic and acoustic signatures, as well as endure the rigours of a close proximity explosion. Instead, the concept of operations for the OCV will be to stand-off from the minefield and deploy its sensors forward.

The MCM module will likely consist of a number of different systems to achieve MCM effects of reconnaissance, clearance and sweeping.⁵ Comfortingly, these are all proven technologies in use in several navies and currently being trialled here. The present

limitations on autonomy, communication and vehicle endurance will still require the parent ship to remain within relatively close proximity to the deployed unmanned systems. Thus, the present generation of UUV and USV technology represents an evolution, not a revolution, in the way MCM will be conducted in the near future.

MCM operations using unmanned systems will still need to be conducted overtly, under the protection of a task force. Although British operational experience in 2003 suggests that significant time reductions are achievable with unmanned systems, it would be a mistake to assume that mine warfare will remain anything but a slow, tedious and challenging process.⁶ The great advantage of this technology is the ability to minimise personnel exposure to mines.

Route Survey

In the event of open hostilities against an opponent with power projection capabilities, it is reasonable to assume that Australian ports will become the target of a mining campaign. Route surveys conducted during peacetime are invaluable to mitigating the danger posed by sea mines in times of open hostilities. The present generation of survey AUVs are more than capable of completing this task. The savings presented by deploying a team to undertake this task with a couple of AUVs could be significant compared to route surveys that presently require a ship and a ship's company.

Submarine UUV

The 2009 White Paper also stipulated that the future submarine be capable of embarking an UUV.⁷ Although its explicit purpose was not stated, it will presumably act as a force multiplier for the submarine in outlined capability areas. Crucially, a submarine deployed UUV would be capable of clandestine insertion into denied waters.

The US Navy, and to an extent other navies, has been working on deploying UUVs from submarines for years. At present, the technical challenges associated with recovery and stowage makes a submarine launched UUV unlikely in the near term. Any Australian UUV would be likely launched from a torpedo tube, something that the US Navy has abandoned in favour of missile tubes. It is unlikely that such a system will be available for future Australian submarines.

Maritime UAS – Maritime Patrol Aircraft

The 2009 White Paper stated the requirement to acquire seven high-altitude, long-endurance UAS.⁸ The future maritime UAS has a well-defined role to augment traditional manned maritime patrol aircraft in providing wide area surveillance in the maritime environment, as well as electronic and land surveillance roles in all weather conditions.⁹

Of all missions undertaken by aircraft today, maritime patrol is likely to benefit the most from the introduction of an UAS. Maritime patrol plays to the chief strength of unmanned aircraft: persistence. Traditionally, the greatest hindrance on maritime patrol activities has been human endurance; by positioning the human operators on the ground, it allows crew rotation and fatigue to be effectively managed.

UAS are already being used for maritime patrol activities today. The Reaper, a medium-altitude, long endurance UAS, is presently being used in support of counter-piracy efforts by the US Navy between Somalia and the Seychelles.¹⁰ Incidentally, the Reaper is a variant of the Mariner demonstrator aircraft that was used in the maritime patrol trial off north-western Australia.

Organic UAS – Frigate & OCV

At present, the RAN has no ship-based or organic UAS capability. While there are no formal acquisition programs for such a UAS in the near term, in the longer term the 2009 White Paper outlined that the future frigate and OCV are to have a UAS embarked.¹¹ Although the exact role of a ship-based UAS has not been specified, such a capability could provide tactical surveillance and targeting capability. The two options presently available are a small tactical unmanned aerial vehicle (STUAV) or a vertical take-off and landing tactical unmanned aerial vehicle (VTUAV).

STUAV or Fixed Wing

Launched either like a sea plane or by some form of catapult mechanism and recoverable by netting, a hook or by simply landing next to the vessel to be retrieved by davit or small boat, the STUAV does not require a flight deck for launch and recovery.

Maritime missions for a STUAV could include extending line of sight communications in support of maritime interdiction operations, over-the-horizon surveillance, and tracking vessels in support of missions to counter small boat attacks or piracy. In addition to providing persistent ISR in the maritime environment, a STUAV launched from a ship could provide support for ground operations.

VTUAV or Rotary wing

VTUAV requires a traditional flight deck, and thus presents a relatively simple launch and recovery solution. With the right payload, it would undoubtedly be a valuable asset in support of traditional ASW and anti-surface warfare operations. Equipped with an electro-optical turret and fitted with a laser designator, it would also provide the host platform with surveillance and targeting capability. If it has a sufficient payload capacity, it could feasibly carry a small armament that would allow it to be used in a force protection capacity against a variety of small boat threats.

Implications

The longer term implications of integrating unmanned systems in the military remain unclear. While by no means exhaustive, this section examines some of the potential challenges that may arise as unmanned systems are progressively integrated into the RAN, particularly with relation to the workforce, future crewing and the procurement process.

The Future Workforce

In 2008, an experiment successfully networked two USVs and an unmanned aerial vehicle. This network of vehicles was controlled by an autonomous mission management system, which dynamically planned and re-planned vehicle operations to meet the task requests of a single operator.¹² Without leaving their desk, a single operator effectively had the equivalent force protection assets at their disposal as an *Anzac* class frigate with both sea boats and the embarked helicopter.

Such a scenario, while still a few years away from being an operational reality, touches upon many of the organisational implications facing the RAN when it begins to integrate unmanned systems into its force structure. Not least of which is who does the RAN want controlling these assets?

What skill sets should that person bring to that job and what training should they undertake when joining? Once recruited, what training should someone undertake prior to managing several platforms that operate in different domains? When their training is completed and they are sitting in the chair, where will they fit into the chain of command, what rank and what seniority will ensure that the capability at their disposal is used effectively?

A further issue is the geographical location of the operator. Modern communication systems make it feasible that the operator could be situated in Canberra while the assets being directed are conducting patrol operations off north-western Australia, or even further afield.

Workforce challenges should not be underestimated when integrating unmanned systems into the RAN. The former Minister for Defence, Hon Joel Fitzgibbon, MP, cited them as the key reason for the deferral of a decision to purchase a maritime UAS until after 2019.¹³ A lesson from the 2003 Iraq War was that United Kingdom mission controllers, unlike US Ground Control Station counterparts, were trained to co-ordinate ground-based fires. During the war, the ability to call for and co-ordinate fires fixed the enemy on many occasions and destroyed several Iraqi attempted counter attacks.¹⁴ Ensuring the correct training for operators and creating the right organisational structure is as important as working through any of the technical difficulties that these systems present.

Crewing Unmanned Systems

The biggest cost to ships and systems is people. Some studies have revealed that personnel can make up to 70 per cent of the total operating cost of some ships.¹⁵ Reducing manpower is a central tenet of the next generation of vessels being designed for the RAN. Ships and submarines will undoubtedly seek to minimise manning burdens by automating processes wherever feasible.

Indications from other militaries suggest that unmanned systems can actually increase manning requirements as legions of technicians and operators work with the system to either process the massive amounts of data produced or to simply ensure that the system remains working optimally.¹⁶ While this is a less-than-desirable outcome for air and ground unmanned systems, the burden is often masked.

For an army or air force, base facilities typically can be easily expanded to accommodate extra personnel and equipment. The opposite is true in the maritime environment. Once a ship or submarine has been built, a finite amount of space exists for expansion, particularly when it comes to accommodating extra personnel onboard.

Every person embarked requires a bed and food, and generates administrative and overhead requirements, not to mention the life support systems that go with providing the requisite quality of life. This in turn also generates its own manpower needs, and adds weight and space pressures to vessels. Understanding how many people it takes to operate a new system can be as important as the capability it may provide.

The US Navy is presently developing the MCM module for the littoral combat ship (LCS), and their initial efforts illustrate the pressures this new technology can place on personnel levels. It is particularly instructive for the RAN because much like the future OCV, the LCS MCM module is dependent on unmanned systems.

A US government audit recently revealed the number of personnel required to operate the MCM module had expanded from the originally allocated 15 to 19.¹⁷ One solution proposed basing four positions ashore. However, transmitting data collected ashore would require communication capabilities beyond those presently designed for the LCS. Another solution proposed keeping the same number of systems, but using the original 15 allocated to operate all these systems. However, this solution would be equally unworkable because the workload pressures being placed on personnel would be beyond levels presently considered safe by US Navy standards.

The number of personnel required to operate unmanned systems suggests a bottleneck in achieving effective operational deployment of these systems. Present technical constraints on levels of realistic autonomy also means that the RAN will need to thoroughly assess the manning considerations before embarking unmanned systems.

Procurement

Consider some of the technological developments that have occurred over the life of the *Adelaide* class frigate HMAS *Sydney*, commissioned in 1983. A list of the more recognisable transformational developments that are now taken for granted would include: personal computers (including laptops); computer networks; fibre optic cables; mobile phone and wireless technology; lithium batteries; global positioning systems; flash memory, which was preceded by DVDs and CD-ROMs; digital cameras; and of course, the internet.

Chief of Naval Operations Admiral Gary Roughead, USN, has acknowledged the challenge that the rapid pace of technological change presents to acquisition programs particularly for unmanned systems.¹⁸ Others such as US Marine Corps Brigadier General Glenn Walters, Deputy Director for Resource and Acquisitions for the US Joint Staff, have warned against using traditional business practices for acquiring and sustaining unmanned systems. He proposes that a production line should not last longer than five years before it is redesigned. Such a system would provide greater responsiveness to changing conditions faced by the operators.¹⁹ Yet this approach is presently at odds with traditional procurement of systems.

The traditional model of purchasing a platform and maintaining it for 25 years with a significant mid-life upgrade does not seem to be appropriate for rapidly changing technology solutions. An alternative model may be what is sometimes known as 'consumable logistics.'²⁰ Central to this philosophy is why pay for any significant sustainment when you can buy a new and improved item three years from now?

Instead of being committed to one type of platform providing a certain capability solution for the next 25 years, the capability would be defined without locking in how it would be provided. Purchasing systems piecemeal as they pass through maturity gates or accepting a 70 per cent solution today will allow the operators at the tactical level to provide greater feedback upon which designers can improve the next generation of systems.

Conclusion

Over the last decade, the number of unmanned systems and their potential applications has grown exponentially. To date, these unmanned systems have been limited mainly to low intensity conflicts over land. This is rapidly changing; maritime patrol will increasingly be undertaken by unmanned aircraft. Globally, navies are pressing ahead with plans to embark vertical take-off unmanned aircraft to augment existing fleet air arms. USVs are being developed by several navies for force protection roles in addition to traditional MCM roles. Similarly, UUVs are being developed for more missions beyond the traditional MCM field. The implications for the way militaries are structured and provide capabilities are nothing short of profound. Understanding how best to operate this new technology will be crucial for ensuring the security of Australia over the next 20 years.

Notes

1. B Burrridge, 'UAVs and the Dawn of the Post-Modern Warfare: A Perspective on Recent Operations', *RUSI Journal*, vol. 5, issue 148, 2003, p. 21.
2. JJ Lok, 'Military Hydrography Technology Ventures into Uncharted Waters', *International Defence Review*, 1 October 2005.
3. Lok, 'Military Hydrography Technology Ventures into Uncharted Waters'.
4. RW Button, J Kamp, TB Curtin & J Dryden, *A Survey of Missions for Unmanned Undersea Vehicles*, RAND Corporation: Santa Monica, 2009, p. 61.
5. Unmanned surface vehicles for sweeping, unmanned underwater vehicles (UUV) for reconnaissance and a one-shot UUV for neutralisation.
6. Directorate General Corporate Communication, *Operations in Iraq*, London, 2003, p. 19.
7. Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, Department of Defence, Canberra, 2009, p. 70.
8. Department of Defence, *Defending Australia in the Asia Pacific Century*, p. 80.
9. Defence Materiel Organisation, *Defence Capability Plan 2009*, 2009, <www.defence.gov.au/dmo/id/dcp/DCP_Dec10.pdf>.
10. Jane's Online, <www.janes.com/extract/cafrsu/seycs130.html> (3 November 2010).
11. Department of Defence, *Defending Australia in the Asia Pacific Century*, p. 70.
12. GV Jean, 'Shifting Sailors' Workload to Robots Still Wishful Thinking', *National Defense*, vol. 94, issue 676, 2010, p. 39.
13. The Hon Joel Fitzgibbon, MP, *Air 7000 Phase 1B*, Defence Media Release 25/09, <www.minister.defence.gov.au/fitzgibbontpl.cfm?CurrentId=8829>.
14. Burrridge, 'UAVs and the Dawn of the Post-Modern Warfare', p. 21.
15. J Carreno, G Caldorisi, S Koepenick & R Volner, 'Autonomous Systems: Challenges and Opportunities', paper presented for the *15th ICCRTS: The Evolution of C2*, Space and Naval Warfare Systems Center Pacific, San Diego, 2010, p. 9.
16. Carreno et al, 'Autonomous Systems', pp. 8-9.
17. US Government Accountability Office, *Defence Acquisitions: Overcoming Challenges Key to Capitalising on Mine Countermeasures Capability*, October 2007, Washington DC, October 2007, p. 19.
18. G Roughead, *The Future of Unmanned Naval Technologies*, November 2009, <http://www.brookings.edu/events/2009/1102_naval_technologies.aspx>.
19. S Magnuson, 'Next Generation: Future Remotely Piloted Aircraft Will Do More than Surveillance', *National Defense*, vol. 94, issue 676, p. 32.
20. Secretary of Defense, *Unmanned Aircraft Systems Roadmap 2005-2030*, Office of the Secretary of Defense: Washington DC, 2005, p. A-1.



HMAS Onslow returning from Hawaii following RIMPAC 98
(US Department of Defense)

Submarines in Australia, 1949-79

Captain Bill Owen, FCIL, RAN (Rtd)

By a happy coincidence, the time frame of this paper coincides, almost exactly, with my own involvement with submarines. This started early in 1949 when I was a sub-lieutenant in the Royal Navy (RN) and joined a 'T' boat called HMS *Tantalus* as 'fourth hand', and finished in 1979, when I came to the end of my second posting in command of the RAN Submarine Squadron in Sydney. The RAN, over that same period of time, had gone from a situation where it had no submarines at all, to being the major submarine power in the southwest Pacific region operating a well-trained, well-maintained squadron of six long-range, attack submarines. The aim of this paper is to give the reader an outline of how this remarkable transformation happened. I am sure that there are useful lessons to be learnt from this small slice of naval history.

Background

The scene was set immediately after World War II (WWII), when the Australian Commonwealth Naval Board (ACNB), in 1946, initiated a series of high-level meetings with the Admiralty in London, to discuss the structure of the post-war Australian Fleet - including the option of adding a submarine element. One might ask why on earth were the British involved in this? Well, in those days, it was nothing out of the ordinary for the RAN to be discussing its force structure with the RN, as the two navies had been in a close partnership ever since the Australian navy was founded in 1901. They had fought together through two world wars, flying the same White Ensign - and nearly all the RAN's ships had been sourced in the United Kingdom (UK).

Those force structure discussions in London ended early in 1947, with a decision by the ACNB to build the post-war fleet around a carrier strike force. While two light fleet carriers were to be acquired from the UK, together with a range of aircraft and escort ships, there were to be no submarines. The board's decision not to include submarines was almost certainly influenced by bad memories of two earlier, very short-lived, submarine acquisitions - the six 'J' boats from 1919 to 1922 and the two 'O' boats, about six years later, from 1927 to 1931. In both of these cases, the big problem had been a lack of suitable maintenance and support arrangements.

However, that 1947 decision to omit submarines from the post-war fleet left a rather obvious question unanswered: how could the RAN's surface ships - and also the Royal Australian Air Force's (RAAF) maritime aircraft - be properly trained in anti-submarine warfare (ASW), without exercising at sea with live targets? This led the ACNB to make a second approach to the Admiralty to see if the RN would agree to

meet this need by basing a number of its own submarines in Australia; the Canadians made a similar approach.

At that time the RN still had about 40 submarines in service and they readily agreed to help. They did so by establishing two new divisions (small squadrons), one to be based in Sydney and one in Halifax. Each division would consist of at least two submarines of the 'T' or 'A' classes and they would operate under formal inter-governmental agreements. To manage and support the Sydney-based Fourth Submarine Division (SM4), the RN provided a small base staff and a partial 'spare crew' - including the Commander SM4, an operations officer (who would also be the 'spare Commanding Officer (CO)', and marine and electrical engineer officers.

The RAN, for its part, agreed to provide berthing facilities for the submarines at HMAS *Penguin* - a handsome naval barracks located on the salubrious north shore of Sydney Harbour - together with staff offices, workshops and shore accommodation for unaccompanied RN personnel. Annual submarine dry dockings were to be done at Sydney's Cockatoo Island Dockyard - a yard with a fine record of building and refitting warships, dating back to the 1860s.

On the command and control side, the submarines were to be under the operational command of the RAN Area Commander in Sydney, who would delegate operational control (OPCON) to SM4. The administration of RN personnel would remain with SM4, reporting to the Flag Officer Submarines (FOSM) in the UK for this.

On the support side, the submarines would do their routine maintenance periods at *Penguin* assisted by the base staff and for major refits they would go to the naval dockyard in Singapore. After 1961, these refits were done at Cockatoo Island - giving the yard, as it turned out, very useful experience.

The first submarine, HMS *Telemachus*, arrived in Sydney in 1949 and over the following 18 years, 10 RN submarines spent two years or more in the division. I had the good fortune to command one of them, HMS *Anchorite*, in 1959-60.

The arrangements worked well and the fleet got used to having submarines around. Importantly, the SM4 experience was proving to be a useful demonstration of the sort of specialised support facilities needed to operate submarines. Then, in 1961, the RN notified the ACNB that time was running out and that it would not be possible to continue basing their submarines in Sydney (or Halifax) beyond the year 1968.

The reason given was that, by the mid-1960s, they would all be coming to the end of their service lives and were going to be replaced by only about 20 submarines of the new, more advanced, *Porpoise/Oberon* class. The RN went on to suggest that it could be in Australia's interests to acquire its *own* submarines and that the UK might well be interested in collaborating with Australia in a joint project to make this happen. A similar approach was made to the Canadians.

This suggestion came at a time in Australia when the Minister for the Navy - and also the Chairman of the ACNB - was Senator Hon John Gorton, a dynamic senator, who had been a fighter pilot in the RAAF during the war. Gorton had been Minister for the Navy since 1958 and was convinced that Australia had a strategic need for a fully capable submarine force. He had written, 'the modern submarine, whether nuclear-powered or diesel-electric, is the most versatile vessel afloat', and, 'the submarine is now a most effective anti-submarine unit'.

However, there were rumours that some members of the ACNB did not share the minister's enthusiasm and felt that the RAN did not need submarines for anything more than providing targets for ASW training. Fortunately, Gorton's view, supported by the Chief of the Naval Staff, Vice Admiral Sir Henry Burrell, RAN, prevailed. In 1962 formal discussions began with the RN about their proposal for an RAN 'build package', to run concurrently with a RN 'training package'.

The Build Package

Under the build package, the Australian government would order a number of the new *Oberon* class submarines, to be built at Scott's Shipyard in Greenock, on the Clyde - a yard that had already built five *Oberons* for the RN - at a unit cost in the region of £5 million (or A\$10 million). The RN had already booked provisional slots at Scott's for a production run for the RAN, starting in 1964 - with submarines being laid down annually, with a three-year construction time for each vessel - and the first being delivered in 1967.

The *Porpoise* and *Oberon* were, in fact, virtually identical. The only difference was that a higher-tensile steel was used for the pressure-hull in the *Oberon* giving it a test depth of 600 feet, compared with 500 feet in the *Porpoise*. The submarines were 295 feet (or 90m) long with a dived displacement of 2400 tons. Range was 10,000nm at 11 knots surfaced, with diesel-electric propulsion - with two diesel-generator sets and a periscopic snort system. There were 6 bow weapon-tubes and space for 20 weapons. The ship's company was 7 officers, and 11 senior and 39 junior sailors.

The *Porpoise/Oberon* platform design was the first to be produced by the British Admiralty after the end of WWII. The design team was headed by a gifted naval architect, John Starks, who used modern hydrodynamic tank-testing to optimise the hull-form and a new, pressurised, water-tunnel to develop low-cavitation propellers. He also adopted some of the design features of the wartime German type-VIIC submarine.

HMS *Porpoise*, the first of the new class, was laid down in 1954 and commissioned four years later. By 1961, eight *Porpoises* were in service. In the same year the first *Oberon* was commissioned and by 1967 there were 13 in service. This made a total of 21 submarines in the combined class. They had been built in four UK shipyards but today, only one of those yards - BAE (formerly Vickers) at Barrow - is still in existence.

Dived runs on the RN's Clyde sound ranges confirmed the remarkable acoustic performance of the *Porpoise/Oberon*. At periscope depth, they were non-cavitating up to a speed of 7 knots – and, below 400-feet depth, non-cavitating up to their top speed of 17 knots.

The US Navy's *Barbel* class, which the ACNB did look at as a possible alternative to the *Oberon*, should also be mentioned.

Three *Barbels* entered US Navy service in 1959. They were high-performance diesel-electrics, single-screw, with the new tear-drop, hull-form, similar to the *Skipjack* nuclear powered attack submarines (SSNs), giving them a higher top speed dived, than the *Oberon*. Unit cost was about A\$20 million, but the US Navy could not offer a feasible crew-training package and the ACNB did not proceed with this option.

The board also looked briefly at the possibility of going for nuclear-steam propulsion. This was also rejected, mainly due to the high costs involved and the lack of a domestic nuclear power industry.

The Training Package

The RN was offering to provide basic submarine training – including escape training in their 100-foot tank – for all RAN submarine crews, at the submarine school at HMS *Dolphin*. The subsequent sea-qualification phase would be provided in RN submarines. But there would not be enough time to have RAN officers trained to the level required for the first COs of the first four submarines – or for the squadron commander. So the RN agreed to transfer suitably qualified officers to the RAN for these postings.

The package – including the command course, the so-called 'Perisher' – would be available for as long the RAN needed it and the brand-new Australian *Oberons* would be able to work-up in the Clyde exercise areas, under Captain Submarine Sea Training, before sailing for Australia.

Project Planning

The ACNB moved quickly. In late 1962 over a one-month period it held a number of special meetings to consider its options. Its decision was to recommend that the government go ahead with the proposed joint project with the RN, without delay. Cabinet agreed and in January 1963, Gorton announced that eight *Oberon* class submarines, in two batches of four, were to be built for the RAN in the UK. The keel of the first submarine – to be named HMAS *Oxley* – was duly laid in July 1964, with a planned completion date of April 1967.

The training package was initiated at the same time and the ACNB called for volunteers for submarine training. There was no shortage of volunteers and the first draft of 29 sailors, accompanied by their families, left for the UK in April 1963.

There were several other important aspects of the RAN *Oberon* project, the most important, perhaps, being the question of a base. The ACNB made its decision, in 1964, to initiate a major civil engineering project to provide an operating, support and training base for the new squadron. It was to be located in North Sydney, across the harbour from Fleet Headquarters and would take up most of the site of an existing torpedo-maintenance establishment.

The base was to be called HMAS *Platypus* and would feature a new 800-foot concrete wharf, equipped with plug-in features, similar to those provided at the RN's main submarine base on the Clyde at Faslane. A three-storey administration building would be built adjacent to the wharf; containing staff offices; an operations room; a communication centre; messes for officers, senior sailors and junior sailors; and overnight accommodation for duty personnel.

Existing buildings would be converted for use as mechanical and electrical workshops, a periscope and mast shop, classrooms for training and a stores building. The workshop building would include a large AC/DC conversion plant to provide DC power, silently, for submarines alongside. This would enable maintenance work to be done on their diesel-generators and, importantly, would avoid disturbing the neighbours.

In another significant move, the ACNB decided to set up two specialist submarine authorities in Navy Office in Canberra – a Director of Submarine Policy (DSMP) in the Naval Staff, and a Director of Submarine Maintenance and Repair (DSMR) in the Engineering Branch. DSMP would be adviser on submarine operational matters and project director for weapon-system acquisition projects while DSMR would advise on submarine maintenance and material safety matters and project manage refits at Cockatoo Island. In addition, a new sub-directorate of Submarine Design was set up in the Engineering Staff, with informal links to the Admiralty design branch in Bath.

There was also the matter of operational command and control. The ACNB decided that the Fleet Commander would have operational command of the new Squadron and would normally delegate OPCON of the submarines to the Squadron Commander, who would also be CO of *Platypus*. The Squadron Commander's OPCON function would include managing – from the *Platypus* Communications Centre – the submarine schedules on a new RAN channel on the very low frequency broadcast, which would be transmitted from the joint US Navy/RAN communication station at North West Cape in Western Australia.

All these aspects of the project were to be in effect by the time *Oxley* arrived in Sydney, remarkably, they all were with one exception: completion of the northern half of the *Platypus* wharf was two months late.

Acquiring a Capability

In April 1967, *Oxley* was accepted from Scott's and was formally commissioned into the Australian Fleet. After successful sea trials and sound-ranging, she went on to pass her Commander Submarine Sea Training work-up with flying colours and headed off for Australia, via the Panama Canal, berthing at *Platypus* on 17 August 1967. On that day the Australian Submarine Squadron and *Platypus* were commissioned, in the presence of the Minister for Defence, Hon Allen Fairhall, MP. Also present at the ceremony was RN FOSM Rear Admiral Ian McGeoch, RN, who had given valuable support to the *Oberon* project. It was a nice coincidence that, back in 1949, he had been the first Commander SM4 in Sydney.

With the establishment of the Australian squadron, the SM4 lapsed. Its two submarines, HM Ships *Tabard* and *Trump*, were temporarily transferred to the Australian Squadron, before leaving for the UK in late 1967 and early 1969 respectively.

The three remaining RAN *Oberons* of the first batch – HMA Ships *Otway*, *Ovens* and *Onslow* – duly arrived in Sydney to join the squadron in 1968, 1969 and 1970. As the number of submarines built up, the squadron settled down to a full program of exercises in the Sydney local area – with participation in major fleet exercises in the region, detachments to operate out of Fleet Base West – and the occasional port visit to ‘show the flag’.

By the mid-1970s, a seven-year operational availability/refit cycle had been developed: five years of operational availability, followed by a two-year refit. Each year of operational availability had its own cycle:

- 4 eight-week operating periods.
- 2 seven-week assisted-maintenance (and leave) periods (AMP).
- 2 two-week self-maintenance periods.

In the third year of operational availability and during one of the two AMPs, the submarine would have her mid-cycle dry-docking at Cockatoo Island. This would include material-safety certification to cover the remaining two years of operational availability.

On the operating safety side, squadron orders prescribed a work-up program and sea inspection after every refit – and a ‘squadron week’ or ‘mini-work-up’ – after every maintenance period. These squadron weeks always started with two days at sea for independent shake-down – exercising the crew in operating procedures, such as stopping and starting snorting, and rapid depth-changing – and in emergency drills to manage things like fire, flood and hydraulic-system failure. Then, after a ‘catch-up’ day in harbour, the rest of squadron week was available for exercises, such as practice-torpedo firing, submarine-versus-submarine attacks or working with the Special Boat Service. The submarine and crew would then be fully prepared for at least eight weeks of fleet exercises and/or operations at sea.

In 1971, the Australian government placed its order for the second batch of two submarines - HMA Ships *Orion* and *Otama* - at a unit cost of A\$24 million, for delivery in 1975 and 1976. This was two less than the number originally planned - perhaps due to competition from other Defence projects - but approval had been given to set up a submarine escape training facility at Fleet Base West. Then came trouble at Scott's yard. Faulty electrical high-power cabling - supplied to Scott's by a subcontractor - had been installed in both submarines and had to be removed, and then replaced with new cabling. The result was that the planned delivery dates for *Orion* and *Otama* were delayed by two years.

Submarine Weapon System Update Program

In 1971, back in Canberra early in my five-year stint as DSMP, we initiated the first of a series of five major acquisition projects aimed at upgrading the sensors, combat system and weapons in the *Oberon*. This upgrade was later dubbed 'SWUP' - an acronym for Submarine Weapon-system Update Program.

The first project to get ACNB approval was the acquisition of a passive sonar range-finding system for the *Oberons*. Back then passive sonar range-finding - discovering the range of a submerged target without transmitting a 'ping' - was quite a revolutionary idea. The principle - in layman's terms - is to use digital technology to measure the time-difference, in microseconds, between the times of arrival of an expanding circular sound-front generated by a distant noise-source, at three accurately aligned, passive hydrophone arrays. From this, the radius of the sound front can be calculated - this radius being also the range of the noise-source.

Systems based on this concept were being developed by Sperry-Gyroscope in the United States - with their AN/BQG-MicroPuffs system - and by Alcatel in France - with their DUUX-2. Sperry had been unable to install a workable system for the US Navy in their SSNs, and were excited to hear about the quiet *Oberon* hull form, with its long, high casing, inside which the two sets of three aligned, equally spaced, hydrophone arrays could be mounted, each side. After an interesting evaluation process, a production contract was placed with Sperry-Gyroscope who proved to be an ideal partner. MicroPuffs would greatly enhance the operational capability of the RAN *Oberons*, especially in the ASW role.

The second SWUP project to be approved was the acquisition of a digital combat system, to replace the analogue TCSS-9 system. There was nothing on the market at the time, so we proceeded, as a first step, to develop a concept-specification for a new digital combat system - later called the Submarine Fire Control System (SFCS) - to be capable of sensor-data processing, plus the fire-control of Sub-harpoon sub-surface to surface missiles and Mark-48 torpedoes.

Tenders were called against our concept-specification and after an evaluation process a contract was awarded to the US company Singer-Librascope for the detailed design and production of on-board systems.

The resulting Singer-Librascope SFCS combat system, powered by an AN/UYK-7 computer, required only three men in the control room to man it, compared with about seven for TCSS-9. It was central to the whole SWUP upgrade and it performed very well.

Replacing a single-beam set in the bow dome, the third project to be approved, was the acquisition of an all-round-scanning, passive 'attack' sonar, to provide accurate, multi-target, bearing data for SFCS. After investigating a number of options, the Krupp-Atlas type CSU-3.41 was selected. It had a large, fixed, cylindrical array and required a new, larger bow dome. This set also performed well.

The fourth and fifth projects - acquisition of the necessary stock holdings of, and support for, Mark-48 torpedoes and Sub-harpoon missiles - were sponsored under SWUP, but were managed by the Departments of Navy and Supply. Incidentally, these two departments no longer exist. They were abolished in the mid-1970s, together with the Minister for the Navy, and the ACNB, as a result of the so-called 'Tange revolution'.

Installation of the three on-board SWUP systems began in October 1977, when *Oxley* was at Cockatoo Island for her second refit.

The SWUP installation work included fitting out a re-designed control room layout to accommodate SFCS - installing the six large passive sonar arrays inside the casing for MicroPuffs - and designing and building a new bow structure for the submarine, to accommodate the new, larger dome for the CSU attack sonar. This work entailed making 25 inserts through the QT28-steel pressure hull and bulkheads - with all the associated welding having to be radiographed for crack-detection.

Oxley's SWUP refit was completed in February 1980. This was only four months over the standard two-year refit time and was a truly remarkable achievement by the dockyard. Completed in 1985 *Otama* was the sixth and final upgrade refit.

The total cost of the SWUP upgrade - covering the acquisition of the three systems and installing them in six submarines and the HMAS *Watson* attack simulator (but excluding the cost of the missiles and torpedoes) - had been just under \$200 million. And it is noteworthy that the entire SWUP process, with its complex design, integration and testing aspects, had been done by the RAN and Cockatoo Island, working with the hardware suppliers (notably Sperry-Gyroscop), without needing to seek advice or support from either the RN or the US Navy.

The one hiccup - that unexpected delay in the completion of *Orion* and *Otama* - had two unexpected benefits. The first was that the recently-acquired MicroPuffs sonar could be installed in both *Orion* and *Otama* during construction while the second was that it was possible to install, in *Orion*, a special electronic surveillance fit, under a separate

collaborative project with the RN. This special fit was put to good use by *Orion* and *Otama* when they conducted a series of important surveillance patrols out of *Platypus* in the context of the Cold War - but that is another story.

There is an amusing post-script. When *Orion* and *Otama* were doing their work-ups in the Clyde, they were asked by CSST staff to switch off their BQG-MicroPuffs passive-ranging sonars during practice attacks - as 'using MicroPuffs would make it too easy for the CO and his attack team to get a good firing solution!'

Conclusion

Now I would like to summarise this story of three interesting decades, by listing four factors, which I think were keys to the success of the RAN *Oberons*:

- The attachment of the RN SM4 to the Australian Fleet. This proved to be the 'lead-in' to a seamless acquisition of a submarine force by the RAN.
- The Australian government's decision in 1963 to go for a proven submarine platform design. This was a strategy - now often referred to as 'military off-the-shelf' or MOTS - which the government had used for all its previous front-line warship acquisitions.
- The ACNB's decision to create two specialist submarine offices within Navy Office in Canberra - DSMP and DSMR - with working links to the squadron.
- The Sydney location of three important elements of the 'front end' - the base, the refitting dockyard and Fleet headquarters. This was, in my opinion, a major factor in the high morale of the Squadron - and of the submariners' families - during the *Oberon* era.

Finally, I would like to pay a tribute to the memory of the late Sir John Gorton, who stood down as Minister for the Navy in December 1963, just 11 months after the first four submarines had been ordered. In his five outstanding years in office, he had won Cabinet approval to acquire 3 guided-missile destroyers and 6 minesweepers, as well as the 6 *Oberons* - and he went on to be Prime Minister of Australia from 1968 to 1971.

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*Admiral Sir John Jellicoe, RN:
'The only commander who could lose the war an afternoon'*

Towards a Unified Model of Maritime Command and Control: A Case Study of the Battle of Jutland

Dr Alexander Kalloniatis

To say notions of command and control (C2) are fragmented is an understatement. No other terms in the military vocabulary can be said to have such a diverse range of definitions. Is C2 about wiring diagrams? Is it about legal authority or about decision-making? Where is the adversary in all of this? In the realm of sea power concepts, matters are worse as in no other environmental domain of military action are the terms 'command' and 'control' used to speak of the physical environment of military action itself but for the sea.¹ Is this semantic fragmentation inevitable and military practitioners and analysts forced at every use to 'mind their Cs'?

This paper will seek to bring the diversity of C2 use together, to unify it no less into a single model that, though generally applicable in any single or intersection of military environments (read 'joint'), thanks to the formulations of the fathers of sea power thinking, is acutely applicable to the maritime environment.

The work of Alfred Thayer Mahan, particularly, set up the operational-strategic expectations on the World War I (WWI) contest between the Royal Navy (RN) Grand Fleet and the German High Seas Fleet (HSF) that was the Battle of Jutland (31 May - 1 June 1916); unquestionably the largest unified coordination of sea power to deploy in a single action. Therefore the RN's *Battle of Jutland, 30th May to 1st June, 1916, Official Despatches with Appendixes* is used as input for this model, which is combined with insights from historical analysis as a validation of the unified model for C2.² Quite simply, the controversy over Jutland is all about operational scale internal coordination versus exercising will over the adversary. The model presented here seeks to provide future commanders and their staff an analytical and monitoring capability for the state of their C2 system in real-time.

It is important at this point to address potential misunderstandings and misconceptions. This analysis uses data that can be described fairly as coming from the scientific field of history. However, this paper does not seek to make a contribution to history, neither with respect to doctrines of sea power nor on the Battle of Jutland itself. It has been said of Jutland that 'a river of ink has been undammed in analyses of the battle', this paper does not aim to add to that flood.³ Taken seriously, however, are the conclusions of recent historians. Indeed, on the verdict of Jutland this paper adopts the views of Andrew Gordon, who sees past Admiral Sir John Jellicoe's actions at Jutland to lay blame on the influence on his career in peacetime Victorian England spent in

preparation for that event. By the time of Jutland, Jellicoe had locked himself and his Grand Fleet into a centralising command philosophy that could not be unravelled at the last moment.⁴ Michael A Palmer, in his review of the fluctuating sway of centralisers over decentralisers through 400 years of naval C2, comes to similar conclusions.⁵ Wayne Hughes, in his classic work *Fleet Tactics and Coastal Combat*, argues that faced with the quality of forces present in the German fleet, Jellicoe had 'no tactical initiative open [to him] that would have been consistent with the offensive spirit of Nelson'.⁶

This paper is content to leave the verdict on Jutland there. Too often, at least in the Australian context, a C2 theory is defended by recourse to abstract social, philosophical, or mathematical arguments, through computer simulations or in light of data from a live military exercise. Such studies are but stepping stones to final empirical validity. Even for military exercises a statement of winners and losers is rarely available at the unclassified level for that ultimate test of a C2 hypothesis or concept: the furnace of real battle. Though the victor at Jutland is still subject to debate 95 years after the event, there exists a definite picture of the price if defeated. Jellicoe, after all, was famously described by Winston Churchill as the man 'who could lose the war in a single afternoon'.⁷ In adopting the verdict of the historical analysis of the Grand Fleet's centralising tendencies the C2 model in this work will be validated to the extent that the lens of the model exposes such features of Jellicoe's C2. Where naval strategists agree such a command philosophy was unsound for that context, this model offers a quantitative picture of an unhealthy C2 system.

It is best to confront at this point concerns regarding the use of 95-year-old data in this age of powerful ICT and network centrality or enablement. The case for analysing WWI fleets in the modern era has been made successfully by contemporary writers on sea power, for example:

A line of First World War battleships should really be understood as a single weapons system operating at the behest of its commander. The secret of success was to be able to coordinate its collective heavy artillery effectively. ... The gunnery of the fleet had to be treated as a whole and often directed from the 'master ship' at targets invisible to the firing ship. For this system of systems (to coin a phrase!) to work properly, the commander needed accurate information on the exact position of the enemy during the battle. He needed to be able to connect sensor to shooter and to ensure that appropriate information was passed around the fleet in a timely manner.⁸

This point is made explicit at this preliminary stage for the case of Jutland. The real analysis presented later in this paper is based on a far more detailed statistical analysis of the signals traffic at Jutland. However, it is useful at this motivating stage to show a network diagram of the RN fleets based on samples of actual communications within the hierarchy of fleet elements overlaid by samples of signals outside the

‘formal’ structure, seen in Figure 1. In this diagram white circles represent distinct C2 nodes distinguishing specific commanders from their ships. For example, Jellicoe, as Commander in Chief (CinC), is represented separately from his flagship HMS *Iron Duke*. Lines, or links, in Figure 1 represent an example of a signal between the respective nodes. Blue links represent signals along the backbone of the formal structure, from the Admiralty to the CinC, to Vice Admiral Sir David Beatty, RN, with the Battle Cruiser Fleet (BCF) and Rear Admiral Sir Hugh Evan-Thomas, RN, with the 5th Battle Squadron (5thBS). Red links signify communications within the branches of the formal hierarchy while the green links represent examples of cross-hierarchical communications. Without being too scientific on this point, what should be immediately evident is the complexity of this interaction network. Indeed, a statistical analysis of this network (developed by a still very un-statistical sampling of the signals in the network) would expose this network as being roughly ‘scale-free’, one of the network classes popular in the contemporary mathematical literature on complexity.⁹ This should settle any concern for relevance in our era of such a choice of data.

The other motive for using Jutland data is one of practicality: modern sources of C2 data are too vast for any realistic development of hypotheses. Hypothesis formation is insight, the discovery of which, as argued, is a deeply human affair. The Jutland source – for all its flaws – is both large and detailed enough to allow for some statistical validity but, on the other hand, small enough for a single human analyst to get oversight and develop the intuition necessary for model building.

The final clarification that must be made concerns the known inaccuracies of manual data collection under fire, as was the case for the RN’s logging of signals at Jutland. It is over this that much controversy abounds. What is effectively being performed is a statistical analysis of the Jutland signals through the C2 model lens proposed. Statistical analysis never provides nor relies upon microscopic detail of individual events, but a collective picture arising from the interaction of many such microscopic events. A more precise statement of the validation that this work performs is: does the gross statistical picture emerging from the analysis agree with the view of history of the operational level C2 philosophy applied at Jutland? The answer will be seen to be yes. This agreement is a stepping-stone to applying this C2 model to more contemporary scenarios for which the verdict of historians may not be available.

This paper is structured therefore as follows. First some key theories of command and control will be discussed: those of Mahan, Julian Corbett, John Boyd and a re-conceptualisation by Ross Pigeau and Carol McCann, to build a single state-space model of C2. Following this a brief overview of the Battle of Jutland will be given. Subsequently explained will be the signal classification scheme at Jutland through which confirmation of the C2 model with real data will be accomplished. The distinct phases of Jutland will then be stepped through using the lens of the C2 model before highlighting the insights arising from the model and validating them against historical

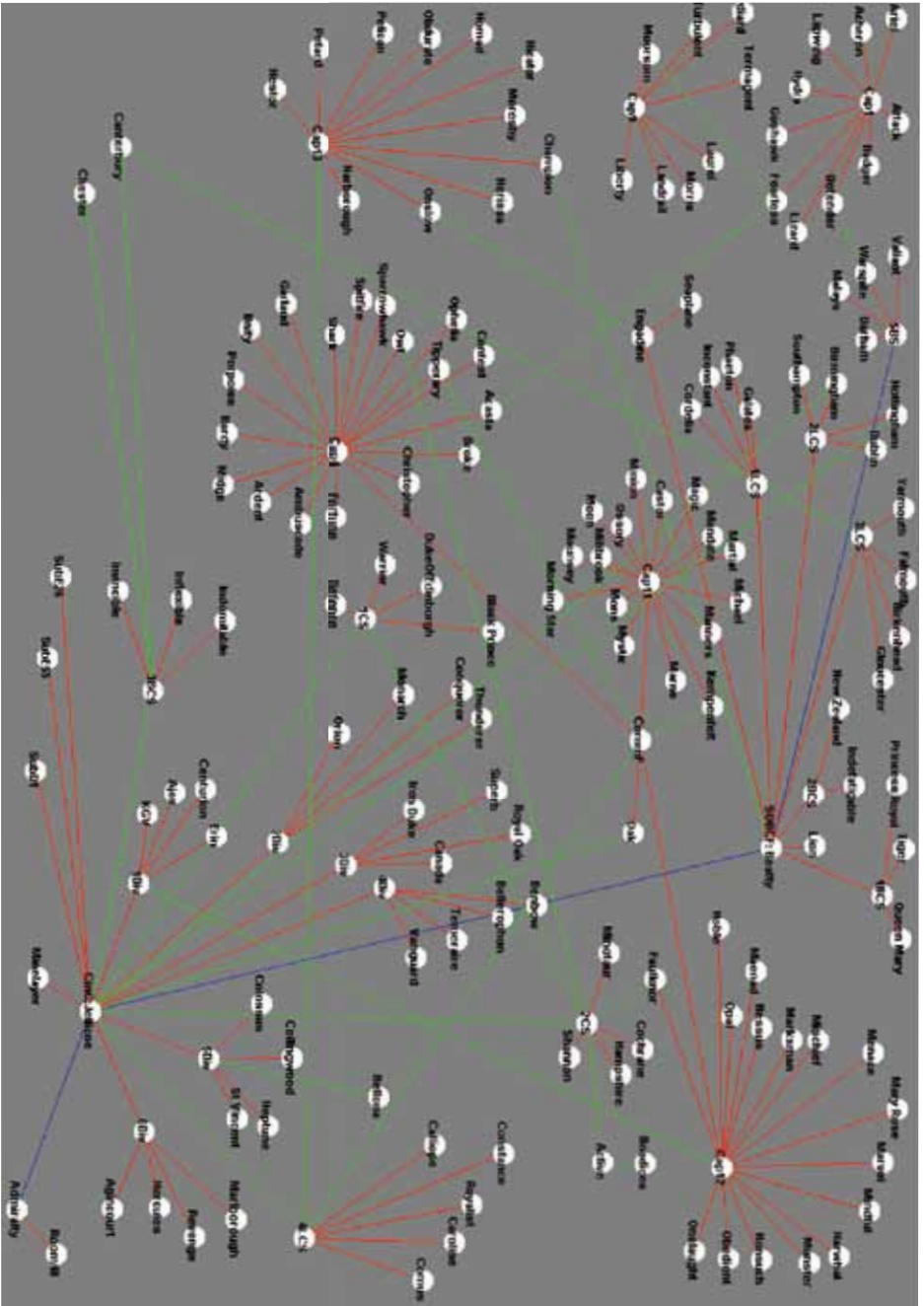


Figure 1: Network diagram for the Royal Navy fleets at Jutland

commentary on Jutland. The penultimate section paints a picture of how this model can be used for modern commanders, both as a conceptual tool and as part of an automated command support system. Finally the results of this work are summarised.

Unifying Models of Command and Control

Up until the 19th century sea communications – the traffic of cargo-laden sea vessels across the oceans – was identical to the mechanism for long-distance signalling between disparate decision makers. Ship's cargoes included the sacks of correspondence between kings, lords of the Admiralty, admirals, captains, individual seamen and disparate citizens of a sea empire. In the meantime, of course, technological developments have enabled communication to progress faster and further while the lifeblood of national economies – international trade – continues to primarily use the sea. The term 'communication' has stuck though and its dual meaning will not evaporate soon.

For Mahan the secret to history was sea power, in particular the ability of nations with vigorous commerce and powerful navies to establish, and defend from an enemy, sea communications. Such communications are the lifeblood not only of a navy or nation but of any land army by which a maritime nation can impact, beyond the shore line, on 'continental' affairs. History's longest standing empires, from Rome to the Great Britain of Mahan's time, were unanimously and inevitably maritime powers. In his sweeping conclusion, Mahan brings these arguments together:

Where the revenues and industries of a country can be concentrated in a few treasure-ships, like the flota of Spanish galleons, the sinew of war may be cut by a stroke; but when its wealth is scattered in thousands of going and coming ships, when the roots of the system spread wide and far, and strike deep, it can stand many a cruel shock and lose many a goodly bough without the life being touched. Only by military command of the sea by prolonged control of the strategic centres of commerce, can such an attack be fatal; and such control can be wrung from a powerful navy only by fighting and overcoming it.¹⁰

Of note here is the interchangeable use of command and control. For Mahan command is achieved by control. Corbett, Mahan's English contemporary, is even more explicit in the identification:

Command of the sea, therefore, means nothing but the control of maritime communications, whether for commercial or for military purposes. The object of naval warfare is the control of communications, and not, as in land warfare, the conquest of territory. The difference is fundamental.¹¹

Though beginning with Carl von Clausewitz's 'War is an act of violence to compel our opponent to do our will', Corbett is at pains to emphasise the significance of 'limited' and 'defensive' warfare.¹² This means that there is more to sea command than all conquering navies and decisive battles. It is more subtle, about the means of passage on the sea. The contrast between Mahan and Corbett can be isolated in precisely the two passages just quoted. Corbett argues that it is erroneous to assume 'that if we are unable to win the command we therefore lose it'. The notion of a fleet in being addresses this potentiality, that an inferior naval force can dispute the sea command of a superior power through opportunistic harassing operations or blockades. However, even in defence, fleets must always 'preserve the aggressive spirit' by retaining the 'will and insight to deal rapid blows in the enemy's unguarded moments'.

These concepts of command and control clearly relate to degrees of influence and freedom of action within the physical environment of the ocean in tension with denial of corresponding degrees of opportunities for maritime adversaries and thereby the gain of material advantage. Above all they are squarely focused on an adversary. This is in contrast with the other usage of C2: to denote the relationships between components of a military force and its legitimate means of achieving internal coordination. Nicholas Rodger is one contemporary historian of sea power who recognises the importance of the internal expression of command for its projection on the ocean. The advances in Admiralty organisation in the 18th and 19th centuries, such as the Victualling Board, were as critical to Britain achieving its maritime superpower status as anything it exhibited afloat.¹³

A similar concern for the appropriate internal process to achieve success in external conflict with an adversary is expressed in the cybernetic model of C2 by Boyd, a United States Air Force colonel. Arising from jet fighter combat after the Korean War, Boyd identifies a four step cyclic process of Observe-Orient-Decide-Act (OODA), which is often simplified down to the maxim: he who gets inside the adversary's OODA loop wins the battle. There are many elaborations of the OODA loop, such as that by Lawson who takes it to five steps: Sense (from the Environment)-Process (inputs from Own Forces)-Compare (with desired state)-Decide-Act (through Own Forces again).¹⁴ The glaring absence of the adversary in this version is corrected in a form that appears in the text on naval tactics by Hughes.¹⁵

More often than not, C2 is discussed as a purely introspective property. NATO and the Australian Defence Force define it as the 'exercise of authority and direction by a properly designated commander over assigned military forces in the accomplishment of the mission'. It is expressed in wiring diagrams, though sees some loosening in concepts such as mission command and a growing awareness of the importance of informal networks in supporting the formal structure.¹⁶ However definitions here are usually circular with neither command nor control given definitions separate of the composite term C2 (also evident in Mahan and Corbett: command is achieved by control).

Precisely this circularity was addressed by Canadian researchers Ross Pigeau and Carol McCann. Their focus was on internal organisation and coordination but in view of the dizzying array of acronyms and technology in command, control and communications, intelligence, surveillance and reconnaissance systems they sought to go back to the heart of the C2 system: the human. They identified this dimension in two aspects: creativity and will. In their words:

Only humans demonstrate the range of innovative and flexible thinking necessary to solve complicated and unexpected operational problems. Only humans accept the responsibility commensurate with military success or failure. Only humans possess the dedication, drive and motivation to raise merely satisfactory military performance to outstanding levels. As self-evident as this assumption seems (ie, that only humans command), it is amazing how little effort has been expended in deducing the organizational, psychological and technological implications it entails.¹⁷

Accordingly, Pigeau and McCann provide the following definitions:

- **Command:** the creative expression of human will necessary to accomplish the mission.
- **Control:** those structures and processes established by command to enable it and to manage risk.
- **Command and Control:** the establishment of common intent to achieve coordinated action.¹⁸

Alternately, for Pigeau and McCann, command means ‘to create new or changing structures and processes (where necessary), to modify control structures and processes when the situation demands it’. Control, on the other hand, is the use of existing structures and processes to accomplish the mission including ‘to monitor structures and processes, carry out established procedures and adjust procedures according to pre-established plans’.

This cutting of the Gordian knot of circularity between command and control is this paper’s starting point in unification. Secondly, this paper adopts Pigeau and McCann’s identification of creativity and will as the essential components of command. Of course, Pigeau and McCann address these components as exercised within and over ‘own forces’. In application over the adversary, the importance of will is explicit in both Clausewitz and Corbett. Adopting the component of creativity from Pigeau and McCann brings us to saying that *command of the adversary* is the imposition of *innovation* upon them – to *change the adversary’s structures and processes*. Such changes to structure include attrition, decapitating the leadership of an adversary force and nation-building in conquered territories. They create new realities, whose future development is clouded by uncertainty.

Whereas command focuses on novelty, control presupposes existing structure, process, a template, a standard against which change should be judged. This is certainly fundamental to the Pigeau-McCann definition for control of own forces. It is now possible to straightforwardly generalise this to state that *control of the adversary* is the conduct of operations against them within their existing structures and processes to achieve influence. This is consistent with the defensive maritime postures that Corbett argues under the concept of sea control. Intelligence, surveillance and reconnaissance activities therefore naturally fall into the category of control with respect to the adversary.

A spectrum of foci of intent has now been established between the poles of the adversary and one's own organisation: command of the adversary, control of the adversary, control of one's own forces through to command of one's own forces.

Boyd's OODA loop represents another spectrum between poles, from sense-making to decision-making. However, his steps of Observe and Orient suggest a neat linear progression from data collection to clean hypothesis formation. For military practitioners like Boyd the reality is far more messy: the gathering of information may include both asking of relevant and irrelevant questions, expressions of confusion and red-herrings before flowing on to the various stages of processing that information and formulation of proposals for action, decisions and subsequent short and long term actions. However, the subject of these confusions, questions, information, proposals, decisions and actions may be the adversary (the focus specifically for Boyd) or one's own forces (to achieve, for example, synchronisation).

This leads to a model of two dimensions: one axis expressing the *orientation* (adversary, own forces) and *scope* of influence of intent (command, control), summarised as *Orientation-Scope*; and the other axis representing *Sense-Decision Making* state (see Figure 2). Naming this a C2 state space indicates that every point in the (geometric) space represents a uniquely different state of the C2 system. In this representation, along the vertical axis rather than just the clean Boyd OODA steps, categories such as Confusing, Questioning and Ascertaining (or Verifying) are used. Indeed, to the fidelity level of Jutland traffic that are soon focused on, these descriptors are apt – and better convey the fog and friction of that battle – rather than the clean Observe and Orient descriptors into which they can be aggregated. To the degree that fog and friction are universal properties of war, it is argued this model is general enough for broad application.

At any point in time an actor (a commander or subordinate) in a C2 system may issue an external artefact – a signal, a document, a spoken statement or even visual gesture – that can be identified with a point in the two dimensional space of Figure 2. (Implicit communications are the hardest to capture and classify. The incorporation of such artefacts can only increase the power of this model.) The receipt of such an artefact impels elements of the C2 system to undertake actions consistent with the intent of the artefact, often requiring the issuing of their own artefact. The system

state thereby changes with time, but also through the changing actions and reactions of the adversary. Over time many such artefacts will be generated by the many C2 actors, in disparate parts of the state space. Depending on the time intervals within which such artefacts will be accumulated and represented in a plot, the aggregation of points will begin to assume some distribution or profile in the two-dimensional space according to the predominance of issued artefact states. Stepping through these time intervals over the course of a military operation in which the C2 system is engaged this profile may or may not change.

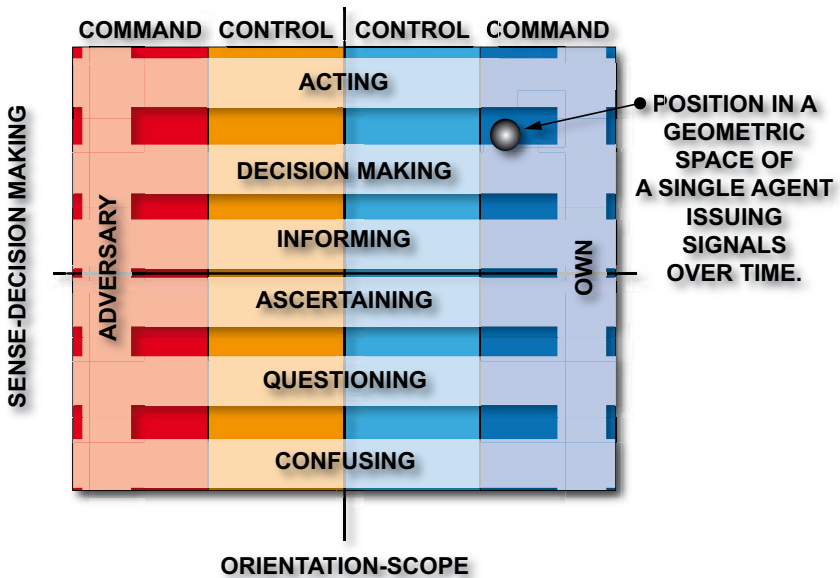


Figure 2: A two dimensional C2 state space in which an external artefact of a C2 system can be located as a single point in the geometric space

It is reasonable to expect that a dynamically changing profile should evolve in correspondence with the ebb and flow of the engagement and according to the command philosophy of the commander imbued within the elements of the C2 system. The profile will change as sense-making shifts between the adversary and one's internal disposition to become decision-making over force elements either directing with respect to internal arrangements or against the enemy in degrees of aggression in posture. If we are tracking the explicit signals between fleet vessels and the profile remains fixed in the bottom left of Figure 2 the system is much in the spirit of Mahan. Inter-ship signals are predominately concerned with large-scale

fleet action against the adversary and minimal effort is put to internal coordination; the implicit signals here may represent undocumented verbal messages passed within a ship. If the profile in such instances is largely fixed in the lower amber zone, the system is in the spirit of Corbett. As such the focus is on a defensive posture, working within the adversary's structure and processes. Finally, a system with its distribution largely fixed in the lower blue zone is dominated by concern for internal coordination, consistent with the Pigeau-McCann notion of C2. In peacetime this is the natural mode of a C2 system. In the presence of an adversary such a mode may be a result of implicit signals, which cannot be readily documented, being the source of sense-making and coordination against the adversary.

Explained thus far has been the model and its use conceptually, it will be now made concrete by examining the Battle of Jutland signals.

A Brief History of the Battle of Jutland

The battle involving the British Grand Fleet, under Jellicoe, and the German HSF, under Vice Admiral Reinhard Scheer, took place in the North Sea off the coast of Denmark over roughly a 15-hour period from 1600 on 31 May to dawn of 1 June 1916. The British used a hybrid scouting fleet, Beatty's BCF, of lightly-armoured, fast battlecruisers and a subordinate group of fast, well-armoured *Queen Elizabeth* class battleships, the 5thBS under Evan-Thomas. The Germans had the First Scouting Group of Vice Admiral Franz Hipper. Jellicoe's Grand Fleet and Scheer's HSF were the main fleets, consisting of comparatively slow, heavily armoured battleships.

The German force constituted a classic fleet in being, seeking to frustrate the RN's sea command by luring parts of the British fleet into localised skirmishes while avoiding a full engagement with the Grand Fleet. The confident British on the other hand, sought to ensnare the entire HSF in battle. The BCF was the bait, its 'sharp end' provided by the fast and heavily armoured 5thBS, with the aim to tie down the HSF long enough for Jellicoe to reach and join the battle. It was important that this take place with sufficient daylight hours left to fight to victory as the British had neither trained for night fighting but more importantly their C2 system for coordinating the fleet relied heavily on the visual media of flag and semaphore. In other words, the key C2 function was to enable coordination of a vast array of afloat gun power and to concentrate that force upon the adversary, all in sufficient time that the setting of the sun would not render both the means of detecting the enemy and communications inoperable. Wireless and Morse code were used circumspectly in comparison to the Germans.¹⁹ The other basic C2 method mission command, or decentralisation, so pivotal to Nelson's emblematic victory at Trafalgar had been long absent as a doctrinal principle. The absence was due to technological enhancements of the Industrial Revolution and particularly the death of mission command advocate, Sir George Tryon,

in the late 19th-century collision between HM Ships *Victoria* and *Camperdown*. Tryon had understood very well that poor visibility on an open sea, smoke from ship turrets and the chaos of war would undermine communication systems and render the great Victorian dream of perfect coordination unattainable. These critical operational level factors had been largely forgotten by the time of Jutland.

On the afternoon of 31 May 1916, German signals were intercepted by the British revealing the German fleet's venture into the open seas. Within hours the BCF made first contact with the German scouting force. The historical record is marred by controversy over the stationing of the 5thBS with respect to the BCF and signalling inefficiencies that effectively led the BCF's most powerful guns being out of range of the enemy at the most critical juncture. Over the course of the afternoon, the 5thBS fell into formation with the BCF and the combined scouting formation engaged in full combat with the converging German fleets, taking significant losses but inexorably drawing the entire adversary force into a 'run to the north'.

As Jellicoe's main fleet converged with Beatty's, requests from the CinC to Beatty for the location of the enemy were flashed by signal light. Beatty's response gave a direction but no further information. The BCF then configured into the main fleet as Jellicoe signalled for the full deployment of the entire Grand Fleet with daylight failing. The completed deployment of the Grand Fleet into line-of-battle left Jellicoe having achieved the much desired 'crossing the T' of the enemy. But in the 20 minutes required for this process, the enemy had turned away. Remarkably, Scheer then turned back into the Grand Fleet and had his T crossed again now from the north-west. At key junctures in all this, Scheer let fly with volleys of torpedoes, in response Jellicoe adopted defensive postures. With Scheer turning away finally, night overtook the fleets.

During the night Jellicoe erroneously guessed the direction in which Scheer would seek to escape. Nevertheless, the German fleet drifted through the rear of the British with ships colliding or exchanging fire. Remarkably none of this information, nor interceptions of German signals by the Admiralty, was transmitted in a timely manner to the CinC. By dawn, Jellicoe realised the HSF had escaped and signalled ceasefire shortly before 0400. Despite heavy mutual losses, the 'new Trafalgar' had slipped from British grasp.

At the strategic level, defeat for the British would have been catastrophic, rendering British prestige and its empire hollow, and Britain's blockade of the Channel unenforceable. Therefore Jellicoe was truly the man who could lose the war in an afternoon. As it turned out, it was a strategic British victory albeit imperceptible psychologically for many of that era and since. The HSF effectively ceased to be a fleet in being. On three other occasions did it venture out into the open seas. The first of these in August 1916 saw the Admiralty on to it early and the Grand Fleet

was out quickly. Scheer abandoned his course for Tyrwhitt when *U-53* alerted him to the presence of Jellicoe's fleet 65 miles to the north. Effectively the HSF remained locked in harbour in Kiel and Wilhelmshaven, its men idle and embittered, for the remainder of the war. It is not a coincidence that their mutiny of 29 October 1918 played a key role in the collapse of the German domestic front and the end of WWI.

Classification of RN Jutland Signals

Using the generic two dimensional C2 state space model described earlier it is possible to classify the signals transmitted by British forces at Jutland. The aim is to attach, for each signal, two numerical values for each dimension of the model.

Beginning with the Orientation-Scope axis the value assignment is:

- negative values for signals that are oriented with respect to the adversary
- zero to signals relating to the general battlespace environment or neutrals
- positive values for those related to own forces.

Large negative values correspond to attack orders which, for Jutland at least, represent the maximum expression of British intent to exert its will over German vessels. Correspondingly, maximum positive values represent maximum exercise of change over British forces, the most severe being the transfer of Vice Admiral Cecil Burney's Flag with the 1st Battle Squadron. Between these extremal ranges of values are included signals about other signals, be they of the enemy or from own forces. Signals related to enemy signals fall halfway in the negative range while signals related to those internal to the RN fleets are in the positive range. Within this numerical scheme, very much developed specifically for the Jutland data, can be identified a threshold between command and control. On the positive side signals with orientation-scope greater than 10 manifest command over own forces, while those with values more negative than minus nine reflect an intention to command the adversary. In between is the regime of varying degrees of control - working within existing structures and processes. Table 1 lists the numerical scheme for the Orientation-Scope axis with illustrative examples from the signals.

Orientation-Scope - Signal Description	Value	Example
Attack/prepare to attack generally	-10	Assume complete readiness for action in every respect
Attack specific target	-9	Engage the enemy's right from 1 to 4
Prepare to attack specific target	-9	
Manoeuvre towards enemy	-7	Sweep to the westward and locate the head of the enemy's line before dark.
Manoeuvre away from enemy	-6	Do not go too near the enemy's battlefleet.
Form screen	-5	Form submarine screen.
Prepare to form screen	-5	
Information/reply/question about enemy state	-4	At 14:30 German Main Fleet in Lat/Long/Course/knots.
Information/reply/question about enemy signals	-3	German coded message intercepted from DZ to DR...
Prepare/look out for enemy specific	-2	Destroyers keep a look out for submarines.
Prepare/look out for enemy general	-1	Keep a good look out for movements of enemy bearing N by W
Information/reply/question about battlespace/unknowns	0	For CinC. Following weather reports off entrance of Rosyth...
Prepare/look out for own general	1	
Prepare/look out for own specific	2	
Information/reply/question about own signals	3	Did you get signal from CinC to close?
Information/reply/question about own state	4	My position at 15:15 ... lat/long/course/speed.
Negative of order for movement/attack	5	
Delegation of responsibility/discretion	5	Admiral intends to proceed at ...
Statement of move intent	5	

Communicate	6	Flag officers inform their divisions of the situation.
Adjust own state, not movement	7	Your masthead light is burning
Move with reference to plan	8	Form single line-ahead in sequence of fleet numbers. Course SW
Move with reference to space	9	Alter course in succession to S by E.
Move/prepare to move with reference to own	10	Alter course in succession to SW.
Encouragement, morale support	11	Remember traditions of glorious 1 June...
Provide/prepare to/offer/suggest help	12	Pick up men from ship on starboard hand.
Suggest change unit/structure	13	Submit van of battleships follow battlecruisers. We can cut off whole of enemy's battlefleet.
Change structure	13	I am going to transfer to you in <i>Fearless</i> .

Table 1: Assignment of Orientation-Scope values to types of signals at the Battle of Jutland

The second dimension corresponds to the sense-making/decision state. Maximum positive values correspond to signals seeking sustained, ongoing action while maximum negative values are assigned to signals that have failed to be registered. The numerical system in this direction is given in Table 2 with some example signals. Unlike the first axis, which merely identifies the focus of the signal's attention and is relatively unambiguous, classifying signals according to this axis requires some subjective judgement. In this respect, the motivation for classifying a number of potentially ambiguous signals follows:

- **'Admiral intends'**. By far the most common signal was from the senior officers with 'Admiral intends to proceed at ... knots'. After discussion with a modern naval signaller the word 'intends' is taken at face value: this signal is not an explicit order for subordinates to follow in identical fashion but gives scope for discretion within the overall constraint of maintaining contact with the admiral.²⁰ These are therefore interpreted as a 'Preparation to Act'. Knowledge of the admiral's intentions is the backdrop against which future changes to actions may be required of the subordinate. Similarly, explicit negation of a movement order is treated as a return of discretion for subsequent movements to the subordinate.

Decision State - Signal Description	Value	Example
Sustained action	6	Keep close to me during the night.
Immediate action	5	Open fire and engage the enemy.
Delayed action at specified time	4	Report when all ships are in station and correct.
Preparation/discretion to Act	3	Prepare to form in single line-abreast to starboard
Suggestion to act	2	Am I to follow you or steer south after fleet?
Information	1	My position Lat 56° 28' N, Long 5° 38' E, course South, speed 17 kn
Correcting/disputing Information	-1	Negative. Those ships are our battlecruisers.
Uncertainty in Information conveyed	-2	An Enemy force, apparently consisting of 7 ships besides Destroyers ...
Scrambled information	-3	CaptD12 to CinC at 01.56: Urgent. Priority. Enemy's Battleships in sight. My position 10 miles astern of 1st BS
Not logged as received	-4	CinC at 18.01: Where is Enemy's BF?
Question	-5	Did you fire any torpedoes?
No answer: un-responded question	-6	SO1stBS to <i>Colossus</i> at 18.40: Why are you hauling out of line?

Table 2: Assignment of Sense-Decision Making state values to types of signals at the Battle of Jutland

- **Planning.** The famous signal from Beatty to his CinC at 1947, 'Submit van of Battleships follow Battle Cruisers...' (not received until 2001 however) is regarded by some as insubordination, an inversion of the entire fleet construct. However, it is one of the few examples in the Jutland traffic as 'planning on the fly', and therefore as a proposal by a subordinate for innovation to change the existing structure; it is command from below, a behaviour consistent with the Pigeau-McCann definition of command. There are other such signals deemed, from the perspective of history, as more respectful of authority.
- **Scrambling/Failure to Receive/Failure to Log.** Three of the classes which deserve further comment are signals that were scrambled or incompletely logged, those not logged as received and those having questions for which no response was received. Such signals, particularly between 1430-1440 on 31 May, are the focus of bitter internal controversy between the Jellicoe, Evan-Thomas and Beatty camps: were certain signals from Beatty received by, or intended to apply to, the 5thBS? Due to the technology of the time such classifications were not made in real time, only significantly in retrospect at a point in history where reputation and future promotion were at stake. The *Official Despatches* data used here does not identify any signals in this 10-minute period as 'not recorded' (though it does classify others in this way). To the extent that there were many signals recorded as 'not received', not just around the 10 minutes before the battlecruiser duel, this uncertainty does not impact on the statistical approach taken in this application. Indeed errors in how to classify certain signals can be formally incorporated in the analysis and also treated in the statistical approach, which have not been pursued at this stage. Either way, even within a statistical view of the behaviour of the C2 system over time, judgement about the robustness of communication links in hindsight is important for capturing the fog and friction of war. There are also potential real-time contemporary applications of this that are discussed in the final section.
- **Composite Signals.** A number of the signals are *composite* with respect to this classification scheme. For example, at 1945 HMS *Southampton* of the BCF signalled the CinC, 'Urgent. Enemy has detached unknown number of ships, type unknown, which are steering NW at 19:15:00. My position Lat 56°50'N, Long 6°27'E.' The strongest component of the message is that closest to contributing to the message recipient undertaking action. The classification of that component determines the classification of the entire signal. However, this can be improved by treating individual components of signals as messages in their own right and classifying each separately which could be pursued in future work.

Plotting each signal now in the two-dimensional C2 state space now enables one to track, signal-by-signal, moment-by-moment, the state of the system. This is too microscopic a view to be helpful. Instead signals will be aggregated over intervals of time for the purpose of building up a statistical profile, as discussed earlier. Conveniently, from intercept of the German signal on 31 May to the 1 June ceasefire there is a period of exactly 13.5 hours wherein there was every expectation that engagement between British and German fleets would take place. This enables a clean decomposition of the battle into nine 90 minute phases (See Table 3). Conveniently, key events such as the BCF duel with Hipper's Scouting Group, Jellicoe's deployment of the Grand Fleet into line-of-battle and the main clash fall neatly within the so-defined phases. Similarly, the descent of darkness nearly coincides with the end of a phase in this decomposition. Table 3 also gives the number of signals issued in each phase.

Phase	Time Period	Description	Number of Signals
1	1428-1558	German signal intercepted; battlecruiser duel	166
2	1558-1728	BCF run to the north	121
3	1728-1858	'Where is the Enemy'; Grand fleet deploys.	199
4	1858-2028	Clash of the battle fleets; HSF about face.	226
5	2028-2158	Desperately seeking the enemy before nightfall.	130
6	2158-2328	Night as the tails of the fleets intersect.	53
7	2328-0058	Sporadic night battles.	35
8	0058-0228	Failure to inform CinC of interceptions.	50
9	0228-0358	Dawn and the enemy has escaped; ceasefire.	184

Table 3: Nine phases of the Battle of Jutland from 31 May to 1 June, 1916

Visualising the C2 at Jutland

The result of plotting in the C2 state space model the signals over Phase 1 of the Battle of Jutland is depicted in Figure 3. According to *Official Despatches*, this opening phase saw 166 signals at an average of a message every 32 seconds, considerably faster than the oft-quoted overall rate of 'one flag signal every 67 seconds in daylight hours'.²¹ Three 'hot spots' dominate this phase. The feature marked 'A' represents signals directing immediate action with respect to direction and speed in the RN fleets: signals explicitly directing internal coordination. The density of colours in the block conveys the large number of signals of this category over this period, a property which will be better seen in subsequent plots. The next spot is labelled 'B' that, from its position in the diagram, is seen to concern signals conveying information about the German ships. Thereafter follows the hot spot labelled 'C' which similarly concerns information about British fleet elements. Thereafter one can observe a number of weaker peaks. The feature 'D' is built up from questions regarding the enemy while 'E' is dominated by 'admirals intends' signals. The hot spot labelled 'F' summarises the signals directing attack against the enemy, after all the first part of the battlecruiser duel took place in this period of time. Notice that in this phase - very much dominated by the efforts of Beatty's BCF - that control of own forces, peak A, is comparable in size to information about the enemy, peak B, both of which overshadow peaks C-F.

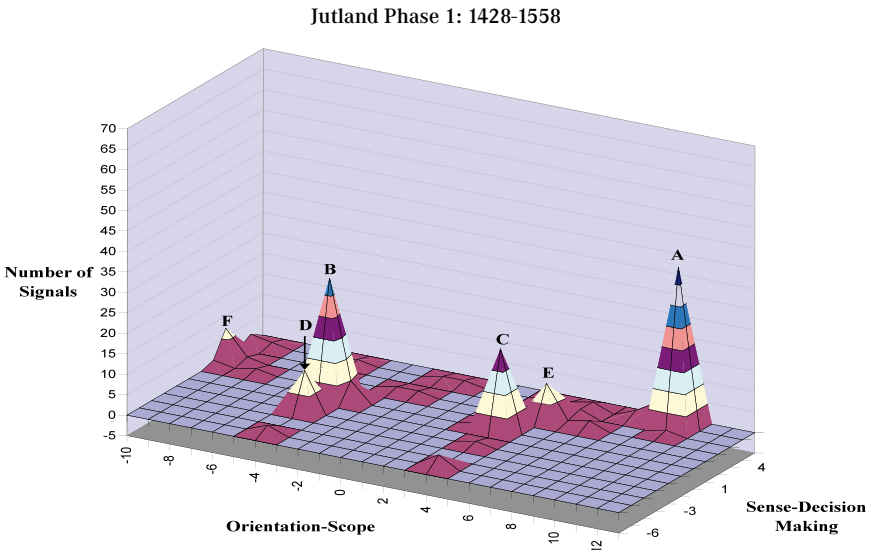


Figure 3: C2 state space for Phase 1 of the Battle of Jutland

Turning to Phase 2 of the battle (see Figure 4), the continuation of the battlecruiser duel and the run to the north, there is much of the first phase that reappears. The structures A-E are present again. However, peak D, involving questions about the enemy, is barely noticeable as there was little for the BCF to ask given the chase afoot at this stage. Note also that peak F, signals ordering attacks, is reduced as there was little scope for the BCF to return fire in the run to the north and the Grand Fleet was not yet engaged.

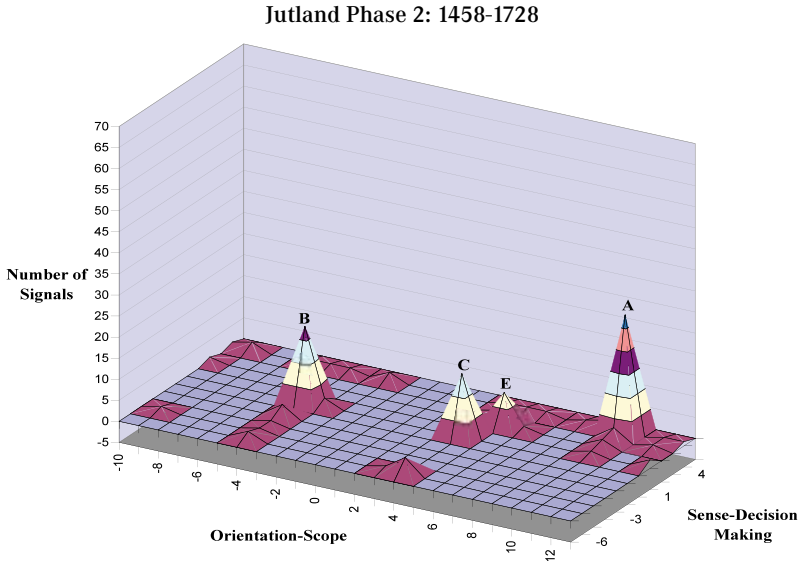


Figure 4: C2 state space for Phase 2 of the Battle of Jutland

The Grand Fleet comes to the fore in Phase 3 (see Figure 5), with its deployment and the limited period of time of full-scale fleet-on-fleet action that can truly be identified as *the* Battle of Jutland. Many structures are again repeated in the C2 state space. However, most noticeable is how dominant feature A has become reflecting that, with the RN fleets having now converged, the C2 system is overwhelmed by its internal coordination activities. The visible presence of the enemy drives information flows about it in the smaller peak B. Together with the reoccurring peaks C and E, the feature F reappears, involving signals ordering attacks against the enemy. The key observation to be made at this point is the contrast between coordination (peak A), information (peaks B and C) and orders to attack the enemy.

Jutland Phase 3: 1728-1858

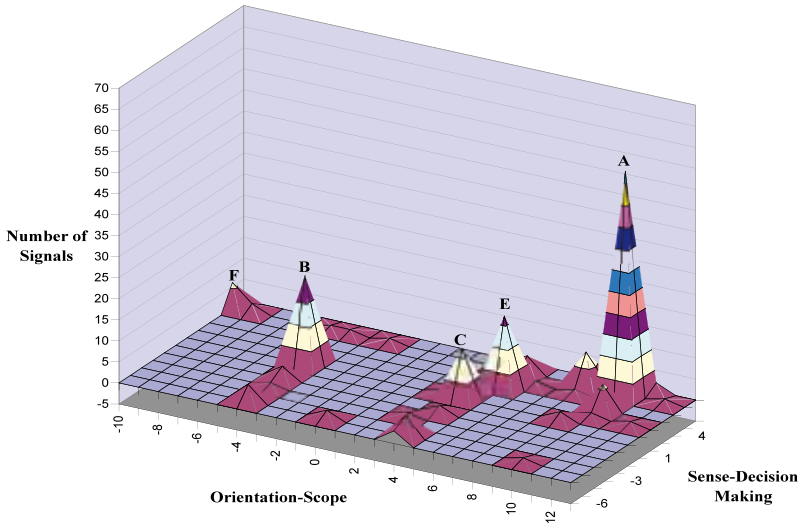


Figure 5: C2 state space for Phase 3 of the Battle of Jutland

Having now examined three of the phases through the lens of the C2 state space model it is appropriate to reflect on some significant points. There is much that is repetitive in figures 3-5, reflecting the normal functioning of a C2 system, namely coordination internally and against the adversary, and the seeking and conveying of information. Evidently the C2 state space model is successfully capturing these basic C2 functions. More revealing of the particular C2 philosophy in practice at Jutland are the relative sizes of the peaks, particularly in Phase 3 where, with the combined fleets, the CinC should naturally be most evident.

Phase 4 (see Figure 6) again reveals familiar structures. This phase sees the battle's most intense signalling: 199 signals averaging one every 24 seconds. In contrast a structure labelled 'G', which has thus far been a minor feature, now becomes relatively prominent. The signals herein are those expressing confusion about the state of various ships as battle damage and the fog and friction of war prevail. But still the greatest peaks are significantly to be found in signals controlling British forces (peak A) and conveying information about them (peak C). The question may be asked at this point whether there are inherent dangers in copious control signals when other signals indicate friction.

The phase preceding nightfall, Phase 5, is seen in Figure 7. The feature G recurs and the peak associated with information about the adversary (peak B), is considerably weaker than before.

Jutland Phase 4: 1858-2028

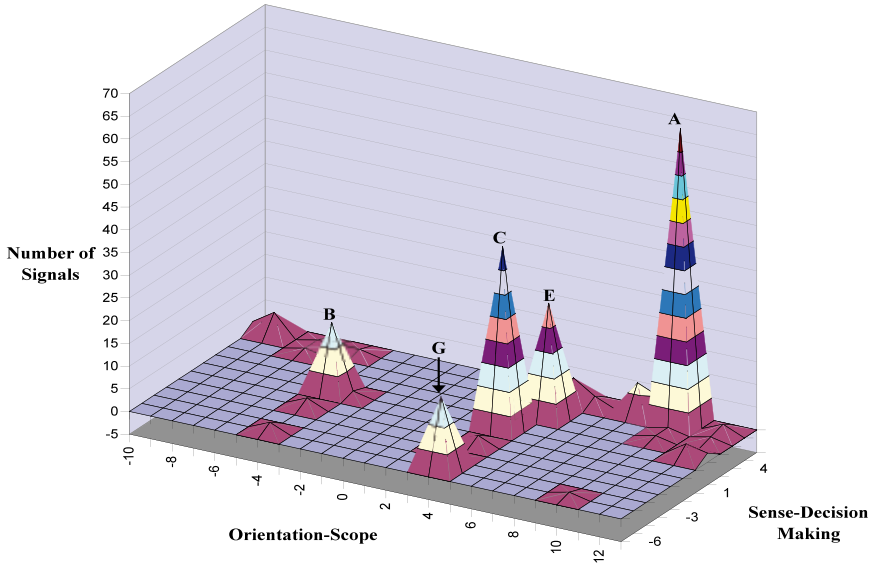


Figure 6: C2 space for Phase 4 of the Battle of Jutland

Jutland Phase 5: 2028-2158

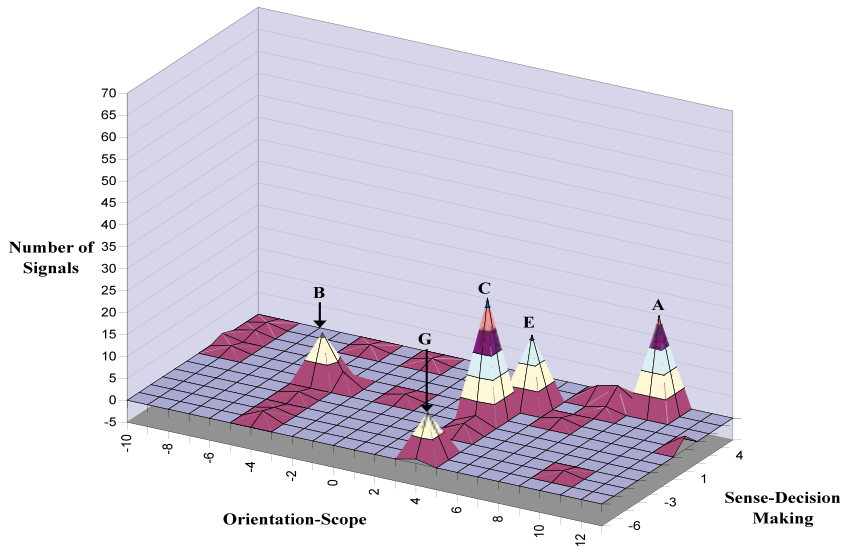


Figure 7: C2 space for Phase 5 of the Battle of Jutland

Phase 6 (see Figure 8), shows a considerable change. This picture of effective shut-down in activity is reminiscent of the modern office environment when computer networks fail: workers emerge from offices and cubicles scratching their heads at a loss of how to conduct any further business. The paucity of structures in this phase, with the few that are evident only conveying information on friend (peak C) and foe (peak B) with no capacity to respond, betrays the dependence of the Grand Fleet on the sun for its functioning.

Jutland Phase 6: 2158-2328

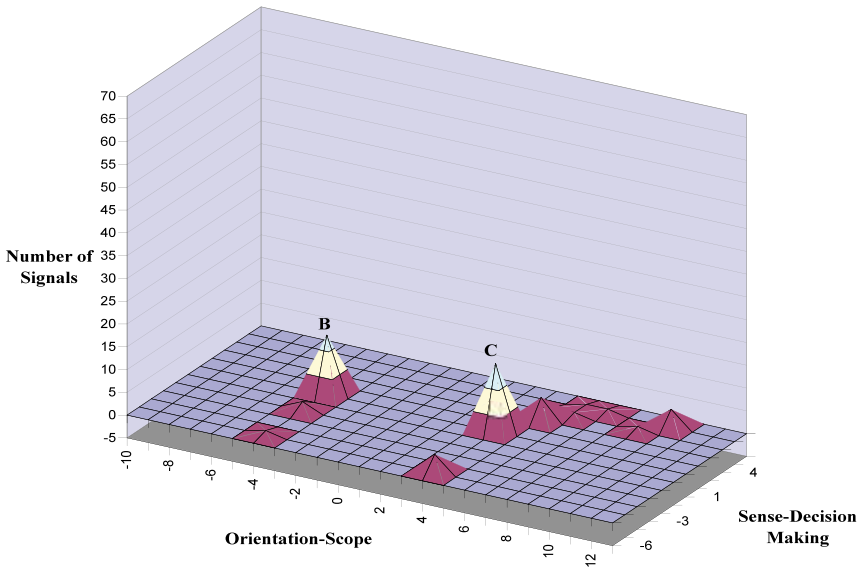


Figure 8: C2 space for Phase 6 of the Battle of Jutland

Phases 7 and 8 (see figures 9 and 10) show the system fully degraded: 35 and 50 signals respectively. There is no sense of a fleet conducting ‘business as usual’. Hidden inside the feeble signal at B in Figure 9, are the few messages conveying information that may have alerted Jellicoe to the position of the HSF in the rear of the Grand Fleet.

Jutland Phase 7: 2328-0058

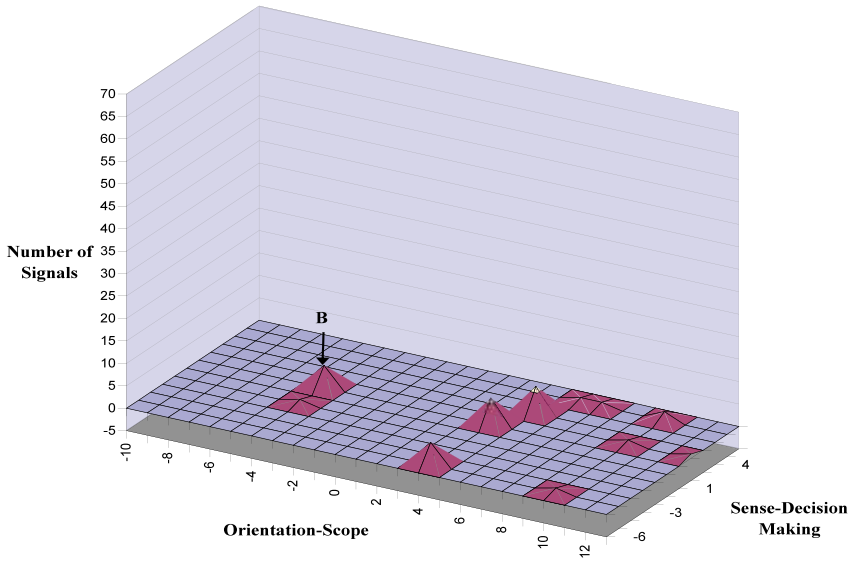


Figure 9: C2 space for Phase 7 of the Battle of Jutland

Jutland Phase 8: 0058-0228

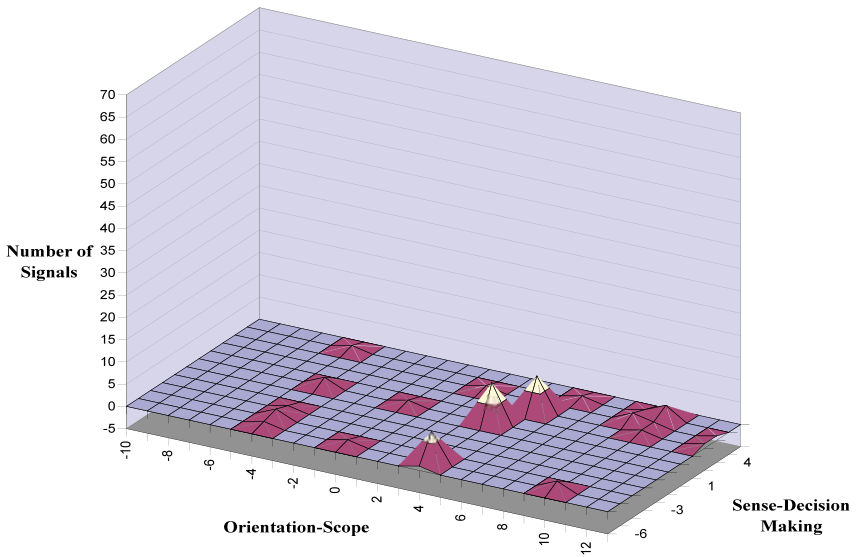


Figure 10: C2 space for Phase 8 of the Battle of Jutland

Phase 9 (see Figure 11) sees the arrival of dawn and the restoration of the key ‘enabler’ of Jellicoe’s C2 system: the sun. What can, by the standards of previous daylight phases of the battle, be clearly seen is the restoration of normal business. The signal count reveals a cracking pace of a signal every 29 seconds. The majority of the features are on the right hand part of the space, concerned with British vessels’ movements and status: updates on the situation after the night’s blackout. Peak C dominates as information finally begins to flow on the status of vessels after the events of the night. However, peak B corresponds to the numerous sightings of German zeppelins, a sighting of one German cruiser and the Admiralty’s signal, disappointing for its tardiness, stating the location of the main German fleet: clean out of the grasp of Jellicoe’s Grand Fleet.

Jutland Phase 9: 0228-0358

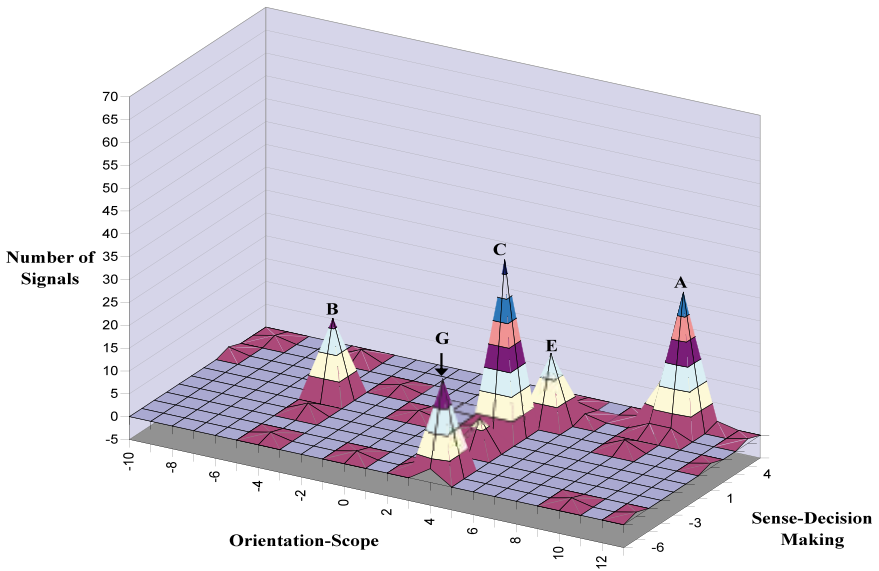


Figure 11: C2 space for Phase 9 of the Battle of Jutland

The Verdict of History and Validating the C2 Model

Stated at the outset of this paper was its agreement with Andrew Gordon's verdict on Jutland. His is a rich set of propositions. With respect to the command philosophies of Jellicoe and Beatty respectively, he comes out on the side of the latter. Jellicoe, unlike Beatty, was too imbued with an approach developed by a generation of seamen in thrall to the controlling potentialities of 19th century technology but having forgotten the nature of war in the long peace of the 'lee-side of Trafalgar'.²² Moreover he describes Jellicoe's C2 philosophy as 'psychosomatic', lacking 'proactive interest in [the movements] of the enemy'.²³ On the controversies over the initial battlecruiser engagement Gordon is decidedly critical of Beatty, both for his handling of the 5thBS and for his tolerance of the inefficiencies of his signals officer, Ralph Seymour.²⁴ Gordon is equally critical of Evan-Thomas for his failure to demonstrate initiative at key moments against Hipper's scouting fleet, a manifestation of the same centralising philosophy of his mentor, Jellicoe.²⁵ On the other hand, Gordon argues that by the time of Jutland Jellicoe could not have done otherwise given the Victorian command philosophy he had imbued himself and inculcated in his forces. He was one of a generation of 'signals junkies'.²⁶ This philosophy itself generated the 'narrow range of tactical options he had made available to himself'.²⁷

From this can be detected four interrelated characteristics that should be present in any analysis of RN C2 at Jutland:

- British C2 at Jutland displayed too small a number of modes of exercising C2.
- British C2 at Jutland exhibited too little variation in behaviour over the entire battle.
- British C2 at Jutland was too introspective, too little concerned with the adversary.
- British C2 at Jutland exhibited too little command, too much control.

Can we see these properties through the lens of the C2 state space model? The answer is a definitive yes.

Looking at the first point, by far the 'busiest' C2 plot according to our analysis occurs in Phase 3 (see Figure 5) with some 11 features out of a total possible space of 276 distinct states. This represents a state usage of less than 4 per cent. But most of the daytime phases exhibit typically fewer states. This is not a statement about limitations of technology for signals; this is about how adept the participants in the British C2 system were in using the degrees of freedom available to them.

On the second point, the similarity from phase to phase of the plots is manifest not just in the positions of peaks but, roughly, the relative sizes of them for the daylight phases (1-3, 5 and 9). Phase 4 (see Figure 6) shows somewhat higher peaks, and yet the biggest difference is in peak A which is 20 per cent higher than in the previous phase. However, this peak is concerned with internal coordination despite this being the only period in which the two main fleets directly confronted each other. Could these profiles have looked different? For example, the relaxing of central control to allow individual divisions to seek opportunities against the adversary may have seen a variety of follow-on behaviours, from defensive to aggressive, as different components of the HSF potentially may have come into range. Signals directly concerned with the adversary would then have issued within divisions as localised engagements ensued. These behaviours would be correspondingly reflected in very different sets of peaks in the C2 state space, primarily increasing type-F peaks as seen in Figure 3. Again, the point is not to judge Jellicoe through this lens but to confirm that the existing judgements can be visualised through this C2 state space model.

This aspect can be further examined by extending the analysis beyond the strict boundaries of the battle to the 24 hours leading up to the engagement (during which the both fleets had proceeded to sea). A cursory examination of the signals data certainly suggests the C2 state space will not be very different: copious move orders and information about internal fleet dispositions. For example, between 0800-0930 on 31 May, well after the coordination of the RN fleets after departure from their moorings, 107 signals are recorded in *Official Despatches*, which is 88 per cent of the volume during the run to the north. In saying 'the volume of traffic expands to meet capacity', Gordon implies that the Grand Fleet had saturated its signalling capacity by the time Jellicoe had encountered the adversary.²⁸ This observation in the Jutland data leads to conjecture that by the time of the engagement between the main fleets at Jutland, the British had reached a state of C2 'equilibrium' around its need for internal coordination.²⁹ This implies that the British had exhausted their degrees of freedom in state space; Jellicoe had no more C2 'room to move' as much as a consequence of the limited tactical choices circumstances presented to him as of the C2 philosophy he had chosen for himself and imbued in his forces.

The third point, introspection of the C2, is evident in the dominance of features in the top right hand quadrant of the diagrams, for example Phase 3 (see Figure 5) where the Grand Fleet deploys. By far the most significant structure related to the adversary occurs in Phase 1 (see Figure 3) where Beatty's BCF was fully, some suggest even recklessly, engaged with Hipper's scouts. This is consistent with Beatty being of the school that believed that flag-officers should 'respond to the ebb and flow of the action', something he instituted in revisions of the Grand Fleet Battle Orders (GFBOs) after he succeeded Jellicoe to command of the Grand Fleet.³⁰

The final point, the excess of control over command, is manifest through the feebleness of structures at the extreme left and right fringes of the C2 state space. Consider that Beatty's 'insubordination' in proposing that his commander should follow him against the enemy, as an example of command in the sense adopted from Pigeau-McCann, may have led to greater flexibility in divisions seeking out their opponents that in turn will have given opportunity for more signals to engage with the enemy. Arguably then more command on the one side (own forces) creates opportunities for more command over the adversary.

Put altogether, to the degree that the verdict is the RN C2 system at Jutland was decidedly unhealthy, it is possible to hypothesise the shape of a C2 state space of a *healthy* system:

- A greater coincidence of peaks will be exhibited since many C2 states will be concurrently occupied by the various actors within the system.
- Over shifting periods of time C2 state space patterns will change significantly in accordance with changes in the adversary behaviours, manifesting, in the C2 state space, Ashby's Principle of Requisite Variety.³¹
- Structures will appear in larger numbers at the fringes of the C2 state space characterising the exercise of command both in the orders from commanders to change structures and activity, and by subordinates in their exercise of initiative.

Final validation of this model requires subjecting it to several different historical engagements, including to some where the verdict of history has judged the C2 to have been successful and decisive in the outcome. However, a first step beyond this work is to treat the German signals at Jutland within the same approach insofar as the Germans did adopt more aggressive tactics and a decentralised command philosophy.³² A number of English translations of selections of these German signals have been published, for example the *German Official Account* published by the British Admiralty in 1926 and recently re-published by Tarrant.³³ Though not nearly as complete as *Official Despatches*, this compilation does offer a viable statistical sample for such an analysis. However, it would be wrong to compare any such analysis too closely to the results presented here for the British signals.

Conclusions: Applying the unified C2 model to the Modern Era

This paper has presented a model for C2 that unifies a diversity of existing definitions and enables and captures the universal lesson of history that C2 is a creative and shifting tension across four poles: from ourselves to our adversary, from our requirement to act but to our need to question in order to feed information into decisions about our actions.

This model is offered, in the first instance, as an analytical device that keeps before commanders and staff in a single dialectical whole the diversity of C2 concerns before them. At any instant in time, naturally, it is impossible for one individual to maintain an eye across the four poles of this C2 model. But over time each of the four poles must be subject to attention. One suspects that the great commanders of history intuitively understood these tensions and knew when and how to change their state and that of their C2 system according to the dynamism of the external environment, when to focus internally, when to cast their eye upon the adversary, when to decide and when to reflect and ask the right questions.

Beyond the making explicit of what is – for military practitioners – implicit, this model serves three contemporary purposes. In the pre-deployment stage of an operation, even the simplest form of the C2 state space in Figure 2 serves as a device for commanders and staff to consider the following questions: how can I, over the duration of an upcoming operation, act across the whole C2 state space? Under which circumstances will I need to act in different parts of the space? Is the infrastructure in place to enable myself to attain every state in this space? Before and even after Jutland, Jellicoe was unable to recognise the fallibility of a basic tenet of his GFBOs, ‘opposing fleets on straight courses’, and therefore could not have conceived the failure of his C2 system.³⁴ Accepting Moltke’s truism that ‘no plan survives contact with the enemy’, the proposed model can lead to formulations of back-up plans for when the primary C2 system fails.³⁵ At the very least, imbuing the model in subordinate staff can lead to the understanding that, in their own way, they too can exercise a form of command and must know how to exploit all the degrees of C2 freedom in the absence of direction from a superior.

The C2 state space mode is naturally invaluable for immediate post-action review of an operation much as it has been used to analyse the Battle of Jutland here. Modern computing power can speed up – using digitally recorded data – and expand the form of analysis conducted here, though to reiterate, this analysis of Jutland has been done manually in order to discover the very C2 model proposed.

More boldly, the C2 state space model offers a basis for a real time representation of the C2 system in an ongoing contemporary operation through monitoring and cataloguing of live signals traffic. Certainly, modern technology enables rich and voluminous communications between geographically distant C2 nodes. Modern machine learning and natural language recognition and processing are beginning to offer the real-time analysis capability of even specialist/technical communications.³⁶ Through the harness of this C2 state space model, visualisations of the C2 state, such as the plots generated 95 years after the Battle of Jutland, can be compiled by computer systems and made available to commanders and staff in real-time throughout an operation. One of the issues raised earlier is that of scrambled messages or messages not receiving a response. It is certainly not beyond the capability of a modern digital computer to record and track in real-time the status and clarity of information requests, (corresponding

to negative values of the Sense-Decision Making axis) to send prompts to senders or recipients to rectify omissions and to subsequently update the status of the C2 state space accordingly. To the extent that, with further research, it will be able to propose definite metrics for the patterns of a healthy C2 system through the lens of this model, commanders can intuitively make judgements (or have computers offer advice for them) whether, for example, attention has been too introspective for some period of time, or that too much or too little command is being exercised or even that the C2 states are fluctuating too fast for any prudent coordinated action.

The benefit of future research of this C2 model over many and varying case studies is that eventually the verdict on an operation may no longer need to emerge first from the sifting efforts of historians but through the filter of this C2 state space. At that point in time, like the classification of chemicals in the periodic table, the model ceases to be descriptive – of operations past – but predictive for operations future.³⁷

Martin van Creveld concludes *Command in War*, his masterpiece on command, with the sage observation:

Far from determining the essence of command, then, communications and information processing technology merely constitutes one part of the general environment in which command operates. To allow that part to dictate the structure and function of command systems, as is sometimes done, is not merely to become the slave of technology but also to lose sight of what command is about.³⁸

Command is about the human. The model proposed captures some of that essence, of the spectrum between commanding, controlling, sensing and acting in a sufficiently simple model that can be used intuitively by a human and built into future command systems – and bring such machine systems a little closer to reflecting that very essence of command.

Acknowledgements

I am indebted to my colleague Tony Dekker, for guidance in using his network analysis tool, CAVALIER, by which the network diagram was prepared, and Mark Burnett for an initial reading of this manuscript. I am grateful to the staff of the Sea Power Centre - Australia for constant support through this work, particularly David Stevens, Greg Gilbert and John Perryman. Finally, I thank the forthrightness and encouragement of RAN officers Rear Admiral James Goldrick, RAN, Rear Admiral Peter Jones, RAN, Commodore Peter Leschen, RAN, Commodore Jack McCaffrie, RAN

(Rtd), and Commander Chris Bourne, RAN, as well as historian Dr Nick Lambert for their insights when this work was first presented at a seminar at the Sea Power Centre - Australia in 2009.

Notes

1. In the air environment the term used is 'superiority' but the implications of having air superiority are similar to the achievement of sea command: one can use the air/sea physical environment with complete freedom.
2. Great Britain Admiralty, *Battle of Jutland, 30th May to 1st June, 1916, Official Despatches with Appendixes*, His Majesty's Stationary Office, London, 1920.
3. Wayne P Hughes, *Fleet Tactics and Coastal Combat*, (2nd edn), Naval Institute Press, Annapolis, 2000, p. 84.
4. Andrew Gordon, *Rules of the Game: Jutland and British Naval Command*, John Murray, London, 1996.
5. Michael A Palmer, *Command at Sea: Naval Command and Control since the Sixteenth Century*, Harvard University Press, 2005
6. Hughes, *Fleet Tactics and Coastal Combat*, p. 86.
7. Winston S Churchill, *World Crisis*, 6 vols. , Thornton Butterworth, London, 1923-27.
8. Geoffrey Till, *Seapower: A Guide for the 21st Century*, (2nd edn), Routledge, London, 2009, p. 133.
9. AL Barabasi, R Albert, 'Emergence of Scaling in Random Networks', *Science*, vol. 286, no. 5439, 1999, p. 509; and R Albert, AL Barabasi, 'Statistical Mechanics of Complex Networks', *Reviews of Modern Physics*, vol. 74, 2002, p. 47.
10. Alfred T Mahan, *The Influence of Sea Power upon History*, Sampson Low, 1890, Chap. XIV.
11. Julian S Corbett, *Some Principles of Maritime Strategy*, Pt. II, Chap. I.
12. Carl von Clausewitz, *On War*, Chap. 1, Para. 2.
13. Nicholas AM Rodger, *The Command of the Ocean*, Allen Lane, London, 2004, p. 583.
14. JS Lawson, 'Command and Control as a Process', *IEEE Control Systems Magazine*, March 1981, pp. 5-12.
15. Hughes, *Fleet Tactics and Coastal Combat*, p. 215.
16. Martin van Creveld, *Command in War*, Harvard University Press, 1985, p. 270; Irena Ali, 'Coexistence or Operational Necessity: The Role of Formally Structured Organisation and Informal Networks during Deployments', submitted to the *16th International Command and Control Research and Technology Symposium*, Quebec City, Canada, June 21-23, 2011.
17. Ross Pigeau & Carol McCann, 'Reconceptualising Command and Control', *Canadian Military Journal*, Spring, 2002, p. 53.

18. Pigeau et al, 'Reconceptualising Command and Control', p. 56.
19. Palmer, *Command at Sea*, p. 233-235.
20. John Perryman, private communication, 2009.
21. Arthur Marder (ed), *Fear God and Dread Nought: The Correspondence of Admiral of the Fleet Lord Fisher of Kilverstone*, 3 vols, Jonathan Cape, 1952-59.
22. Gordon, *Rules of the Game*, pp. 155-192.
23. Gordon, *Rules of the Game*, p. 567.
24. Gordon, *Rules of the Game*, pp. 68, 93-97 and 542-543.
25. Gordon, *Rules of the Game*, pp.150-151.
26. Gordon, *Rules of the Game*, p. 355.
27. Gordon, *Rules of the Game*, p. 565.
28. Gordon, *Rules of the Game*, p. 582.
29. Alexander Kalloniatis, 'Communications, C2-Entropy and Maritime Operations', Paper delivered to the 2007 King-Hall Naval History Conference.
30. Gordon, *Rules of the Game*, p. 529.
31. Ross W Ashby, *An Introduction to Cybernetics*, Chapman-Hall, 1957.
32. Palmer, *Command at Sea*, p. 250.
33. Royal Navy, *The Battle of Jutland (German Official Account)*, Admiralty, 1 May 1926; VE Tarrant, *Jutland: The German Perspective*, Arms & Armour Press, 1995.
34. Gordon, *Rules of the Game*, p. 567.
35. Translated in Daniel J Hughes (ed), *Moltke on the Art of War: Selected Writings*, Presidio Press, New York, 1993, pp. 45-47.
36. Wray Buntine, Marko Grobelnik, Dunja Mladenic & John Shawe-Taylor, 'Machine Learning and Knowledge Discovery in Databases', *European Conference, ECML PKDD 2009*, Bled, Slovenia, 7-11 September, 2009, Proceedings Part I, Springer, 2009.
37. Michael Riordan, *The Hunting of the Quark*, Simon & Schuster, New York, 1987.
38. van Creveld, *Command in War*, p. 275.



A Women's Royal Australian Naval Service (WRANS) commemorative window, unveiled at the Royal Australian Naval 75th Anniversary ceremonies in 1985, was created after a committee was established by Jess Doyle, one of the original 14 WRANS members.

The Women's Royal Australian Naval Service

Ms Kelly Christopherson

When one considers the contribution made by women to the RAN it is important to distinguish between women who served in different branches of the RAN at different times. This article will focus on the women who served in the Women's Royal Australian Navy Service (WRANS) during their initial and secondary phases (1941-47 and 1951-85 respectively). While not diminishing the work of those women who served in other female branches of the RAN, such as the Royal Australian Navy Nursing Service (RANNS), the WRANS was the largest of the RAN's female branches, and had the most impact on the future of the RAN as a whole.

This article also seeks to recognise the significant and positive contributions that the WRANS, and women as a whole, have made throughout the history of the RAN.

Genesis of the WRANS

Unlike the Royal Navy (RN), where women had served as members of the Women's Royal Naval Service between 1917 and the end of World War I (WWI), the concept of a women's service in the RAN took considerable time to germinate and gain the approval of both the Australian government and Australian Commonwealth Naval Board (ACNB).

Women were not introduced into the RAN until 1941, and then only due to critical labour shortages. However, prior to the outbreak of World War II (WWII), there were a number of volunteer organisations that had formed in response to the impending threat of war. One such organisation was the Women's Emergency Signalling Corps (WESC).

The Women's Emergency Signals Corps

The WESC was established six months before the outbreak of WWII by Florence MacKenzie to train female volunteers in the skills of Morse code and wireless telegraphy. MacKenzie, quite rightly, believed that telegraphy would play a crucial part in any Australian war effort, were hostilities to begin.

MacKenzie pushed the boundaries at a time when a woman's duties rarely extended beyond the domestic realm. She would later be heralded as 'a remarkable woman ... who made a tremendous contribution to Australia's war effort.'¹ She graduated as the first female electrical engineer in Australia and held a Radio Amateur Operator's Licence.

The WESC proved extremely popular, and by the beginning of August 1940, there was a waiting list of 600 women who wished to join.² Those who joined did so at their own expense, paying to cover the costs of instruction and for the provision of uniforms. Many

of the volunteers had day jobs and gave up their spare time in the afternoons and on weekends to undertake training. For these women, membership in the WESC provided an opportunity to actively participate in the war effort, and they took their duty to learn and educate others in the skills of Morse code very seriously. News of the telegraphy classes spread quickly, and students of both sexes streamed in. Soon, MacKenzie's graduates were not only teaching men from the Australian armed services, but also men from the merchant navy, Royal Indian Navy and later, American serviceman.

MacKenzie took great pride in the quality of telegraphists she was producing, and wrote to the Minister of the Navy, Rt Hon William Hughes, CH, KC, MP, suggesting that they could be employed in the RAN. Although the letter went unanswered, MacKenzie was undeterred and sent her request directly to the ACNB in Melbourne. Her determination eventually paid off when the Director of Signals and Communications, Commander JB Newman, RAN, agreed to conduct an examination of a group of volunteers. The subsequent success resulted in 12 telegraphists being accepted for naval service as an 'experimental bunch'.³

Yet, the government and the ACNB remained reluctant to allow women into the RAN. Hughes went so far as to suggest to the prime minister that 'the employment of females in the navy is undesirable.'⁴ Nevertheless, formal approval was forthcoming on the condition that no publicity should be made of this 'break with tradition.'⁵ An agreement to trial 14 women followed, 12 of whom were employed as telegraphists and two as cooks. All were posted to the RAN Wireless/Transmitting Station in Canberra on 28 April 1941.

The Women's Royal Australian Navy Service, 1941-47

Because the RAN remained hesitant to formally establish a separate women's auxiliary, the first women enlisted for naval service in April 1941 were not recruited through any official policy to actively employ women. Consequently, numbers were initially limited to the first recruits from the WESC. Billie Donoghue, one of the original 14 women recruited, recalled:

Three months after being absorbed into the working complement of Harman Wireless Transmitting Station, we were still being 'disowned' by the Minister for the Navy, who denied in Parliament that there were any women in the RAN.⁶

Over the next six months, the service expanded slowly with only an additional nine women being accepted.⁷ Even after the Australian Women's Army Service (AWAS) and the Women's Australian Auxiliary Air Force (WAAAF) had been established, the RAN administration remained reluctant to embrace the establishment of a women's naval auxiliary.

All this changed with the war's expansion into the Pacific theatre and the need to relieve more men for sea duty. On 24 July 1942, a Navy Office conference agreed to institute WRANS to help with increased wartime demands for naval personnel. The conference agreed that 580 personnel would be recruited; 280 as telegraphists and 300 for general purposes.⁸ On 1 October 1942, the original 14 women were offered enlistment under the provisions of the *Naval Defence Act 1910*. From that point on, women began to be enlisted on a larger scale, also taking on skilled jobs as visual signallers, writers, cooks, messengers and motor transport drivers.⁹

The expansion of the war time WRANS

Throughout the war years, recruitment for the WRANS was conducted on the basis that employment within the service was temporary.¹⁰ This did not detract from the lure of serving, since, for most women who joined, the experience was not about pursuing greater equality or opportunity, but rather it was about contributing to the war effort.¹¹ Indeed, the women soon proved themselves highly competent and valued workers, and demands for their skills naturally increased. At the end of 1942, a large scale recruiting campaign began, resulting in the service growing at a much faster pace. The RAN was ill equipped to manage this number of women. To address the issue, a decision was made to establish an officer corps within the WRANS, which, once trained, could more effectively oversee the rapid expansion.

On 18 January 1943, the first course for WRANS officers began at Flinders Naval Depot, Victoria (HMAS *Cerberus*).¹² The first class comprised 16 women, 9 of whom were selected from ratings already serving and 7 others who were recruited from civilian occupations.¹³ All of the initial class of officers successfully graduated and were appointed in the rank of third officer. These officers then assumed the responsibility for the discipline, administration and welfare of the WRANS as well as performing other important roles such as confidential cipher and bookwork.¹⁴ A new rank structure was also established (see Table 1).

WRANS Ranks	Permanent Naval Force Ranks
Chief Officer	Commander
First Officer	Lieutenant Commander
Second Officer	Lieutenant
Third Officer	Sub-Lieutenant
Chief Petty Officer	Chief Petty Officer
Petty Officer	Petty Officer
Leading Wran	Leading Seaman
WRAN	Able Seaman

Table 1: WRANS and Permanent Naval Force equivalent ranks

The first female to attain the rank of Chief Officer was Sheila McClemons. Director of the WRANS since May 1944, McClemons was greatly respected among both male and female members of the navy as a fair, practical and compassionate woman. She fought hard for better pay and conditions at a time when women's rights were considered secondary to the war effort.

By the end of WWII, over 3000 women had enlisted in the WRANS, 109 of whom had graduated as officers. Over 2500 women were serving when peace was declared, making up 10 per cent of the total naval establishment.¹⁵ Nevertheless, the WRANS numbers remained small in comparison with the AWAS (18,066) and WAAAF (18,680).¹⁶



Sheila McClemons, the first female to attain the rank of Chief Officer



By 1943, the more practical khaki uniforms had been introduced throughout the RAN and WRANS.

Conditions of Service

When women first entered the RAN in 1941, they enlisted under National Security Regulations by application through the Women's Voluntary Registration for National Service. The WRANS was not yet considered an Auxiliary Force, so from a legal perspective the women were considered civilians, and thus not subject to the *Naval Discipline Act 1866 (Imp)*. Notwithstanding this, the initial entry were administered as naval members and treated quite differently to civilians employed by the navy.¹⁷

From 1 October 1942, members of the WRANS enlisted for service under the *Naval Defence Act* as members of the Commonwealth Naval Forces. Those members already serving were offered the alternative of enlistment under the act or discharge. There is some debate concerning the official date for the inception of the WRANS due to this change. Nevertheless, noting the conditions placed upon those women recruited in April 1941, it is generally accepted that this marks the formation of the WRANS. The date is reflected on a commemorative window in the Garden Island Memorial Chapel, Sydney, which pays tribute to all who served in the WRANS during both war and peace.

On 28 April 1941, the first 14 women arrived at the RAN Wireless/Transmitting Station in Canberra accompanied by MacKenzie.¹⁸ Accommodation was among their first concerns, and they soon discovered that four cottages were assigned to them. Three of the cottages provided sleeping quarters, while the fourth was used as a small mess and as sleeping quarters for the two female cooks: Elsie Collis and Shirley Drew.¹⁹ All of the women wore their WESC uniforms to begin with, as there was no approved female naval equivalent.²⁰

The ‘Wrans’ as they became known, generated much interest and at the administrative level were received with some apprehension as nobody really knew their capabilities. Before beginning work, it was explained to the women that if they could not cope, then the WRANS concept might not be pursued.²¹ With that in mind, the women set about proving their abilities and earning the respect of their male counterparts.

As situations peculiar to the new female recruits arose, solutions were created ‘along the way’. Reflecting upon her arrival at HMAS *Harman*, Marion Stevens recalled, ‘at first we had no rules ... gradually the rules and regulations built up around us, as they were found necessary’.²²



Women working in the wireless telegraphy room at HMAS Harman in 1941.



*WRANS members at HMAS Harman in 1944.
(l-r. Back row: Marion Stevens, Judy Alley, Joan Cade, Frances Provan.
Front row: Denise Owen, Shirley Drew, Joan Hodges, Billie Thompson)*

One minor issue was how to awaken the new female recruits. Traditionally, male members of the RAN relied on a member of the duty watch to physically stir them prior to going on watch. However, in the case of women this proved unworkable as their quarters were strictly out of bounds to all males.²³ A remedy was found by equipping each of the women's cottages with alarm clocks to negate the need for male members to enter their quarters.

McKenzie had always required her students to operate perfectly, and transmit/receive Morse code at a rate of 22 words per minute. Therefore, when the women began their first watch at the RAN Wireless/Transmitting Station, it was little wonder that their male counterparts were shocked by their skills. Any initial apprehension felt towards the women ended immediately, and they soon earned the respect of the permanent naval staff.

After the success of the initial intake, the RAN sought to increase the number of women entering the Service. The RAN also expanded the jobs available to women, and created positions for them in other naval bases around Australia. As a result, the experiences of the women varied greatly depending on which branch they served in and where they were stationed.

Work

Since women were not permitted to serve at sea, they were limited to shore based employment. Notwithstanding this, there was still a wide variety of work available to them and, by 1945, they had successfully integrated into the workplace.²⁴

Before commencing work in their chosen field, all recruits undertook a new entry course in which they learned how the RAN was administered, naval ranks and ratings, naval customs and traditions, and what would be expected of them as serving members of the WRANS.²⁵ The next stage of training was dependent on whether their chosen branch required specialist training. If they were being placed in a specialised category such as communications, they would undertake additional training to provide them with the requisite skills.

The branch in which they served shaped the women's experiences in the WRANS. For those rated telegraphists, the nature of the work could often be intense, particularly in times of heightened operational activity. They were responsible for sending and receiving signals from all over the world, the content of which was routinely classified or highly sensitive.²⁶ They were also involved in the decryption of Japanese signal intercepts.

Individual experiences of those who worked at *Harman* vary, but none could deny the extreme pressure under which the women worked. In December 1941, as a 19-year-old telegraphist, Jess Prain found herself responsible for communicating the information that Australia was at war with Japan to the RAN fleet. Under these conditions, they were very aware that if they made a mistake it could have fatal consequences.²⁷

Within a few months of starting at the RAN Wireless/Transmitting Station in Canberra, the women were considered by many to be indispensable, having taken over many of the communications centre operations. For the most part, they were accepted, although there was still reluctance in some quarters of the navy to expand the WRANS further.

Towards the end of the war, Rear Admiral Sir Victor Crutchley, RN, the former Admiral Commanding the Australian Station, recognised the role the WRANS had played when he said 'the Navy relied on you. You didn't let us down.'²⁸ This sentiment was backed up by the WRANS wartime director Sheila McClemons who felt that any resistance the women faced from men when entering the navy was short-lived. McClemons believed that:

The resistance might come perhaps from a man who had spent all his life in the Navy and resented the intrusion of women. He often, once he had found women working under his control, became their most firm supporter.²⁹



Evonne Linton, Pat Ricketts, Val Gascoyne (front) and Marge Green. The WRANS took it upon themselves to maintain their cottages and tend to the surrounding gardens. A surfeit of supplies due to wartime demands was supplemented by growing vegetables and raising chickens.

Although the women often worked under difficult circumstances, there was time during their off-duty hours to pursue recreational activities such as bike riding, hiking, sport, picnics, fishing and holding concerts and dances in recreation halls.³⁰ The women serving at HMA Ships *Moreton*, *Harman* and *Rushcutter* produced magazines that were distributed throughout the WRANS as a source of keeping in touch with one another.³¹

For many women, it was their first time living away from home, and the service life offered them a unique social experience. Living and working in such close proximity, sharing the same experiences, values and goals saw many form bonds that lasted a lifetime. Reflecting on her time in the WRANS, Jean Nysen recalls fondly the camaraderie she experienced:

The women worked together and took great pride in restoring and bringing to life their living quarters. Great effort was expended in order to create a homely living environment that the women could call their own, and the cottages were kept in excellent condition.³²

The Coast Watcher

One of the most unusual experiences of an Australian woman during the war was that of Ruby Boye. Boye lived in Vanikoro, Santa Cruz in the Solomon Islands with her husband who was the manager of the Kauri Timber Company. When the war broke out, Boye could have left Vanikoro when the civilian population was evacuated, but she chose to remain with her husband. The timber company had its own wireless broadcasting set and Boye, believing that it may prove useful to the Allies, set about learning to work it. Boye taught herself Morse code from a book and was soon transmitting weather reports and other useful intelligence in voice code to Australia.³³

It was through this work that Boye became Australia's only female coast watcher. She was eventually appointed a member of the WRANS after a fellow coast watcher in New Guinea was tortured and murdered by Japanese troops. The hope was that she would be treated as a member of the armed forces if she were captured. Boye was commissioned as a honorary officer at age 51 by the supervising intelligence officer in charge of the coast watchers, and issued with a WRANS uniform, which was covertly delivered to her by parachute drop.³⁴ Boye's experience as a coast watcher and in the WRANS was unique, and the important role that she played in supporting the Allies during the war was recognised in 1943 when she was awarded the British Empire Medal by King George VI.

Experiences

Women serving in Canberra or Sydney had very different experiences to those women posted to Darwin towards the end of the WWII under Third Officer Francis Provan. At that time, Darwin was a garrison city where very few civilians lived.³⁵ Due to its geographical position, Darwin was closer to the realities of war. The women stationed there experienced the last air raids on Darwin shortly after their arrival, when a large-scale air raid took place not far from their living quarters in the RAN hospital. Raids of this sort were not uncommon and Darwin bore the scars of them as testament to its isolation and vulnerability. The Japanese had conducted over 60 air attacks on Darwin before the WRANS arrival leaving much of the city in ruins with shipwrecks littering the harbour.³⁶

Following the cessation of hostilities, the WRANS assisted with the landing of former prisoners of war liberated from Singapore. Many of the women were confronted with 'skinny and starved' prisoners of war who landed with few clothes or possessions, a stark reminder of the realities of war.³⁷

Darwin's geographical location and climate also presented many challenges, consequently, WRANS postings were usually limited to 12 months.³⁸ Women were again posted to Darwin during the post-war years. When Cyclone Tracy swept through the city in 1974, women stationed at HMAS *Coonawarra* were among those who relayed updates and situation reports to the rest of Australia. The record of communications documented by the women on duty is considered by many to be the most reliable account of the events that took place that night.³⁹ After the damage Cyclone Tracy wrought, a decision was made to evacuate all women and children from Darwin. However, many WRANS chose not to leave, and stayed behind to work alongside their male counterparts in the RAN Fleet during the relief effort, and clean up of the city.⁴⁰

The experiences in other capital cities were by no means easier than in posts like Darwin, just different. In June 1942, seven women from *Harman* and two from Melbourne were transferred to the US Navy intercept station in Moorabbin, a southeastern suburb of Melbourne. Some of the US Navy petty officers who operated the station had escaped from Corregidor in the Philippines, and been transferred to Australia by submarine with nothing more than the clothes on their back. The station was established to intercept and receive Morse code transmissions from Japanese forces, and the five women trained as telegraphists were given a crash course in US Navy communications procedures.

One of those women was Nourma Gascoine, who joined the WRANS in 1941 as a telegraphist from MacKenzie's WESC. She recalls that:

We worked all night ... and were so busy we could not look sideways. We just worked, ate and slept around the clock adapting to the eight, nine and ten hour watches. These hours were even increased during the battle operations.⁴¹

Conditions for the women stationed at Moorabbin were tough. Some felt that the Americans were unhappy about working with 'a bunch of girls' and eight WRANS endured a bout of typhoid fever.⁴² However, as the women demonstrated their skills, they once again proved their worth and soon earned the respect and friendship of their American 'cousins.'

The gains made by women during the war were short lived. Throughout WWII, the WRANS had gained both respect and improved conditions. However, when the war ended the WRANS soon disbanded. The official end came in 1947, and the last serving member discharged in 1948.

Concerns at that time were centred on providing returning servicemen with work, and the ACNB expected that they would fill the jobs previously held by women. For many women this was not a disappointment. As Nysen recalled, 'all we wanted to do when the war ended was to go back to our homes'.⁴³ For Jean, her participation was something to be extremely proud of, 'we just wanted to survive as a nation'.⁴⁴

Women's National Emergency Legion

Many Australian women participated in the war effort under the control of the RAN without officially joining the WRANS. One such organisation was the mine-watchers who were members of the Women's National Emergency Legion (WNEL). The WNEL trained women in first aid, home nursing, Morse code, flag signalling, car mechanics and driving.⁴⁵ The mine-watchers were a WNEL subgroup under the control of the RAN. The mine-watchers' main priority was providing the early detection of enemy submarines and aircraft.

Mine-watchers were dropped at the mouth of the Brisbane River by the RAN were also responsible for making reports on shipping, taking note of every ship which entered the Brisbane River and noting how close to the shoreline each vessel passed.⁴⁶ Although the mine-watchers were under the control of the RAN, their bunkers were not a part of the RAN's controlled bases or land. Most of the posts were located in private backyards and houses along the river. Each shelter contained a direct telephone line to RAN headquarters and the mine-watchers were sworn to absolute secrecy concerning their activities.⁴⁷ The women who participated in the mine-watchers did so voluntarily, and did not receive a wage from the RAN, even though they were under their control. Although the mine-watchers were not officially acknowledged as volunteering for the RAN they wore a WNEL uniform with a mine-watchers emblem on their arm. The armband was navy blue with an anchor and the word 'Minewatcher' printed in red.



Two mine-watchers at their post on the Brisbane River in 1942. The mine-watcher on the right used the bearing-plate to locate the position of suspected mines (AWM)

The Women's Royal Australian Navy Service, 1951-85

Not until Australia's Cold War commitments again put pressure on labour, did the Government look more favourably on the employment of women in the Services. On 18 July 1950, the Minister for the Navy, Hon Josiah Francis, MP, announced the decision to re-establish the WRANS. The task of setting up the preliminary organisation was entrusted to one of the original 16 officers appointed in February 1943, Margaret Curtis-Otter.⁴⁸ Unable to fulfil the role of Director due to a rule preventing the enlistment of married women, she pursued the task of resurrecting the WRANS in a civilian capacity. Blair Bowden, another of the original WRANS officers, eventually filled the role of Director on 23 December 1950.⁴⁹ The WRANS was formally inaugurated in 1951 and began actively recruiting. The response to the campaign was overwhelming. Within the first two weeks, the WRANS received 1500 applications to fill the 250 available billets.⁵⁰

Restrictions still applied to the conditions under which females could be employed. Wartime WRANS re-enlisting did so on the understanding that their previous service would be disregarded in determining their rates of pay and advancement.⁵¹ Women still received separate training, could only occupy positions specifically designated for women and could not serve at sea.⁵² Moreover, reflecting societal values at the time, women would be discharged on the grounds of marriage or pregnancy.



WRAN officer candidates at HMAS Cerberus in 1952

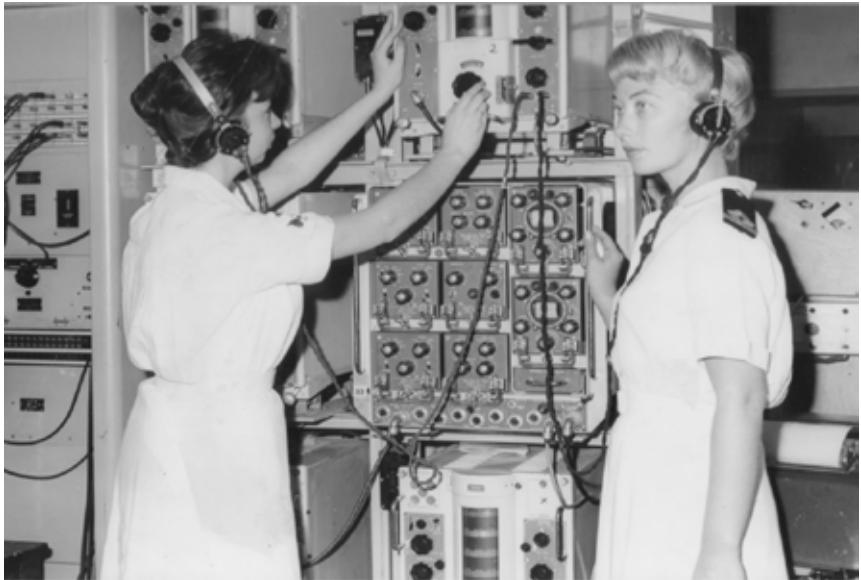
In this constrained atmosphere, Bowden and Curtis-Otter found it almost impossible to implement effective change. Both argued for better rates of pay to keep up with the private sector, to have the rule that women are discharged upon marriage thrown out and for a larger number of women to be recruited to strengthen the foundations of the WRANS. As Director, Bowden made numerous requests for changes to be made to the conditions of service to improve advancement opportunities and try to attract the most talented and qualified female recruits. Bowden was extremely passionate about the need to expand the service. In 1953 she wrote, 'it is my considered opinion that unless the service is expanded it will eventually dwindle away from sheer lack of incentive to live'.⁵⁴

The WRANS intended to assist in overcoming labour shortages by releasing more trained male personnel for service at sea through what became known as the 'Wran in, a man out' policy. The policy never intended to provide women for sea service. Moreover, following the wartime policy, no women were posted overseas. Nevertheless, over the next decade attempts continued to improve conditions with gains gradually being made. In December 1959, the WRANS was granted permanent status, and in

1960, the entry age for the WRANS was reduced from 18 to 17. Because of the service restrictions, the government thought that the younger entry might help overcome the 'short life span' of women in the Service.

Further improvements came in the 1960s and 1970s in response to changes in Australian society and the growth of the women's liberation movement. Of particular importance was the Australian government's decision in 1966 to abolish the bar on married women remaining permanent employees in the Commonwealth public service. This had the obvious effect of increasing the ability of women to control the length of their careers and hence, their opportunities for advancement. In 1969, this was extended to the RAN. In 1974, the rule of automatic discharge upon pregnancy was also removed.

This was followed by International Women's Day in 1975, when Prime Minister Gough Whitlam directed the Department of Defence to investigate new employment opportunities for women.⁵⁵ The eventual result was a recommendation that women should be permitted to serve at sea, although not in combat roles.⁵⁶ In 1978, women received equal pay with men.⁵⁷



Communicators at HMAS Harman

In an environment in which the public and government had both made clear their desire for greater female equality, the government decided that separate women's services could no longer be sustained. In September 1984, all women who joined the RAN were informed that they would be liable for sea service and the impracticalities of having separate male and female services became apparent. Consequently, the government abolished the separate women's services. In 1985, the Naval Forces (Women's Service) Regulations were repealed, with the WRANS integrating within the RAN to form a united service.

Women's Royal Australian Naval Nursing Service

Initially hesitant to establish a separate women's nursing service due to the RAN having their own male sick-berth attendants, the RANNS was officially inaugurated on 1 October 1942 as a separate women's auxiliary to the WRANS.⁵⁸ Matron Annie Laidlaw was appointed in control of the new service, an appointment she was eminently qualified for having seen previous overseas service in the Australian Army Nursing Service during WWI.

At first, the RANNS numbered only 23 nursing sisters across Melbourne and Sydney. This number remained low throughout the war, reaching only 57 by 30 June 1945.⁵⁹ In order to be eligible to enter the RANNS, the nursing sisters were required to have at least a year of registered nursing experience. Once accepted into the RANNS the nursing sisters held the equivalent rank of a sub-lieutenant, and on promotion, that of lieutenant.

RANNS basic naval training was similar to that of the WRANS and once completed the nurses were soon going about their naval duties. In Victoria, women of the RANNS worked at the premier naval training establishment, *Cerberus*. It did not take long before they found themselves extremely busy that, when combined with the Melbourne winter, saw many recruits contracting chills and infectious diseases.⁶⁰

In addition to their day-to-day duties of caring for the sick and wounded, the RAN nurses were also responsible for training male sick-berth attendants for duty at sea. As with the WRANS, restrictions were placed on the RANNS that prevented them from serving at sea due to the impracticalities of having women living amongst men on ships. As a result, they served mainly at shore establishments around Australia, relieving the nursing shortage created by male sick-berth attendants who were being drafted to sea.⁶¹ However, some members of the RANNS did serve overseas at shore establishments at Milne Bay, New Guinea.

In 1944, it was believed that Australia's military position in Papua had stabilised to the point that RANNS could be sent there to provide medical treatment to Australian servicemen.⁶² Six RAN nursing sisters were sent to Papua to take over a 40-bed hospital that was later taken over completely by the RAN and refitted to accommodate up to

200 injured servicemen.⁶³ Because of the extreme conditions in Papua, the six nursing sisters who served there were issued with tropical uniforms, which included khaki slacks, long sleeved shirts, army-style boots and woollen socks into which their slacks were tucked into to protect them from mosquitoes, bugs and the mud.⁶⁴

Three RAN nursing sisters got the opportunity to experience life in a naval ship. The first was Sister Cherrie Wilson (sister of the WRANS Director and Chief Officer Sheila McClemans), who travelled to England in HMAS *Shropshire* with other female officers representing the three Services at the Victory Parade in London.⁶⁵ The second was Sister Tame who made a voyage to India in the hospital ship *Manunda*, and who later joined Sister Slattery in HMAS *Manoora* in 1947.⁶⁶

In the post-war years, the RANNS suffered a similar fate to the WRANS, disbanding in 1948. In 1959, a decision was made to employ civilian nurses in naval hospitals, and the growing need for them eventually led to the re-establishment of the RANNS in 1964.⁶⁷



*Superintending Sister E Emms and Sister M Schienkel
tending to a patient at Flinders Naval Depot, Victoria (AWM)*

Conditions of service in the re-instituted RANNS still placed restrictions on where nursing sisters could serve, although a small number were offered the opportunity to serve overseas. On 29 June 1971, Sister Robyn Kingston was the first nursing officer of the RAN to be posted to an overseas appointment when she joined the ANZUK (Australian, New Zealand, United Kingdom) Forces in Singapore.

On 31 August 1984, the first male nursing officer, Sub Lieutenant Villiani, joined the RAN. Because the RANNS was a 'women's' service he was unable to join, and was subsequently enlisted as a special entry officer in the RAN.⁶⁸ The RANNS disbanded in 1985 upon integration with the RAN.

Conclusion

While today the WRANS is no longer required because men and women work together in a unified RAN, it is important to remember the role the WRANS played in Australian naval history. Women have worked hard to earn their place in the RAN and it was often an uphill battle to ensure greater rights and equality. Their motivation for joining, the jobs they were assigned, and their interaction and experiences working with and alongside men all reflect these varied experiences. Although women in the RAN have had to fight along the way to improve conditions for themselves, overall it seems to have been a positive journey. This is not to deny the sexism, discrimination and harassment that some women in the navy have been subjected to, only to say that such experiences do not appear to be the norm. Women have faced unique challenges and continue to rise above them, working with the RAN to continually improve conditions.

The RAN continues to be a popular service for women entering the Australian Defence Force. This is evident by the fact that as of 30 June 2010, the RAN has the highest percentage of women, 18.4 per cent, compared with the Royal Australian Air Force and Army (17.8 per cent and 9.7 per cent respectively).⁶⁹ As of 2011 women can now serve in all parts of the RAN, this is due in no small part to the hard work and dedication of all the women who served in the WRANS.

1941	21 April, a Navy Office letter to the Commodore-in-Charge, Sydney, authorised the entry of women into the Royal Australian Navy (RAN) as the Women's Royal Australian Naval Service (WRANS). On 28 April, the first 14 women arrived at the RAN Wireless/Transmitting Station in Canberra.
1942	1 October, the WRANS was formalised under the provisions of the <i>Naval Defence Act 1910</i> and the full-scale enlistment of over 500 women into the WRANS began.
1943	18 January, the first course for WRANS officers commenced at Flinders Naval Depot, Victoria (HMAS <i>Cerberus</i>).
1945	Sheila McClemans appointed the first Chief Officer of the WRANS.
1947	WRANS disbanded.
1948	The last serving WRANS discharged.
1951	The WRANS re-established.
1959	The WRANS granted permanent status.
1960	The entry age reduced from 18 to 17 years.
1968	12 July, the Women's Royal Australian Naval Service Reserve formed.
1969	Women allowed to remain in the service following marriage.
1974	Pregnancy no longer automatically resulted in being discharged.
1977	Midshipman Erika Jean Yates became the first woman to be admitted to the RAN without first being a member of the WRANS or Royal Australian Navy Nursing Service (RANNS).
1978	Equal pay with men introduced.
1982	The first WRANS officers were permitted to complete full training courses onboard HMAS <i>Jervis Bay</i> .
1984	<i>Sex Discrimination Act 1984</i> passed. In the same year, all women who joined the navy from September 1984 were informed that they would be liable for sea service.
1985	WRANS regulations were repealed and the WRANS and RANNS were abolished.

Table 2: The Women's Royal Australian Naval Service timeline

Notes

1. Talk given by Jess Doyle to Waverly Rotary Club, May 1984.
2. Kathryn Spurling, 'The Women's Royal Australian Naval Service: A Study in Discrimination 1939-1960', MA Thesis, University of New South Wales, 1988, p. 78.
3. Billie Thompson's account of the first Women's Royal Australian Navy Service (WRANS) members having their medical, ANZAC Day 1941.
4. Kathryn Spurling, 'From Exclusion to Submarines - The Integration of Australian Women Naval Volunteers', *Australian Defence Force Journal*, Issue 139, 1999, p. 35.
5. Article provided by WRANS Directorate, 26 January 1971.
6. Billie Donoghue, 'Sound in Wind and Limb-But In Mind?' *Ditty Box*, April 1981. As cited in Kathryn Spurling, 'The Women's Royal Australian Naval Service: A Study in Discrimination 1939-1960', vol. 1, p. 100.
7. Doc 190f Women's Royal Australian Naval Service - World War II. Naval History.
8. Margaret Curtis-Otter, *WRANS: The Women's Royal Australian Naval Service*, Naval Historical Society of Australia, Garden Island, 1975, p. 6.
9. Sheila McClemons, 'The WRANS Grows Up', *HMAS Mk I: The RAN's Second Book*, Australian War Memorial for the Royal Australian Navy, Canberra, 1943.
10. Kathryn Spurling, 'The Women's Royal Australian Naval Service: A Study in Discrimination 1939-1960', vol. 2, p. 196.
11. Shirley Fenton Huie, *Ships Belles: The Story of the Women's Royal Australian Naval Service in War and Peace 1941-1985*, Watermark Press, Sydney, 2000, p. 12.
12. Doc 190f Women's Royal Australian Naval Service - World War II. Naval History.
13. Huie, *Ships Belles*, p. 29.
14. Huie, *Ships Belles*, p. 223.
15. Huie, *Ships Belles*, p. 11.
16. Alfred W Foster, 'The Experience of Women's Employment Board in Australia', *International Labour Review*, 1945, p. 635.
17. Conditions of Service - *WRANS (1941-45) War Service Homes Act*. In addition to civilian requirements, women joining had to: pass a medical; be given a service number; be issued with a WRANS Certificate of Service; wear an identity disc displaying their blood group and religion; have a smallpox vaccination and regular tetanus and typhoid injections; and attend divisions, cleaning stations, fire drills; and salute officers. They also had to wear a navy uniform, carry a gas mask and be on call 24 hours a day.
18. The first 14 WRANS were: Francis Provan, Joan Furely, Pat Ross, Denise Owen, Marion Stevens, June McLeod, Daphne Wright, Jess Prain, Joan Cade, Joan Hodges, Billie Thompson, Judy Alley, Shirley Drew and Elsie Collis.
19. Huie, *Ships Belles*, p. 45.
20. Curtis-Otter, *WRANS*.
21. Huie, *Ships Belles*, p. 46.
22. Marion Stewart, 'The Beginning of the WRANS in the late 1930s'.
23. Spurling, 'The Women's Royal Australian Naval Service'. vol. 1, p. 90.

24. McClemons, 'The WRANS Grows Up', p. 74. Some jobs included; communicators, writers, supply assistants, cooks, motor transport drivers, sick-berth attendants, messengers, stewardesses, telephonists, seamstresses, tracers, draughtswomen, dental attendants, range-makers and WRANS officers
25. McClemons, 'The WRANS Grows Up', p. 75.
26. Spurling, 'From Exclusion to Submarines', p. 36.
27. Former WRAN Sue Tembry, interview with Peter Ryan 18 January 2010.
28. Jean Nysen, 'The Way We Were', *Ditty Box*, July/August 1995.
29. 'Message from WRANS First Director, "Fine Contribution by WRANS To Nation"', *Navy News*, vol. 5, no. 7, 1962, p. 6.
30. Enid Conley (Coper), *Ex -WRANS Ditty Box*, 1976.
31. Spurling, 'The Women's Royal Australian Naval Service', vol. 1, p. 161.
32. Spurling, 'The Women's Royal Australian Naval Service', vol. 1, p. 162.
33. Lawrence Cohn (ed), *Requiem for a Wran*, Antelope Press, Doncaster, p. 50.
34. Cohn, *Requiem for a Wran*, p. 50.
35. Huie, *Ships Belles*, p. 38.
36. Curtis-Otter, *WRANS*, p. 34.
37. Huie, *Ships Belles*, p. 41.
38. Huie, *Ships Belles*, p. 40.
39. Huie, *Ships Belles*, p. 41.
40. Patricia Collins, 'After the Storm', *Australian Warship*, Issue 24, 2005, p. 45.
41. Norma Gascoine, *Ex-WRANS Ditty Box*, October 1978.
42. Gascoine, *Ex-WRANS Ditty Box*, October 1978.
43. Interview with Peter Ryan 18 January 2010.
44. Nysen, 'The Way We Were'.
45. Grace Johansen, *Women in Central Queensland: A Study of Three Coastal Centres 1940-1965*, PhD Thesis, Central Queensland University, 2002, p. 90.
46. Kathryn Spurling, 'Willing Volunteers, Resisting Society, Reluctant Navy: The Troubled First Years of the Women's Royal Australian Naval Service', in David Stevens (ed), *The Royal Australian Navy in World War II*, (2nd edn), Allen & Unwin, Sydney, 2005, p. 210.
47. Spurling, 'Willing Volunteers, Resisting Society, Reluctant Navy'.
48. Doc 190f Re-establishment of the WRANs. Naval History.
49. David Stevens (ed), *The Royal Australian Navy: The Australian Centenary of Defence Volume III*, The Oxford University Press, Melbourne, 2001, p. 171.
50. Spurling, 'From Exclusion to Submarines', p. 37.
51. Spurling, 'The Women's Royal Australian Naval Service', vol. 2, p. 260.
52. The Hon Bruce Scott MP, Minister for Veterans' Affairs and Minister Assisting the Minister for Defence, 'Australian Women and Defence: A Century of Service', Presented at *Women in Uniform: Pathways and Perceptions*, Australian Defence Force Academy, Canberra, 13 May 1999.
53. Spurling, 'The Women's Royal Australian Naval Service', vol. 2, p. 295.

54. Stevens, *The Royal Australian Navy*, p. 224.
55. Department of Defence, 'Women in Defence' <www.defence.gov.au/fr/RR/Womenindefence/history.html> (3 March 2010).
56. Joan Beaumont, *Australian Defence: Sources and Statistics: The Australian Centenary of Defence Volume VI*, Oxford University Press, South Melbourne, 2001, p. 353.
57. Susan Hudson, 'Obituary - Nell Margaret Lang (Barrow) - Navy Nurse: She Joined the Navy and Saw the Rules Change', *The Age*, 5 June 2002, p. 9.
58. JC Jeppesen, *Constant Care: the Royal Australian Navy Health Services, 1915-2002*, 2002, Loftus, NSW, p. 162.
59. 'The Navy's Modern Florence Nightingales', *Navy News*, vol. 14, no. 5, March 5, 1971, p. 9.
60. 'The Navy's Modern Florence Nightingales', p. 9.
61. Susan Hudson, 'Obituary - Nell Margaret Lang (Barrow)', p. 9.
62. 'The Navy's Modern Florence Nightingales', p. 9.
63. Jeppesen, *Constant Care*, p. 162.
64. Jeppesen, *Constant Care*, p. 162.
65. Jeppesen, *Constant Care*, p. 162.
66. 'The Navy's Modern Florence Nightingales', p. 9.
67. Jeppesen, *Constant Care*, p. 162.
68. Department of Defence, *Defence Annual Report 2009-10*, Canberra, 2010, vol. 1, p. 344.

HMAS *Yarra* and Operation MARMALADE

Petty Officer Peter Cannon

The RAN's history of operating in the Persian Gulf dates back 70 years to World War II, five decades before Saddam Hussein's Iraq triggered a chain of events that would see a generation of Australian sailors become well accustomed to operations in 'The Gulf'. During 1941, a number of Australian ships were serving overseas under Admiralty control as part of the British Empire's world wide naval effort. One of these ships was the escort sloop HMAS *Yarra* under Lieutenant Commander Wilfred Hastings Harrington, RAN. In May *Yarra* was involved in the occupation of Iraq after a pro-Axis coup had threatened the British position in the Middle East. A complex international situation in August 1941 saw Britain and the Soviet Union undertake a joint invasion of neighbouring neutral Iran. The invasion and subsequent occupation of Iran was designed to eliminate a perceived threat of German influence as well as secure existing British oil interests vital to the Empire's capacity to remain in the war. The British assault was to be known as Operation COUNTENANCE and *Yarra* and her ship's company would play a leading role.

The under-resourced Persian Gulf Division of the Royal Navy was required to land Indian Army troops in three separate operations at dawn on 25 August 1941, secrecy and surprise being vital to make up for a lack of adequate forces. The primary object of the British invasion was to secure the huge Anglo-Iranian Oil Company (later to become British Petroleum) refinery on Abadan Island in the Shatt-el Arab River; the waterway forming part of the frontier between Iran and Iraq. Serious fighting in and around the all important facilities was far from desirable which made the Iranian naval base upstream at Khorramshahr a serious threat to both the landings and the safety of the refinery. It therefore needed to be captured before the Iranians could respond to the British assault on Abadan. This would be the responsibility of Commander Ughtred James, RN, in the sloop HMS *Falmouth* with *Yarra* under his command in an operation codenamed MARMALADE. The third landing would occur at the Persian Gulf port of Bandar Shahpur where the Australian manned armed merchant cruiser HMS *Kanimbla* would spearhead the capture of the port and sheltering Axis shipping.

Yarra was a 266 foot long, 1060 ton *Grimsby* class escort sloop built in Sydney and commissioned in 1936. She carried an armament of:

- three single 4-inch Mark V guns in high angle anti-aircraft mountings
- four single Hotchkiss 3-pounder guns of rather ancient provenance
- four 0.5-inch Vickers heavy machine guns in a quadruple mounting
- two depth charge throwers.

Yarra had a modest maximum speed of 16.5 knots. First deploying overseas in August 1940, she had sailed from Karachi for service in the Persian Gulf on 12 April 1941 with a ship's company of 9 officers and 129 ratings. *Yarra* was an efficient, well drilled ship and its Commanding Officer (CO) was both well respected and popular. But after nearly four months serving through the enervating Iraqi summer with a poor diet the crew was exhausted and had suffered high rates of sickness including malaria. At the end of July, Harrington had remarked that there was no doubt that many of the men were debilitated. *Yarra* had actually been transiting the Strait of Hormuz on passage to Bombay in India for rest and refit before being recalled for the Iranian operation.



HMAS Yarra on the Shatt-el Arab River, 25 June 1941

The town of Khorramshahr lies on the western bank of the Karun River as it enters the Shatt-el Arab through the tributary of the Haffar Channel and is 45 miles from the Persian Gulf. The naval depot was on the opposite side of the channel and the primary base of the small Iranian navy. Expected to be present alongside at Khorramshahr were the 950-ton sloop *Babr*, depot ship *Ivy*, tug *Neyrou*, two 331-ton gunboats, as well as around 1000 naval personnel. The sloop and gunboats were all of Italian design and construction, having been built for the Iranians in 1931. *Yarra* would embark a platoon of Indian soldiers while *Falmouth* would carry two platoons, the troops being provided by C Company of the 3rd Battalion, 10th Baluch Regiment. The requisitioned tug *Souriya* was also attached to the force carrying a Royal Indian Navy (RIN) boarding party and crewed by sailors from *Yarra*. All vessels would sail from the Iraqi river port of Basra down the Shatt-el Arab whilst two separate Indian army formations approached the town from the north to engage an estimated 3000 defending soldiers.



Shatt-el Arab Chart (Cannon)

Yarra sailed from Basra at 0056 to lead *Falmouth* and *Souriya* 24 miles down river to Khorramshahr but *Falmouth* immediately went aground with a falling tide and there was no way to float her off for some time. Any delay would run the risk of the small force not being in position when the Abadan assault went in at dawn and invite the feared Iranian naval response. Harrington was forced to continue while *Falmouth* and her landing party languished on their mud bank for the next two and a quarter hours. *Yarra* arrived off Khorramshahr on time at 0408 and lay off the entrance to the Haffar Channel, the waterway running off the Shatt-el Arab in north easterly direction. The naval base covered a 600 yard frontage of the channel on the eastern bank where five 'T' jetties provided berthing for Iranian vessels. The first ship alongside leading up the channel was the sloop *Babr*, with the tug *Neyrou* ahead of her, then the depot ship *Ivy*, followed by the two gunboats *Charogh* and *Simorgh* lying alongside one another.

Planning had seen *Yarra* allocated to board and capture the two gunboats whilst *Falmouth* secured *Babr* if at all possible, capturing ships intact and minimising casualties being the aim. But the fact that he was now unsupported prompted Harrington to destroy *Babr* during his approach into Khorramshahr before she had a chance to react to the assault. He had three reasons for doing this. First, the violence of her rapid destruction was deemed likely to seriously dent the morale of the remaining Iranian forces and hasten their collapse. Second, there was a chance that the two gunboats, tied up further

along the waterfront, may be able to get underway and escape up the Karen River as *Yarra* was engaged in boarding the sloop. Last, he could not take the risk of boarding the gunboats whilst *Babr* remained capable of action. Harrington had stopped behind a British cargo ship, *Barala*, anchored midstream in order to conceal his ship from the base whilst waiting for the Abadan assault to go in; preserving the element of surprise at the oil refinery being of more concern than the execution of his own assault.

The Australians did not have long to wait. The first troops went ashore at Abadan at 0410. The British sloop HMS *Shoreham* opened fire three minutes later on *Babr's* sister ship *Palang* lying alongside the refinery and immediately set her on fire. The gunfire, only about 8 miles distant, could clearly be seen and heard from *Yarra's* bridge and at this point Harrington ordered the ship underway. As *Babr* came into view off *Yarra's* port bow it became apparent that there need not have been any concern at achieving surprise as the barracks were deserted with no apparent reaction to the sounds of battle downstream. A similar state of unpreparedness prevailed aboard the Iranian warships as most of their crews were ashore on overnight leave.

As *Yarra* picked up speed and cleared *Barala*, her powerful searchlight was trained on the closest target to reveal *Babr's* three single 4-inch guns trained fore and aft, and an awning rigged across her foremast. The range was so short that when the rangefinder-director crew directing the guns in primary control attempted to open fire they found that the fire control system's safety depression cut off and would not allow the electrical firing circuits to close. Not that this hindered *Yarra's* well practised gunners rapidly engaging; the crews switched into local control and individual gun captains directed their weapons over open sights. The gunlayers and trainers on No. 1 and No. 2 guns forward of the bridge could of course easily make out the target and laid their hand-worked weapons accordingly. However, much to the disgust of No. 3 gun's crew, their gun would not bear on the enemy as *Yarra* picked up speed and prepared to turn into the channel. No. 2 gun under Leading Seaman Ronald Taylor was the first to engage.

The first two 31-pound high-explosive (HE) projectiles slammed into the flagship of the Iranian navy dead amidships as fast as it took the empty cartridges to be ejected and fly past the loading numbers onto the deck. The loaders then thrust the next fixed round comprising both shell and cartridge into the quick-firing breach. Despite being a little on the small side for naval ordnance of the day in an anti-ship role, the 4-inch shell was more than capable of doing crippling damage to unarmoured warships such as destroyers and smaller vessels. In keeping with his plan of making a stunning example of *Babr*, Harrington fired 10 salvos into the hapless Iranian ship before he ordered the forward guns to cease fire. Engaging at maximum depression, the gunners fired as fast as their semi-automatic weapons would allow and not a shot missed. As an empty brass cartridge hit the deck, each loader placed the nose of his shell into the breach and rammed it home with his right arm. The sliding breach block automatically closed and the gun was fired as long as the gunlayer's finger remained on the trigger.

With a firing cycle of three to four seconds, *Yarra* fired 20 rounds into her target in approximately a minute and a half. The heavy 4-inch bombardment was supported by the crews manning the ship's 3-pounder guns that would bear on the target.

Babr was shattered in as little time as it takes to describe. Shells struck home through the port side from abaft the sloop's forecastle to the quarterdeck. The nose-fused HE shells exploded on impact and sent deadly shrapnel inboard through mess decks, machinery spaces and other compartments whilst causing blast damage and starting heavy fires throughout the ship. Some of the Iranian crew still aboard bravely attempted to bring the single 4-inch gun on the forecastle into action. The weapon was trained on the Australians off *Babr's* port quarter but the crew were forced to take cover by the sheer violence of *Yarra's* fire without being able to engage. As Harrington described it, 'ten salvos, although more than was essential, produced a most impressive blazing wreck.' *Babr* was burning from her forward superstructure all the way aft and the fires soon touched off her after magazine; the force of the explosion blowing a hole 8ft in diameter in the bottom of the ship and she immediately sank at her moorings. Harrington now brought his ship slowly around to port to enter the Haffar Channel at 0425 and proceed alongside the two gunboats to take them by boarding. He was obliged to proceed with particular caution as the available charts of the channel were of dubious age and reliability.



Babr sunk at her moorings (Kanimbla Association)

As *Yarra* passed *Babr*, the wrecked sloop had come to rest on the muddy river bed with a 60° list to port supported by her mooring lines. She was heavily afire and periodic explosions continued to tear through the wreck. By this stage at least the Iranians in Khorramshahr were awake and manning their weapons. Pipes and bugles could be heard sounding in the barracks and *Yarra* was soon taking rifle fire. A motor boat appeared leaving the vicinity of the Iranian Admiral's house on *Yarra*'s port bow heading across the channel for the base. Ron Taylor and his gun crew engaged the fast moving target with two rounds of HE, the first round just missing over while the second exploding shell was close enough to lift the boat out of the water. The accurate shooting was sufficient to convince the occupants that they were pushing their luck and they ran their boat up onto a mud bank as the Australians again ceased fire. The incoming small arms fire was returned by the two gunners manning the quadruple Vickers mounting amidships as well as the ship's .303 Lewis guns while the boarding and landing parties also joined in with rifles. By the time a single 3-pounder shell from one of the starboard guns landed in the vicinity of the barracks, the fight had gone out of the defenders and their fire tapered off. It appeared to Harrington that simple volume of fire was all that was required to overcome resistance.

Yarra now approached the gunboats *Charogh* and *Simorgh* preparing to board them but the Iranian sailors had managed to man their weapons. Their two 3-inch guns were mounted side by side on the forecastle; the port weapons now being trained in the direction of the oncoming Australians in addition to their two single 37mm automatic anti-aircraft guns aft. The Iranians had every chance of making *Yarra* pay for her unopposed destruction of their flagship but, with the exception of a few rifles, were yet to open fire when Harrington took any such opportunity away. His gunners swept the decks of both gunboats with a hail of heavy machine gun and small arms fire. The Vickers gunners directed a withering volume of fire upon the 3-inch gun crews on each of the gunboats. The Iranians didn't have a chance. Meanwhile the Australian boarding and Baluch landing parties, augmented by members of the 4-inch gun crews, poured .303 Bren, Lewis and rifle fire at the remainder of the gunboat's upper decks. Predictably, all incoming fire ceased. As Harrington manoeuvred *Yarra* alongside the outboard gunboat, the decks of both vessels were completely clear of personnel although some stray bullets from ashore were still flying over the forecastle.

Yarra's starboard bow nudged alongside the outboard gunboat at 0450; No. 1 gun's crew grappling and making fast before sailors ran out the brows that had been pre-positioned on the forecastle for boarding the enemy ships. Lieutenant Francis Smith, RANR led a boarding party comprised of cooks, officer's stewards and stokers along with No. 1 gun's crew over the side to board the first gunboat before continuing on to take the inboard vessel. Whilst going over the side, one of the boarding party managed to drop his rifle into the river. Harrington, himself a professional seaman officer, was later to caustically remark that 'it wasn't a cook or a steward, but a seaman, who lost his rifle'.



*Lieutenant Commander Wilfred Harrington, RAN,
on HMAS Yarra's bridge (Frank Glover)*

The Australian sailors immediately secured the upper deck doors and hatches on both gunboats through which the Iranian crews had retreated when faced with the fusillade of fire during *Yarra's* approach. Luckily for all concerned, whatever fight the enemy had possessed now evaporated and barked orders aided by a few rifle shots fired into the darkness below was enough to secure their surrender. The speed and efficiency with which the boarding party had carried out their task ensured that the Iranians had no time to organise further resistance from below. Whilst the boarding was underway, a bus load of Iranians rounded a corner on the waterfront heading towards the action. Instead of being reinforcements, they turned out to be a group of sailors returning from leave but were encouraged to promptly swing around another corner and retire by Australian automatic weapon fire. Soon about 60 Iranian sailors were secured on *Yarra's* quarterdeck under armed guard. There were no Australian casualties despite some particularly close shaves.

At 0459, only nine minutes after *Yarra* had secured to the outboard gunboat, silence temporarily fell across the Khorramshahr Naval Base and Harrington considered his next move. *Falmouth* had been refloated at 0315 and was at that moment making her way at speed towards Khorramshahr, no doubt her CO and crew a little embarrassed by their experience and keen to get into the action. Harrington received a signal that *Falmouth* was on her way and decided not to land his Baluch No. 13 Platoon to assault the barracks until she arrived with the remainder of C Company. It was thought that the sight of a solitary platoon of soldiers landing ashore may be enough to encourage the numerous defenders to fight back and risk the Indians being roughly handled amongst the palm groves and buildings of the barracks. *Falmouth* finally turned into the channel at 0520 and secured alongside the deserted *Ivy* before landing Nos. 14 and 15 Platoons, soon joined by the troops from *Yarra*.

Having had to await *Falmouth's* arrival and follow her alongside, *Souriya*, under the command of Lieutenant Noel Anderson, RANVR, was manoeuvring alongside a barge tied up outboard of *Neyrou* when the Iranian tug's crew opened fire on them with rifles. The Australian and Indian sailors returned fire with small arms but *Souriya* overshot the tug on her first attempt at grappling after Anderson was hit in the right forearm. Only Sub Lieutenant Nilakanta Krishnan, RIN, of HMIS *Investigator*, had managed to get aboard the barge and was exposed under heavy fire as Anderson recovered to get back alongside and support the lone Indian officer. By the time *Souriya* was secured and the remainder of the RIN boarding party had gone over the side, Krishnan had already fought his way onto the tug with two pistols wounding two Iranians in the process. Krishnan and his sailors then exchanged gunfire with the Iranian crew above and below decks at point blank range before isolating and flushing them out to secure the tug. It appears that one Indian and four Iranian sailors were wounded aboard *Neyrou* while the tug's skipper died of his wounds after a shootout with the intrepid sub lieutenant. Another 20 prisoners were taken aboard *Souriya* at gun point before casting off to tie up alongside *Yarra*. The prisoners were then transferred to the sloop to join

their compatriots. As the fighting at the waterfront concluded, 83 Iranian sailors were being supervised on the quarterdeck, 3 officers were in the wardroom and 4 wounded were under the care of Surgeon Lieutenant William McLaren-Robinson, RAN, in the wardroom. The army went on to secure both the town of Khorramshahr and the naval base with minimal resistance and *Yarra* sailed that afternoon for the Strait of Hormuz to capture an Italian merchant vessel in the Iranian port of Bandar Abbas, rounding out her involvement in COUNTENANCE. She was finally able to return to India and to be taken in hand for a well deserved refit in Bombay on 17 September while her crew was billeted ashore in a rest camp.

At Khorramshahr, *Yarra's* role in MARMALADE had been a complete success. That role was larger than originally envisaged after *Falmouth* found herself in difficulties, but Harrington had used his delegated authority and discretion to achieve his objectives. One of the Iranian navy's two sloops had been sunk and two of their four gunboats captured with no damage incurred in exchange. In conjunction with the British sloop, she had landed troops that had captured Iran's premier naval base and the eastern bank of the Karun River. The Iranians appeared to be completely unaware of their danger right up until the Australians began shelling *Babr* to destruction and *Yarra's* long suffering ship's company had executed their duties in spectacular fashion. Harrington was awarded the Distinguished Service Order for 'courage, enterprise and devotion to duty in operations in the Persian Gulf', and later went on to the rank of Vice Admiral and Chief of Naval Staff from 1962-65.

Notes

1. AF Parry, *HMAS Yarra 1936-1942: The Story of a Gallant Sloop*, The Naval Historical Society of Australia, Sydney, 1980.
2. AWM (Australian War Memorial) 78, Item 374/1, HMAS YARRA: Reports of Proceedings (War Diary), May, June, July, August and September 1941.
3. AWM78, Item 374/1, HMAS YARRA: Reports of Proceedings (War Diary), Operations at Khorramshahr - 25th August, 1941 and Report on *Yarra's* Movements in Operation MARMALADE.
4. AWM Private Record, MSS1581 Taylor, Ron (Leading Seaman, b: 1918 d: 1942), Greg Swinden, 'Their Finest Hour' The Story of Leading Seaman Ron Taylor and the Loss of HMAS Yarra.
5. DJE Collins, *Official History of the Indian Armed Forces in the Second World War, The Royal Indian Navy*, Combined Inter-Services Historical Section (India-Pakistan), 1964.

6. Dharm Pal, *Official History of the Indian Armed Forces in the Second World War, Campaign in Western Asia*, Combined Inter-Services Historical Section (India-Pakistan), 1957.
7. Interview: Frank Glover (ex HMAS *Yarra* II), North Manly, 2 July 2008.
8. NAA (National Archives of Australia): B6121, Item 55E, Persian Gulf Operations (Operation 'Countenance') - Report of Senior Naval Officer.
9. TNA (The National Archives UK): PRO ADM 199/410, Persian Gulf and Aden Squadrons: War Diaries, Persian Gulf Division War Diary August 1941.

Forming the First Fleet Unit: The Henderson and Jellicoe Recommendations

Lieutenant Commander Michael Paes, RAN

Naval policy then is not decided in isolation nor can it be implemented in isolation. It must be determined and re-determined with due regard to the political realities of the day.¹

Following the 1909 Imperial Conference, the Australian government sought to create a coherent defence policy and associated armed forces. It invited the Royal Navy's (RN's) First Sea Lord, Admiral Sir Jackie Fisher, RN, to assess the naval situation in Australia; however, unable to attend he suggested Admiral Sir Reginald Henderson, RN, as his replacement. The government accepted this proposal and in 1910, Admiral Henderson came to Australia to review the organisation, administration, distribution and composition of the Australian navy.

Following a six month study tour of Australia, Admiral Henderson submitted his recommendations to the government on 1 March 1911. He advocated a progressive expansion of the navy extending over a generation. By 1933, Henderson estimated it should comprise 8 battle cruisers, 10 light cruisers, 18 destroyers, 12 submarines and 15,000 personnel while 16 bases and sub-bases around Australia would support the fleet. But the reality is that at the beginning of 1933, the RAN had 2 County class cruisers, 1 sea plane carrier (in reserve for much of the year), 1 S class destroyer and 1 convoy sloop. By the end of the year, four V and W class destroyers also joined the fleet. As David Stevens writes, 'by 1933, the personnel strength of the RAN had reached its nadir with only 339 officers and 2483 men in the seagoing forces.'²

The reasons for the abandonment of Henderson's recommendations are many with finances being the central cause. The *Treaty of Versailles 1919*, the *Washington Naval Treaty 1922* and the Great Depression are obvious factors. However, practical difficulties, institutional limits, technological change, a failure to adequately posit the RAN within the broader Australian governmental and social spectrum, and incompatible British views of sea power were some of the accompanying failures that led to problems implementing the plan. This paper touches on these causes with an analysis of the RAN's experience between 1911 and 1933 and is followed by a discussion on the theoretical hurdles of Henderson's recommendations in an effort to reflect on Australia's early naval policy.

Inception and Experience

The Henderson mission followed the 1909 Imperial Conference, which sought to focus the British Empire's ability to counter increased German power and influence on the world stage, not least its sea power. The notion was that the British fleet in the Pacific was largely geared towards neutralising Germany's Pacific presence. The conference endorsed the fleet unit concept which later underpinned Henderson's recommendations.

The Australian government readily accepted Henderson's recommendations when they were released. The acceptance was never formal or detailed which left some to wonder whether the recommendations were to be followed *in toto* or otherwise. There was also criticism over one of the terms of reference which allowed Henderson to provide his opinion on 'any other matters which he cared to express'. According to some, this resulted in an all too cursory assessment of his plan's financial aspect.³

The size of Henderson's proposed fleet was based on a ratio that Britain's population was 10 times that of Australia; hence, the RAN should be 10 times smaller than the RN. As the British spent £40 million annually on its navy, then Australia should spend £4 million. Henderson grouped this expenditure into four separate periods: the first of seven years, and three of five years each. For the first period, £3 million a year had to be provided to meet expenditure as it arises; £4 million a year for the second period; £4.5 million a year for the third period; and £5 million a year for the fourth period.⁴ This was somewhat unrealistic as the ratio approach had been rejected at the 1887 Imperial Conference on the grounds that it did not take into consideration the needs of the Dominions to develop national resources and meet the needs of growing populations.⁵ In 1911, the Australian government had revenue of only £18.8 million, and it had pledged to build a number of railways around the country and its borrowing abilities, like its policies, were still developing.⁶ In the first year of the Henderson plan, £3 million was set aside for the navy; however, in the 1912-13 budget, the planned expenditure was over £1 million short. Furthermore, the expenses that were made were devoted entirely to acquiring warships rather than a simultaneous infrastructure build up of harbours and repair docks.

The first stage of Henderson's plan required a network of support bases, administration, personnel, training, communications, intelligence, naval reserves and stores.⁷ Henderson identified a range of sites in his report for these bases, but work on these sites was slow to commence. In 1913, with a change of ministers, the government commissioned a report to inquire into the viability of the prospective bases identified by Henderson. This move was questioned as undermining Henderson's initial advice.⁸ The Fitzmaurice Report highlighted that more studies needed to be done regarding the viability of some sites with respect to wharfage, water supplies and the ability to host ships larger than a torpedo boat destroyer. The main concerns were over recommendations for major fleet bases in Cockburn Sound, Jervis Bay and Port

Stephens.⁹ Furthermore, without a two-ocean navy, the proposal for a major base near Fremantle was described as unnecessary.¹⁰ This demonstrated the early stages for the deconstruction of Henderson's recommendations.

World War I (WWI) began the following year. The deterrence posed by the battle cruiser HMAS *Australia* to the German East Asiatic Squadron and the initial success of the Australian Naval and Military Expeditionary Force in capturing German territories in the Pacific Ocean demonstrated the utility and potential of a strong Australian navy. Over the course of the conflict Australia lost both its submarines while acquiring the River class destroyers, HMA Ships *Huon*, *Torrens* and *Swan*. The end of WWI saw Germany lose its Pacific territories and, thus, the underlying impetus for a larger RAN vanished. The public desire for increased defence expenditure had also been tempered; instead, there was an emphasis on reducing defence costs. In 1919 Admiral of the Fleet Lord John Jellicoe, RN, came to Australia at the request of the Australian government in order to review Australia's naval situation. In once again appointing a RN officer the government was obtaining the services of someone who did not possess a full appreciation of Australia's institutional, financial and strategic position. At the time, some of the Australian press reported that Jellicoe was to review the unrealistic expectations of Henderson.¹¹ However, like Henderson before him, Jellicoe proposed a fleet beyond the means of Australia to achieve.

To Jellicoe, the overall purpose of the Australian fleet was to serve to delay immediate decisive action from a foreign naval and military power.¹² Furthermore, in time of war, this fleet was to be directed by a flag officer located in Singapore. Jellicoe adopted a more regional approach to Henderson's empire-based methodology, devising a fleet size for the Pacific to which Australia, New Zealand, the East Indies, Malay States and Canada would all contribute. The percentage of overseas trade which each Dominion relied upon was taken into account in determining their input into this fleet. A ratio of 75:20:5 (United Kingdom: Australia: New Zealand) was devised for the core makeup. The fleet Jellicoe proposed was divided into three forces:

- **The striking force.** To consist of 3 cruisers, 6 destroyers, 4 submarines and 2 minesweepers supported by a flotilla leader, aircraft carrier, depot repair and mine laying ships.
- **The direct defence of trade force.** To consist of 4 light cruisers and 8 armed escort ships.
- **The harbour defence force.** This required 20 destroyers, 10 submarines, 82 mine sweepers and 4 boom defence vessels.

Jellicoe recognised harbour defence as the immediate need for Australia and something that would need to be achieved by 1925. His harbour defence force demonstrated an understanding that Australia had independent security needs but that the ultimate question of war would still need to be decided by a large fleet action for which

Australia needed to contribute to the RN. With respect to bases, Jellicoe disagreed with Henderson's spread out fleet in favour of more concentrated positions.¹³ Jellicoe's proposal recognised the affect the changing nature of labour costs and technology had upon naval warfare and to this end, recommended re-evaluations of the fleet requirements every five years.

Jellicoe's report had also highlighted Japan's rise as a new threat to Australia's security in the Pacific; Japanese and Australian acquisitions of German territory under the *Versailles Treaty* meant that they now shared a maritime border which heightened this concern. However, Jellicoe was out of step with British policy in this regard on two fronts. First, Japan was still an ally to Britain and had assisted in the escort of Australian troops to the battlefields of Europe during WWI. Second, the British government had announced the '10 year rule', which meant that all defence spending was to be conducted on the basis that there would be no major war for at least ten years.¹⁴ To this end, proposing a fleet to counter Japan was not without its political problems.

From 1919 onwards, no expenditure that went beyond the immediate financial year was permitted without the concurrence of the Treasury. The cruiser squadron was protected by the Australian Commonwealth Naval Board (ACNB) but constant Treasury demands to reduce spending saw less money being spent on maintenance, fuel and stores.¹⁵ As time went on, other expenses also had to be ruthlessly cut. Due to the shift from war to peace, increases in expenditure were difficult, if not impossible, to justify. At this stage, the Henderson plan had envisaged that the navy was to possess 18 destroyers. However, the reality of the situation saw the six River class destroyers placed into reserve as the five S class destroyers came into commission. Of the River class, only *Huon* and *Parramatta* would once again see service with one-year stints in 1921 and 1924 respectively.

Australia's small population became a significant obstacle to achieving the Henderson plan. By 1920 it appeared that Henderson had changed his mind; seeing the shortfalls in the demography and infrastructure of Australia in achieving his vision, he advocated a focus on developing Australia's internal capabilities. This included: building railways and roads, opening up harbours, and above all, adding to the population.¹⁶ The latter is something Jellicoe also commented on in his report.¹⁷ Henderson's comments in 1920 became a foundation stone for further reductions in defence spending.¹⁸

The *Anglo-Japanese Naval Alliance 1902* was seen as an obstacle to the Versailles peace negotiations and was formally terminated in 1923. Any chance of orienting naval policy towards the emerging Asian giant was also dashed with the signing of the *Washington Naval Treaty* in 1922. This arms reduction treaty focused on major naval surface combatants. As the RAN was encompassed under the RN, *Australia* was

scrapped under its auspices. Although its scrapping was a given in any event - due to the cessation of production of the ammunition type used by the ship - the inability to build up the cruiser squadron to Henderson's recommendation size was, in part, a result of the treaty.

Another influencing factor was the founding of the Royal Australian Air Force (RAAF) in 1921. Forming a new armed service, which, according to air power proponent American Brigadier General Billy Mitchell, made the battleship obsolete, introduced a rival for funds as well as doctrine. Air power challenged the proponents of command of the sea and offered a cheaper means of projecting power and fleet in being (area denial) strategy.

The 1923 Imperial Conference held that it was for the parliaments of the respective Dominions to decide the nature and extent of action taken for the defence of the realm. This gave some sense of ownership to Australia regarding its destiny in defence matters. The decision was made to maintain a cruiser squadron with the addition of two heavy cruisers. The efforts commenced in 1924 resulted in five new ships by 1929, however, there was not enough money to man and train them.¹⁹ In 1930 the Minister for Defence instructed that no further naval stores were to be ordered until reserves had been exhausted.

1930 also saw the effects of the Great Depression as the economy began to shrink and government revenues fell. A further effect was the decline in business as governments around the world increased protectionist barriers and made trade more difficult. This saw the navy reduce its manpower and proposed naval acquisitions. The reality was that the economy needed stimulus and the purchase of cruisers was not something which could achieve this aim.²⁰ By 1932, naval expenditure was a third of what it was in 1927. Between early 1930 and the arrival of the V and W class destroyers at the end of 1933, there were no destroyers in commission.

By 1933, naval gunnery had developed considerably. The 12-inch guns on *Australia* did not have the range and firepower of 8-inch guns in 1931. This meant that the initial firepower of the cruisers recommended by Henderson could be achieved with smaller ships in smaller concentration. Emerging naval airpower also questioned the dreadnought's centrality to naval doctrine.²¹ This is not to say that the fleet in existence combined with the RAAF in 1933 held any parity in power to that proposed by Henderson, rather, the changes in technology became another factor by which the government could justify spending less on naval acquisitions.²² As such, the RAN was a skeleton force in 1933; the fleet was small, personnel shortages were critical and there was not enough fuel or stores to ensure it was proficient and well maintained. It would not be until the 1938 Munich Crisis that the Australian government would shift their focus back to defence matters.

Theoretical Hurdles

Senator Burford Sampson made the following remarks in 1931 regarding naval policy when speaking of WWI:

Before the late war broke out, and before many people thought that there would be war, [naval policy] embodied in the following formula:

1. There should be ships in the Pacific Ocean enough, and large enough to cope with any hostile fleet.
2. Those ships should constitute one fleet, and be worked on a common plan.
3. That fleet should be based, as far as concerns construction, repairs, naval bases, [et cetera] on the British Dominions in the Pacific.
4. The ships should be contributed by the various members of the Empire, who are interested in the control of the Pacific, and manned as far as possible from their citizens.
5. The licet [sic] should be controlled by an authority which, while not divorced in any way from the British naval authorities, would be in direct touch with the governments of the dominions, and would carry out a policy agreed to by all.²³

This was based on Henderson's report in which he had said that once command of the sea was lost by the empire, no local system of defence, naval or military, could secure Australia's autonomy, and she would be the prey of the strongest maritime power. Therefore, any nation that threatened or attacked the sea power of the empire must be an enemy of Australia and of the whole empire. Instead of looking at Australia's strategic and financial position, and developing policy based on Australia-centric objectives, he remained focused on Britain. Unity of purpose across the empire would be the underlying premise for the RAN.²⁴ Unlike Henderson, Jellicoe recognised an independent Australian security requirement but, nonetheless, placed this within the empire defence needs of the original plan. Robert Hyslop writes:

Decision making in naval preparedness is as much an essay in economics as it is in strategy and [prior to 1939] there was too little mingling of the economic and strategic minds.²⁵

This stands true to Henderson's plan. Both Henderson and Jellicoe provided how much their proposals would cost but there is no evidence of them actually examining the revenue of the Australian government, its defence budget and what was actually feasible within its parameters. Instead, ratios of trade and population in comparison

with the largest empire on Earth were made in order to impose a vision of sea command for *Pax Britannica* purposes.

In Britain, the RN was an entrenched institution within the Westminster system of government. Conversely, the RAN was a new organisation with its role and position within the emerging Commonwealth bureaucracy still to be determined by an Australian government whose foreign policy was controlled by Whitehall.²⁶ Treasury remained accountable and focused on the needs of the Australian population while the ACNB was focused on the needs of the British Admiralty. This created a three part stovepipe process whereby the Admiralty placed demands, the ACNB debated them and Treasury limited them. This disconnect ensured that the Henderson plan lacked the necessary institutional foundations for success. The inability to question the foreign policy of Whitehall can explain why the government used RN officers for their strategic planning and accepted their findings so readily. However, this resulted in the subsequent government acquisitions being called into question as soon as it became apparent that they were not meeting the timetable for naval build up according to the Henderson or Jellicoe plans. This was summed up in the following statement:

An opposition's questions on what Australia had got for the money spent rarely listened for an answer which in any case was often a mere catalogue of acquisition of material unrelated to ends.²⁷

In terms of demographics, the population of Australia was approximately 4.5 million in 1911 and had only grown to 6.2 million by 1933. The sea played very little role in employment within this number, as the primary employment of Australians was agriculture and manufacturing. Immigration, exports, imports and communications between the states was carried out by sea but the personnel who made up this labour force were not always from Australia.

According to census data from 1911, only 33,553 people were employed by the Australian government, including the armed forces. Furthermore, only 42,691 men had employment associated with communications via seas and rivers and 7791 who were associated with fisheries. This is compared to 49,940 who worked on railways, 562,473 who worked in other primary industries and 453,743 who worked in the industrial sector. Thus, while Australia relied on the sea for its existence, its seafaring sector did not feature prominently in the field of employment where the navy would fit. This stood in contrast to the likes of Britain which had an extensive merchant marine including cargo vessels, passenger transports, commercial fishing vessels and a coast guard; and where the RN was an institution integrated amongst an extensive seafaring labour force. Henderson recognised this in his later visit to Australia. His advocacy for population increases was coupled with those for an expansion of the mercantile marine and fishing industry in order to increase the seafaring population.²⁸

The original Henderson plan had failed to recognise that although Britain was a tiny island, its population was immense, it was networked with railways, and it could draw on revenue from its population and commercial ventures which covered all parts of the globe. It was a highly developed industrial, commercial and fiscal society compared to the largely agrarian based land mass of Australia which, even though it had great cities like Sydney and Melbourne, was not a networked global power with a strong national bureaucratic or seafaring sector. To transpose the doctrines of the RN onto such a geographically, demographically and politically different antipodes was too simplistic in its approach. The Mahanian notions of sea command which informed Henderson's views needed to be tempered with the political realities of the day.

Conclusion

Henderson's plan marked an ambitious step in Australian defence policy. However, flawed methodology, institutional impediments and budgetary factors meant that the means of achieving it were never within Australia's capabilities. This was compounded by external factors such as treaty obligations and global market forces.

Henderson's recommendations, Jellicoe's report and actions following the 1923 Imperial Conference all proposed a naval means for Australia's defence, however, these means were never properly reconciled to the financial and institutional means of the Australian government, nor were they recognised to an end state of Australian defence separate to Imperial defence. Some may argue that at the time, the two could not be separated. However, this would ignore Vice Admiral William Creswell's lobbying for a destroyer force disposed toward coastal defence as the most realistic naval force disposition for Australia, something he proposed in 1909.²⁹ It would also ignore early moves towards independent naval forces which went back to the colonial navies' experience. It is a debate which carries on to this day. When we look at the Henderson plan against the backdrop of Australia's naval experience, its demise stands as a useful case study in the history of Australian defence policy.

Notes

1. Robert Hyslop, *Australian Naval Administration 1900-1939*, Hawthorn Press, Melbourne, 1973, p. 149.
2. David Stevens (ed), *The Royal Australian Navy: The Australian Centenary of Defence Volume III*, The Oxford University Press, Melbourne, p. 90.
3. An incomplete chapter now sits in the National Archives which highlights such shortcomings of Henderson's plan. NAA: A5954, Item 1282/7 Book (duplicate copy) Chapter 30 - Impossible Naval Objectives - Admiral Sir Reginald Henderson's Report (1911). It cites Rear Admiral Beaumont Commander in Chief Australia Naval Station 1901 comments to Barton, p. 10.
4. See a summary in, House of Representatives, *Hansard*, 29 August 1912, Question, Moisture in Butter, Mr Harper (Mernda).
5. NAA: A5954, Item 1282/7 Book (duplicate copy) Chapter 30 - Impossible Naval Objectives - Admiral Sir Reginald Henderson's Report (1911), p. 11.
6. The budget debates for 1911 illustrate this, most notably, House of Representatives, *Hansard*, 16 November 1911, Budget, Mr Smith (Parkes).
7. Hyslop, *Australian Naval Administration 1900-1939*, p. 73.
8. Senate, *Hansard*, 5 November 1913, Budget, Senator Needham (Western Australia).
9. References to Fitzmaurice's Report can be found in, NAA: A5954, Item 1282/7 Book (duplicate copy) Chapter 30 - Impossible Naval Objectives - Admiral Sir Reginald HENDERSON's Report (1911).
10. Hyslop, *Australian Naval Administration 1900-1939*, p. 163.
11. For example, Naval Defence, *The Argus*, 29 August 1919, p. 6.
12. Naval Defence, Report of Admiral of the Fleet Viscount Jellicoe of Scapa GCB OM GCVO on Naval Mission to the Commonwealth of Australia (May-August 1919), p. 6.
13. Naval Defence, Report of Admiral of the Fleet Viscount Jellicoe of Scapa GCB OM GCVO on Naval Mission to the Commonwealth of Australia (May-August 1919), p. 21.
14. This rule was renewed annually until 1932.
15. Hyslop, *Australian Naval Administration 1900-1939*, p. 77.
16. House of Representatives, *Hansard*, Wednesday 19 May 1920, Question Budget and Estimates 1919-20, Mr Fowler (Perth).
17. Naval Defence, Report of Admiral of the Fleet Viscount Jellicoe of Scapa GCB OM GCVO on Naval Mission to the Commonwealth of Australia (May-August 1919), p. 13.
18. House of Representatives, *Hansard*, 15 October 1920, Budget (1920-21) In Committee of Supply, Mr Fowler (Perth).
19. Hyslop, *Australian Naval Administration 1900-1939*, p. 83.
20. Hyslop, *Australian Naval Administration 1900-1939*, p. 85.
21. Having said this, the battleship remained the centrepiece of naval doctrine until air power's true utility against the warship was demonstrated at the Battle of Taranto.
22. Senator Sampson's speech in the Senate provides an excellent history and discussion of these issues in Senate, *Hansard*, 4 August 1931, Appropriation Bill 1931-32, First Reading, Senator Sampson (Tasmania).

23. Senate, *Hansard*, 4 August 1931, Appropriation Bill 1931-32, First Reading, Senator Sampson (Tasmania).
24. Reginald Henderson, *The Naval Forces [of the Commonwealth: Recommendations of Sir Reginald Henderson]*, Government of the Commonwealth of Australia, Melbourne, p. 6.
25. Hyslop, *Australian Naval Administration 1900-1939*, p. 174.
26. Hyslop, *Australian Naval Administration 1900-1939*, p. 153.
27. Hyslop, *Australian Naval Administration 1900-1939*, p. 154.
28. House of Representatives, *Hansard*, 20 June 1923, Governor-General's Speech: Address in Reply, Censure Amendment, Mr Mahoney (Dalley).
29. Creswell's proposal was largely ignored by government ministers. See Hyslop, *Australian Naval Administration 1900-1939*, pp. 157-158.

SEMAPHORES



The Canberra class amphibious ship, part of the Royal Australian Navy's commitment to the joint expeditionary operations of the Australian Defence Force

Joint Expeditionary Operations Doctrine

Dr Gregory P Gilbert

For Marines, the term expeditionary connotes more than the mere capability to deploy overseas when needed. Expeditionary is our ethos; a pervasive mindset that influences all aspects of organization, training, and equipping.¹

United States Marine Corps

Since at least the 1987 Fiji crisis (Operation MORRIS DANCE), the Australian Defence Force (ADF) has recognised the need to possess the capabilities to conduct complex expeditionary operations within our region. Existing weaknesses in capability were firmly underlined by the joint and combined intervention in East Timor during 1999-2000 (Operation STABILISE), and since then the ADF has been almost continually involved in such operations. This interest in the ADF's ability to generate deployments at a distance reflects the experience of all three Services over recent decades, and the requirement was explicitly reconfirmed in the 2009 Defence White Paper, *Defending Australian in the Asia Pacific Century: Force 2030*.²

More recently, at the RAN Sea Power Conference, held in late January 2010, the Chief of Navy (CN), Chief of Army (CA) and Chief of Air Force (CAF) appeared together in a panel session where each spoke on the topic *Combined and Joint Operations from the Sea*. That they essentially spoke with one voice demonstrates just how much the ADF's conceptual thinking on expeditionary operations has advanced over the last ten years or so.

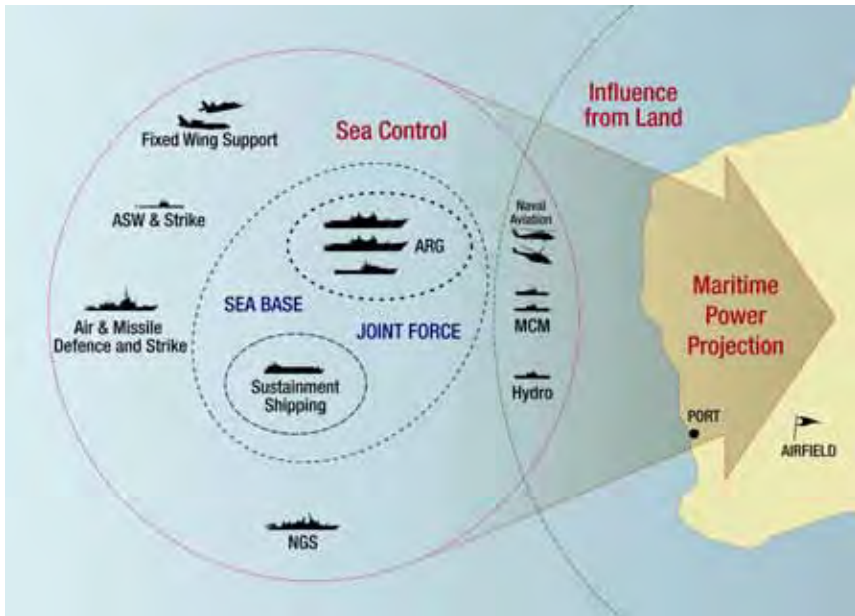
CN's speech provided an overall Australian perspective, noting that in order to be an effective force we need to have appropriate doctrine that is comprehensively understood. He then listed the five keys to the effective operation of an expeditionary capability:

- **Forward** - the ADF must be able to take its presence to where it is needed by the government. The oceans provide a highway to enable this and we need to take full advantage of this freedom.
- **Mobile** - we will not have an expeditionary capability if we do not exercise it. Air Force and Army elements will become more used to being at sea and deployed either on operations or as a contingency.
- **Offensive** - it is axiomatic to success in military operations that we take the initiative. We need to be able to quickly establish a forward presence from which we can react to government direction as the strategic circumstances require.

- **Self-reliant** - it is one of the truisms of contemporary maritime operations that we work in coalitions, often with partners with whom we do not have historic links. But it is our ability to operate both independently and with others that makes us valuable to coalitions and the ability to be self-reliant is a key tenet of the White Paper.
- **Adaptable** - in our maritime doctrine the adaptability of maritime forces to match the strategic situation is one of the fundamental characteristics that define their utility. A force capable of expeditionary operations is able to respond to a humanitarian crisis just as readily as conducting military operations without changing its configuration.³

In similarly a wide ranging speech, CA confirmed that:

The introduction of emerging amphibious doctrine, such as ship-to-objective manoeuvre, distributed manoeuvre and sea basing highlights that this capability [the new amphibious assault (LHD) and sea lift ships] is beyond just delivering Army to the amphibious objective area. It is clear to me that Army needs to learn how to live, deploy, operate in, and operate from the LHDs to maximise the government's investment in this capability.



Australian expeditionary operations involve elements from all three Services working together as a joint force

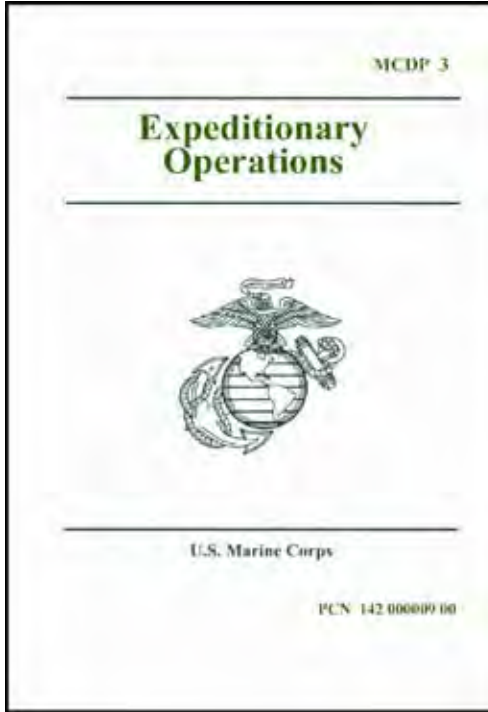
All this, CA admitted, will require a major cultural change for the Australian Army.⁴ For his part, CAF emphasised the need for expeditionary air power:

Regardless of the maritime environment that the amphibious task force is operating in - littoral, brown or blue water - or the phase of the operation, air power expands the ISR [intelligence, surveillance and reconnaissance], strike and defensive capabilities of the task force and provides a significant sustainment function. Further, we have the command and control systems in place to do this effectively and with the best efficiency.⁵

With the post-Cold War era imposing many changes on Western armed forces, in particular a change of focus from the blue water environment to the littoral, it should not be surprising to find that the ADF is not alone in reconsidering expeditionary issues. During the 1990s the US Navy adopted the 'From the Sea' and the 'Forward from the Sea' strategic concepts, while the Royal Navy developed the 'Maritime Contribution to Joint Operations' concept.⁶ US Marine Corps doctrine *MCDP 3 Expeditionary Operations* is an outstanding, if dated, reference, while the 'Expeditionary Maneuvre Warfare' concept is one of the principal drivers of future US Marine Corps strategy.⁷ Such concepts represent world-best practice on the subject and not only inform our allies' views but also our own.

But how should these concepts inform ADF doctrine? In truth we still have a long way to go. *Foundations of Australian Military Doctrine*, issued in July 2005, only mentions expeditionary operations in passing, and then in the historical context of the seizure of German New Guinea in 1914. It lacks detail on how the three Services should work as a team, alongside our allies, and in conjunction with other government and non-government organisations. The latest version of *ADDP 3.2 Amphibious Operations*, effectively combines theory and operational experience, and provides lower level doctrinal information on the conduct of amphibious operations, but likewise does not adequately address expeditionary operations.

Current joint ADF amphibious doctrine does not fill the expeditionary void at the higher levels of command, and this is largely because 'amphibious' and 'expeditionary' are not synonymous. As Professor Geoffrey Till argues in a recent study, amphibious operations should be seen as 'primarily military in purpose, usually being related to other operations in the course of a conventional campaign or war'. Expeditionary operations, however, 'may grow out of the coercive aspects of naval diplomacy and are usually highly politicised' normally involving 'joint action of a more sustained kind'.⁸ Even if Till's definitions are not entirely accepted, it should be clear that more work will be required to fill in the ADF's doctrinal gaps.



MCDP 3 Expeditionary Operations (US Marine Corps)

This is not to suggest that relevant doctrinal work has not already been undertaken by the individual Services. The Australian Army's *LWD 1: The Fundamentals of Land Warfare*, has been recently updated to reflect what it calls the emerging expeditionary military strategy, while the Royal Australian Air Force's *AAP 1000-D: The Air Power Manual* reflects the requirements of a 'networked expeditionary Air Force'. The naval aspects of expeditionary operations are similarly addressed in *Australian Maritime Doctrine* and *The Navy Contribution to Australian Maritime Operations*. Unfortunately individual Service doctrine cannot define the complete expeditionary requirement and is thus inadequate from a joint warfare perspective.

One of the first steps to improving this situation would be to ensure that we all speak the same expeditionary language. Currently, many terms are common, but are used differently by each of the Services, and even an agreed joint definition of fundamental terms such as 'expeditionary operation' and 'littoral' is lacking.⁹ These definitions should ensure that they incorporate joint influence and support 'from the land' as well as 'from the sea', and in this respect the existing RAN definitions may be the most suitable.

Within our joint and increasingly seamless ADF, each Service has committed to developing its part of a leading edge expeditionary force that is capable of meeting the land, sea and air demands required by Australia's maritime strategy. Over the next few years we will no doubt see much related doctrinal work to ensure that we are all singing from the same song-sheet. The present focus on 'introduction into service' of the two new *Canberra* class amphibious ships from 2015 will provide the necessary impetus and a clear deadline to achieve this work.

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Notes

1. Commandant of the Marine Corps, *Expeditionary Maneuvre Warfare*, United States Marine Corps, Washington, November 2001.
2. Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, Canberra, 2009, pp. 53-57.
3. Chief of Navy, Vice Admiral Russ Crane, Keynote address presented at the RAN Sea Power Conference 2010, Darling Harbour, 27 January 2010.
4. Chief of Army, Lieutenant General Ken Gillespie, Keynote address at the RAN Sea Power Conference 2010, Darling Harbour, 27 January 2010.
5. Chief of Air Force, Air Marshall Mark Binskin, Keynote address at the RAN Sea Power Conference 2010, Darling Harbour, 27 January 2010.
6. E Rhodes, "... from the Sea" and Back Again: Naval Power in the Second American Century', *Naval War College Review*, vol. 52, 1999, pp. 13-55; and J Slater, 'The Maritime Contribution to Joint Operations', *RUSI Journal*, vol. 143, 1998, pp. 20-25.
7. For US Marine Corps expeditionary doctrine see <www.dtic.mil/doctrine/jel/service_pubs/mcdp3.pdf> (8 March 2010), and for the US Marine Corps Headquarters Concepts and Programs website <www.marines.mil/unit/pandr/Pages/candp.aspx> (8 March 2010).
8. Geoffrey Till, *Seapower: A Guide for the Twenty-First Century*, Frank Cass, London, 2004, p. 237.
9. The Royal Australian Navy definitions are respectively:
 - Expeditionary Operation** - A military operation which can be initiated at short notice, consisting of forward deployed, rapidly deployable, self-sustaining forces tailored to a clearly stated objective at a distance from a home base.
 - Littoral** - The areas to seaward of the coast which are susceptible to influence or support from the land and the areas inland from the coast which are susceptible to influence or support from the sea.



Three generations of Australian patrol combatants: Armidale, Fremantle and Attack (l-r) class boats together in Darling Harbor, Sydney (Mackinnon)

Australian Patrol Combatants

The RAN's patrol boats are one of the most flexible and versatile elements of the Australian Defence Force (ADF). Every day they are at sea policing Australia's maritime domain and protecting our sovereignty, resources and national interests. Involved as they are in the enforcement of Australian legislation relating to illegal immigration, fishing, quarantine and smuggling, patrol boats maintain a fairly high public profile. Indeed, the fictional HMAS *Hammersley* continues to star in the high-rating TV drama *Sea Patrol*.

It was the RAN's experiences during Indonesian Confrontation (1963-66) which led to the reintroduction of patrol boats into the fleet. Existing minor war vessels, such as the Ton class minesweepers, had performed well in the patrol and interdiction tasks which featured in the conflict, but their engines were not designed for loitering and the ships had proven expensive to maintain. Guided by the experience, the RAN let a contract for 20 locally-designed *Attack* class patrol boats in 1965. By the time the boats entered service, Confrontation had reached a negotiated end and, rather than combat, the boats were instead directed towards the newly prominent role of Australian coastal surveillance, as well as for reserve training. The *Fremantle* class patrol boat (FCPB), which replaced the *Attack* class in the early 1980s, was likewise devoted to fisheries protection and coastal surveillance, although early plans did include proposals for the inclusion of modern gunnery systems and a missile equipped variant.

Replacing the FCPB, the larger *Armidale* class patrol boat (ACPB) first entered service in 2005 and the RAN now operates 14 of these vessels. Each is just under 57m in length, of 305 tonnes displacement and has a draft of around 2.5m. They are operated by a ship's company of 21 with space to accommodate up to 29. To increase their available patrol days the ACPBs are multi-crewed, with a target ratio of three crews for every two patrol boats. There are 10 boats home ported in Darwin and 4 in Cairns, but the ACPB may also be deployed for short periods across the Indian and Pacific oceans. In future, the ACPB improved crew employment concept may incorporate crew changeovers remote from homeport.

Limitations

Although incorporating significant improvements over its predecessors and adequate for most expected tasking, the ACPB design does impose some inherent operational limitations:

- **Environmental conditions.** ACPBs are normally limited to operations in less than sea state 5, and experience difficulty in conducting boarding operations in seas exceeding 2.5m.

- **Range.** Fuel capacity and provisions storage limit range.
- **Crew.** Most evolutions involve a significant number of the crew. High-intensity operational periods must be interspersed with adequate opportunities for rest.
- **Self-protection.** The stabilised ACPB 25mm gun provides a limited offensive and defensive capability. Despite its improvement over the older 40mm weapon fitted in the FCPB, the 25mm does not greatly increase self-protection in a high-threat warfighting environment. ACPBs are especially susceptible to attack from air-to-surface weapons.
- **Survivability.** The ACPB is not designed with combat survivability as a prime consideration, however, the crew are capable of standard naval damage control actions.



HMAS Pirie in the Yellow Sea during a Southeast Asian deployment in April 2009. Together with the tanker HMAS Success the patrol boat took part in the Chinese navy's 60th Anniversary and International Fleet Review of Qingdao

Maritime Operations

In seeking to illustrate the span of maritime tasks, *Australian Maritime Doctrine* defines the three roles normally undertaken by maritime forces. These are described as military (or combat related), diplomatic (or foreign policy related) and constabulary (or policing related) roles.¹ The remainder of this *Semaphore* will look at how our patrol boats directly contribute to these broad roles and their subordinate tasks across the spectrum of maritime operations. It should be kept in mind that these descriptions are representative rather than specific, since it is often the case that more than one of the roles and several of the tasks will be carried out simultaneously.

Combat Operations

The degree of force employed in combat operations is defined primarily by the national interest. Compared to major surface combatants, the ACPB is relatively simple and do not carry sophisticated sensors or overly powerful weapons. Nevertheless, the ability of the ACPB to undertake constabulary and diplomatic roles depends substantially on their ability to carry out their combat role.

In some circumstances, 'patrol combatants' will represent a cost effective littoral warfighting asset. They are particularly suitable for inshore operations - at choke points, in estuaries and other shallow waters where larger units often have restricted access. In the absence of high-level threats, they can contribute significantly to local patrol, response and surveillance efforts. Suitable tasks might include intelligence gathering, interdiction, boarding and the landing of small parties of Special Forces.

Recent regional conflicts illustrate how ACPBs might be used. In Sri Lanka, for example, we have recently witnessed a return of hybrid-threats, such as massed attacks by small craft and infiltration by terrorists using small boats to enter secure areas. Through the effective use of their patrol combatant force the Sri Lankan Navy played a decisive role in defeating the insurgency and bringing an end to the separatist conflict.²

Diplomatic Operations

Naval diplomacy, or the use of naval forces in support of foreign policy, provides context for those maritime tasks primarily designed to influence the policies and actions of other nations. Tasks undertaken within this role may range from the benign to the coercive depending upon the context. One important aim of such operations is to develop conditions that will allow the successful conduct of combined maritime operations in the future.



Armidale class patrol boats at HMAS Coonawarra ready for the next surge of patrol activity in Australian's northern waters

ACPBs routinely undertake combined patrols, training exercises and ship visits throughout the region as a form of Defence cooperation and to demonstrate Australia's enduring interests in our maritime neighbourhood. In addition to providing humanitarian aid and disaster relief where appropriate, Australian patrol boats will often offer assistance with maritime surveillance to smaller regional nations, most of which have very limited maritime patrol capabilities of their own.

Again, there will often be occasions where patrol boats can achieve desired outcomes more efficiently and economically than larger warships or land forces. This can be particularly significant in times of uncertainty and crisis where, due to their smaller footprint and less threatening presence, a small number of Australian sailors may be able to achieve more in difficult diplomatic circumstances than an equivalent unit of soldiers.

Operations with allied and friendly navies also include participation in exercises with Indian and Pacific ocean nations ranging from larger exercises, such as the Exercise BERSAMA series under the Five Power Defence Arrangements, to smaller regional exercises, such as those conducted with Pacific Island nations.

Constabulary Operations

Constabulary operations function within the framework of Australia's domestic and international law obligations, and hence the amount of force that can be applied must be strictly in accordance within the mandate given. These tasks are the regular fare of patrol boats and range from the routine maintenance of good order at sea through to the active enforcement of Australian sovereignty.

Such tasks, which are unlikely to require the use of force, include search and rescue, and environmental and resource management. Patrol boats have undertaken biological studies of Australia's coastal reefs, the launching and recovering of meteorological instruments at sea, and regularly collect, record and report environmental data.

Further up the threat scale, ACPBs contribute to the national task of fisheries protection as part of the Border Protection Command (BPC) managed national effort. Other tasks for BPC involve maritime barrier operations, which include the prevention of illegal immigration, supporting anti-smuggling operations conducted by federal and state police agencies, and assisting in Australia's quarantine effort.

Currently there are seven ACPBs assigned to Operation RESOLUTE, the ADF's contribution to the whole of government effort to protect Australia's borders and offshore maritime interests. An additional two ACPBs are available should the threat level warrant further response capability.³ Each year Australian patrol boats respond to hundreds of foreign vessel sightings. They routinely intercept and board vessels suspected of breaching Australian laws. Examination and inspection by trained and experienced patrol boat boarding parties may result in the apprehension of the vessels concerned.

Patrol boats are also useful for peace operations, which can be among the most difficult of constabulary tasks. ACPBs played a significant role in the restoration of order to the Solomon Islands during Operation ANODE (2003-04).⁴ Australian patrol boats were deployed throughout the country conducting patrol and response duties, participating in the confiscation of weapons, and visiting outlying islands to educate communities on the restoration of order and process.

The 2009 White Paper has directed that when the ACPBs reach the end of their useful life, they will be replaced by the new offshore combatant vessel. No matter what these future vessels are designated, the need for patrol boat capabilities will endure.⁵

Published as Semaphore Issue 3, 2010

Notes

1. Royal Australian Navy, *Australian Maritime Doctrine*, Sea Power Centre - Australia, Canberra, 2010, p. 99.
2. Sergei DeSilva-Ranasinghe, 'Maritime Counter-Terrorism and the Evolution of the Sri Lanka Navy', *Headmark: Journal of the Australian Naval Institute*, Dec 2009, pp. 35-37.
3. Navy website Operation RESOLUTE, <www.defence.gov.au/opEx/global/opresolute/index.htm> (12 February 2010).
4. P Laurence and D Stevens, 'The Royal Australian Navy and the Restoration of Stability in the Solomon Islands', in A Forbes and M Lovi (eds), *Australian Maritime Issues 2006: SPC-A Annual*, Papers in Australian Maritime Affairs No. 19, Sea Power Centre - Australia, Canberra, 2007, pp. 83-87.
5. Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, Canberra, 2009, pp. 72-73.

Australian Offshore Combatant Vessels

The future Offshore Combatant Vessel will be able to undertake offshore and littoral warfighting roles, border protection tasks, long-range counter-terrorism and counter-piracy operations, support to special forces, and missions in support of security and stability in the immediate neighbourhood.¹

Defending Australia in the Asia Pacific Century: Force 2030

To minimise cost and personnel overheads, the government has directed that the Department of Defence develop proposals to rationalise the RAN's patrol boat, mine countermeasures (MCM), hydrographic and oceanographic forces into a single modular class of around 20 offshore combatant vessels (OCVs). This initiative could provide significant operational efficiencies and long term cost savings, and should substantially improve seagoing capacity as well as flexibility and deployability for future operations. The OCVs will be larger than the current *Armidale* class patrol boats, displacing up to 2000 tonnes. As well as replacing current patrol, mine warfare and hydrographic capacity the OCVs will also substitute for major combatants in less onerous warfighting tasks. The OCV concept will feature modular unmanned underwater MCM and hydrographic systems, which will be containerised and portable, useable from ashore, in any OCV or craft of opportunity.

While the OCV modular concept is yet to be developed in detail, it is likely that ships configured for specialist roles (say mine warfare) will be re-roled to meet other specific operational needs. The introduction of the modular OCV will also allow the RAN to exploit advances in mechanical and electronic technology and upgrade platforms simply and quickly during the course of the life of the ship; negating the need for long refits or major capability upgrade programs. The modular concept, hosting a range of capabilities in a common or near common hull should also limit purchase and operating costs and realise cost savings demanded by the 2009 Defence White Paper, *Defending Australia in the Asia Pacific Century: Force 2030*.

Capability Development

The development of proposals for the OCV began with a detailed Joint Capability Needs Analysis in late 2009, which involved many authorities within and outside Defence. The outcomes of this analysis defined the scope of the OCV Project, better informed the capability needs and identified the issues requiring further study in 2010. These studies will aid Defence in developing the top level requirements that will drive proposals for the OCV. The Defence Science and Technology Organisation and other agencies are providing

technical support to develop qualitative and quantitative assessments that will guide future decisions. It is envisaged that the proposals to go to government initially will be broad options based on past and ongoing studies; really an affirmation to proceed or not with the rationalisation concept, and in what form.

Other countries are also working on the OCV concept. The US Navy continues to develop its littoral combat ship (LCS), which is a much larger ship also based on modular system concepts. The RAN will monitor the LCS Program for any applicable lessons. The United Kingdom (UK) is also exploring options for combining patrol, MCM, and hydrographic roles into a common hull as part of its Future Surface Combatant Program. Royal Navy studies will commence in 2010, and both the UK and Australia are seeking to share the results of their analyses.

Conceptual Issues

For some years, the RAN's long-range plan, *Plan Blue 2006*, recognised the need for multi-mission platforms comprising adaptable, flexible mission systems and identified a need to lessen costs by reducing crew numbers, and increasing automation and system and hull commonality.² To a large extent the key to rationalisation is 'commonality' - this may mean a single, common hull and permanently fitted systems; however, it may also mean hull 'variants' with a range of common permanently fitted equipment. A major challenge in replacing the current minor warship fleet with common or variant hulls and modular payloads is to embrace the concept without compromising on the level of capability needed for each role. That is, the mission payload is effectively the OCV's major weapons system and will need a significant investment. Any additional cost associated with mission systems is expected to be offset by savings from commonality in generic hull systems, training synergies and administration. To some degree the ship, as the carrier of this modular functionality, is the less important part of the overall OCV system, as long as it provides the endurance, range and survivability required by the strategic guidance.

Two key capability attributes which stand out from the White Paper guidance for the future force are 'deployability' and 'flexibility'. The modular OCV certainly has the potential to provide flexibility, as well as improving ship affordability. The need to deploy means that the OCV must be able to accompany a task force or advance force. This has generally not been possible for either hydrographic or MCM ships, largely because of a lack of speed and limited communications. Additionally, seakeeping, endurance and self-protection measures are limitations of all current minor war vessel classes. Nevertheless, the advantages of a future larger hull must be weighed against the possibilities that the associated cost may limit ship numbers and that current basing infrastructure may be inadequate.

Although the OCV is deliberately described as a combatant it will almost certainly not be comparable in capability with any major surface combatant. Its design features will be aimed primarily to meet the patrol, mine warfare and hydrographic force

needs and it will mount defensive weapons systems. It may also be built without the levels of survivability associated with major combatants and may need protection in higher level combat. Despite these potential limitations, the OCV, if capable of operating autonomous systems, may be able to contribute significantly in higher level conflict by operating from stand-off ranges.³ This premise will be tested through fleet experimentation and assessing the experience of other navies. Most likely, the future OCV will be tasked primarily in its specialist roles, but it will have the flexibility and capability to substitute for major surface combatants where their additional capability may be neither needed nor cost effective.⁴

As well as being flexible and deployable, the OCV must be able to defend itself against low to medium level air, surface and sub-surface threats. It must also be able to sustain operations with high systems serviceability and be able to operate with national or combined task forces.



The new littoral combat ship USS Independence has many functional requirements that are similar to those of a future Australian offshore combatant vessel (US Navy)

Deployed task group operations, particularly those in littoral areas, are becoming more important and common, both for humanitarian and military tasks. Future task group deployments involving the new amphibious ships with their ability to carry large numbers of troops, may need the accompaniment of MCM and hydrographic configured OCVs. They would be tasked with environmental assessment, and mine identification and neutralisation and in some cases would need to precede the main body of the task group to an area of operations (AO).

For mine warfare and hydrography especially, the OCV concept depends greatly on anticipated advances in automated technology for specialist sensors. These advances will bring both opportunities and burdens. On one hand, they should lead to superior understanding of the physical battlespace, and the optimisation of sensors and weapons. On the other hand, more environmental data is likely to be collected, generating a need for more analysis, production and dissemination of information, and thus additional effort on the part of limited ships' companies. This is particularly relevant to the rapid environmental assessment (REA) capability needed in amphibious operations. It is also closely linked to the Task Group Mine Countermeasures (TGMCM) concept of operations, whereby similar deployable teams and their mine disposal systems deploy with the task group.

Synergies are continuing to develop among hydrography, oceanography and MCM, especially because of growing commonality in equipment and information needs. This will generate closer cooperation between MCM and survey forces, which will be further enabled with the delivery of the OCV. In REA and TGMCM operations, there will be considerable opportunity to share facilities, equipment and personnel. In turn, this will necessitate much more integration of training and exercises in the future. These common doctrinal and operational links need to be understood in more depth to enable production of operating concepts that will reflect the likely capabilities and employment of the OCV. This is particularly pertinent as squadrons of OCVs may deploy for a specific operation, in which they will need to be multi-mission capable.

Enhanced Capabilities

The future OCVs may be seen by some as a means to expand existing Australian Defence Force (ADF) capabilities. In particular, they could be used for warfighting in the littorals for tasks involving amphibious manoeuvre, support to operations on land and in the air, and sealift. If space and facilities for embarked forces were provided, the OCV could be used as a flexible joint expeditionary asset. If the OCVs also had a flight deck and aviation facilities they could operate helicopters or unmanned aerial vehicles (UAV) in support of littoral tasks as well as patrol activities. The potential to embark a helicopter or UAV on the OCVs, or at least to operate aircraft from its deck would have significant potential to enhance the operational effectiveness of each vessel. Such aircraft would dramatically increase the ADF's current surveillance and

response abilities and reduce the need to deploy large numbers of patrol boats. Both of these potential requirements, however, are only possible as design compromises and at considerable additional cost. Such capability enhancement options will be subject to further study, including cost-benefit analyses, before a decision on the way ahead can be made.

Concluding Thoughts

The OCV announced in the White Paper will introduce a concept new to the RAN, a common or variant hull capable of meeting the demands of the patrol, hydrographic and mine warfare missions by using modular combat capability. It will rely on advanced technologies, some of which are still under development, and which will lead to new more flexible operating concepts. The OCV is also planned to have a level of warfighting capability that will allow it to support or substitute for major combatants in some circumstances. The higher speed and improved seakeeping qualities expected from the OCV will enable it to accompany or precede major task group units to an AO and conduct environmental and mine warfare operations in support of the task group.

Published as Semaphore Issue 4, 2010

Notes

1. Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, Canberra, 2009, p. 73.
2. Royal Australian Navy, *Plan Blue 2006*, Canberra, 2006, p. 16.
3. RO Work, *Naval Transformation and the Littoral Combat Ship*, Centre for Strategic and Budgetary Assessments, Washington DC, February 2004, p. ii, <www.csbaonline.org/4Publications/PubLibrary/R.20040218.LCS/R.20040218.LCS.pdf> (27 April 2010).
4. Department of Defence, *Defending Australia in the Asia Pacific Century*, p. 73.



HMAS Wollongong, one of fifty six RAN Bathurst class minesweepers, more commonly known as corvettes, built in Australian shipyards during World War II. 'Workhorses' rather than 'glamour' ships the corvettes filled many roles including minesweeping, surveying, anti-submarine and escort duties

The Australian Corvettes

Dr David Stevens

The corvettes were handy and reliable, and in addition to minesweeping, patrol and escort work they were employed on an endless variety of tasks including the carrying of troops and stores, participation in bombardments and assault landings, surveying and towing operations. In short they were maids-of-all-work.¹

John Bastock

Semaphore Issue 4 described plans outlined in the 2009 White Paper, *Defending Australia in the Asia Pacific Century: Force 2030*, to develop a modular class of 20 offshore combatant vessels (OCVs); the aim being to rationalise the RAN's existing fleet of patrol boats, mine countermeasures vessels and hydrographic and oceanographic ships.² This is not the first time that the RAN has employed multi-role vessels for these tasks, and the successful experience 70 years ago of building and operating the *Bathurst* class minesweepers offers an intriguing background to current and future challenges.

The 56 *Bathursts* were workhorses rather than 'glamour' ships.³ Although some sources claim that the design was a variant of the British *Bangor* class minesweepers, it was in fact a uniquely Australian development. The staff requirement for large numbers of a relatively simple, anti-submarine (AS) and minesweeping (MS) patrol vessel arose in February 1938, but the design actually originated in the need for a tender to be permanently allocated to the RAN's new AS School at Rushcutters Bay in Sydney.⁴ In July 1938, the Australian Commonwealth Naval Board (ACNB) set the Director of Engineering (Navy), Rear Admiral (E) PE McNeil, RAN, to the task, and within a fortnight he had reported back that a 500 ton local defence craft could be built for £100,000. By means of a quite remarkable in-house design effort, within another month McNeil had provided preliminary plans of a 'very useful little ship', and by February 1939 had the drawings virtually complete.

The vessel's revised displacement stood at 680 tons, with a speed of 15.5 knots and a range of 2850nm. With a 4-inch gun, asdic and optimised either with depth charges or MS gear, the proposed vessel had the capabilities of a small sloop rather than a local defence craft, but it was also much more versatile. Although somewhat slow for a specialised AS vessel, the designers expected twin screws to provide good manoeuvrability and a performance about midway between the average small merchant ship and a destroyer. The estimated cost had increased by only £10,000 and McNeill was clearly proud of his branch's work, remarking that it represented 'the smallest type in which reasonable seagoing qualities and speed for the purposes in view can be combined'.⁵ Perhaps more

importantly, in view of the need for Australian self-reliance, was that with the exception of armament and specialised instruments the vessel could be repeated from local resources, and built in yards unaccustomed to naval shipbuilding.

Finding that equivalent British designs were either too unhandy for AS work or too deep draught for MS tasks, the ACNB accepted that the Australian design not only met both requirements better, but could also perform the convoy escort task. Yet despite its evident usefulness and a recognised shortage of ocean escorts across the British Empire, the new vessel, officially designated the 'Australian Minesweeper' (AMS), but popularly known as the corvette, remained subject to the normal procurement process. Government approval for the construction of the first seven vessels was not obtained until September 1939, just after the outbreak of World War II (WWII).

When placing the orders, the Minister for the Navy, Hon Archie Cameron, MP, predicted an output of two AMS per month, but planners had underestimated the difficulties, notably delays in equipment delivery caused by the war at sea and the impact of other urgent defence requirements. Notwithstanding RAN pressure to begin building as early as possible, Cockatoo Island Dockyard in Sydney did not lay the keel of the first hull, HMAS *Bathurst*, until February 1940. The decision to share the ship construction work between eight shipyards, spread out across southern and eastern Australia, inevitably slowed down the project. The small team of naval overseers located at Cockatoo Island was stretched to their limit providing support to the commercial shipyards. Although the corvettes were nominally built to merchant ship standards, the ACNB soon discovered that each corvette might still take at least 10 months to complete. Further slowing RAN deliveries, the Australian government had soon graciously offered to assist with urgent build orders for the British Admiralty.



The lead ship, HMAS Bathurst, on trials, but already fitted for minesweeping

By June 1940 only five corvettes had been laid down of the first 17 ordered. The early delivery of future vessels could only be achieved by giving their construction first priority of supply, and a position in advance of the remainder of the Defence program. Although the start of enemy surface raider activity in October 1940 had further highlighted the shortage of ocean escorts, no such adjustment was forthcoming.

Year	Corvettes Commissioning		
	Jan-Jun	Jul-Dec	Total
1940	-	2	2
1941	6	7	13
1942	12	16	28
1943	7	2	9
1944	4	-	4

Table 1: Australian corvette production

Minesweeping

With their roomy quarterdeck, the corvettes performed particularly well as minesweepers. In addition to deploying traditional mechanical (wire) sweeps, influence (LL) sweeps designed to simulate a target ship's magnetic and acoustic signature were soon introduced. In March 1943, HMAS *Gympie* successfully swept the first ground influence mine found in Australian waters, a German supplied weapon laid by a Japanese submarine in the approaches to Brisbane. In August 1945 eight corvettes swept ahead of the victorious British fleet as it entered Hong Kong and three were present in Tokyo Bay at the Japanese surrender. The post-war era allowed no let up, and in addition to further sweeping and anti-piracy patrols off Hong Kong, the corvettes played a major role in clearing minefields around the Southwest Pacific. None were ever lost to enemy mines but, tragically, in September 1947 HMAS *Warrnambool* struck an Australian-laid mine while attempting to clear a defensive field in the Great Barrier Reef. She sank with the loss of four lives.

Anti-Submarine and Escort Tasks

Former corvette sailors have claimed that their beloved ships would 'roll on wet grass', but they proved capable, if rather lively, ocean escorts. In January 1942, HMAS *Deloraine*, while off Darwin, achieved the RAN's first victory over a Japanese submarine, and other corvettes took part in several combined kills. With the introduction of the east coast convoy system in June 1942, corvettes became a familiar sight escorting merchant ships between Melbourne and Brisbane, and troop and military stores ships to and from northern theatres. Well suited to operations in poorly charted waters, the

corvettes did much to provide an effective counter to enemy submarine and air attacks, and they led the gradual advance of Allied power round the south-eastern tip of New Guinea. Operation LILIPUT, for example, saw 15 corvettes provide protection for a regular supply service between Milne and Oro bays from December 1942 to June 1943 in support of joint and combined operations in the Buna-Gona area.

Further afield, the corvettes performed similar tasks in the Indian Ocean, Persian Gulf and Mediterranean Sea while a few even operated briefly in the Atlantic. In July 1943 eight corvettes acted as convoy escorts during the invasion of Sicily and later provided MS and an AS screen off the landing beaches. A month later four of these corvettes demonstrated how, when adequately armed and skilfully handled, they could mount a formidable air defence. Forming half the escort strength for a convoy of 40 large merchant ships heading from Oran, Algeria to Gibraltar, they helped break up a determined attack by almost 50 German torpedo bombers. For the loss of at least nine aircraft, the enemy caused non-critical damage to only two ships in the convoy.

Surveying and Other Roles

The flexible design of the corvettes meant that they could adopt many other roles as the war situation demanded. Capable of transporting up to 400 troops ship-to-shore and 100 for periods of up to four days, they were regularly employed on army support, and later in the transport of internees and the liberation of Allied prisoners of war. The sole corvette lost to enemy action, HMAS *Armidale*, was sunk by Japanese aircraft in December 1942 while engaged in the reinforcement of guerrilla forces and the evacuation of civilians from Portuguese Timor. Support to Australian troops culminated in the capture of Wewak in May 1945, with the involvement of two corvettes in the larger naval bombardment and covering force operations.

The new corvettes were fitted with both AS and MS equipment, but previous plans had called for them to be employed almost exclusively on AS duties. Hence, when German raiders began employing mines to begin their anti-shipping campaign in Australian waters, the RAN found it difficult to mount an effective response. In partial answer, the Chief of Naval Staff agreed that all AMS vessels might be employed on minesweeping duties 'until a greater submarine threat exists'.⁶ Further easing the situation, the British accepted that the RAN could retain the first four corvettes building on Admiralty account until replaced by new construction. Nevertheless, when Japan entered the war in December 1941, the RAN had just three corvettes available for local operations. Production accelerated during 1942 and continued as a priority until early 1943. But thereafter, it became clear that the improving war situation required additional craft for amphibious assault operations rather than ocean escort.



HMAS Shepparton fitted out as a survey vessel, with radar, an extra bridge and bamboo survey markers

In early 1943 two corvettes were specially modified for survey work and, forming part of Task Group 70.5, took part in surveying and charting operations for the US 7th Fleet in the Southwest Pacific area. They first piloted an invasion force to its landing on Kiriwina Island in June 1943 and subsequently took part in many of the most important amphibious operations. HMAS *Benalla*, for instance, was in the survey group for the bombardment and US assaults at Leyte Gulf in the Philippines in November 1944. Often these initial survey tasks were performed without the benefit of friendly air cover.

Some 20,000 men served in corvettes during WWII, making them the RAN's largest single grouping of personnel. Much of the work they performed was unspectacular, but it was essential nonetheless. Continuously engaged in escort, ferrying and a myriad other tasks their vessels more than proved the wisdom of the designers. The need for such a useful and adaptable warship has not gone away, and as the design of the new OCV matures the need for long-term flexibility must necessarily be a key factor in decision making.

Published as Hindsight Issue 5, 2010

Notes

1. J Bastock, *Australian Ships of War*, Angus & Robertson, Sydney 1975, p. 163.
2. See, 'Australian Offshore Combatant Vessels', *Semaphore* 04, May 2010; Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, Canberra, 2009, p. 73.
3. Of the 56 ships constructed 36 were built for Australia and 20 on Admiralty account, but commissioned as HMA ships. Another four were built for the Royal Indian Navy.
4. Paper by JA Collins, 'A plea for smaller sloops in larger numbers, February 1942, SPC-A, file 191C.
5. D Stevens, *A Critical Vulnerability: The Impact of the Submarine Threat on Australia's Maritime Defence 1915-1954*, Papers in Australian Maritime Affairs No 15, Sea Power Centre - Australia, Canberra, 2005, pp. 104-105.
6. Stevens, *A Critical Vulnerability*, p. 152-153.

Australian Maritime Doctrine 2010

Military doctrine contains the fundamental principles by which military forces guide their actions in support of national objectives. It helps planners and commanders approach dangerous, chaotic and unfamiliar situations with clarity of thought. It is based on rigorous analysis and a comprehensive understanding of the history of human conflict and national experience. In effect, military doctrine provides a basis for action founded in knowledge.¹

Australian Maritime Doctrine

Australian Maritime Doctrine stands at the summit of Australian naval doctrinal effort. At a fundamental level it explains what the RAN does, and how maritime operations contribute to the overall Australian Defence Force (ADF) effort to protect Australia's sovereignty, interests and values. First published in 2000, the Chief of Navy, Vice Admiral Russ Crane, AO, CSM, RAN, officially launched the latest edition of *Australian Maritime Doctrine* on 4 June 2010 in Canberra. The following is an excerpt from his speech:

It is an inescapable strategic reality that as Australians we live within a huge maritime realm. Unfortunately, not many of us are aware of it. We are surrounded by three great oceans that control our climate, provide much of the region's protein and generate most of the air we breathe. To put it simply, if the oceans die, we die.

Few people now travel by sea. Fewer still, appreciate how our maritime economy functions. Yet when flying into Sydney, we only have to glance down at Botany Bay container terminal to realise that our life's blood still flows by sea. Our maritime sector is already worth more than \$48 billion a year, and this will continue to grow as mineral and energy extraction techniques improve. The value is already far larger than our agricultural sector. Truly, Australia's future prosperity lies within our offshore domain.

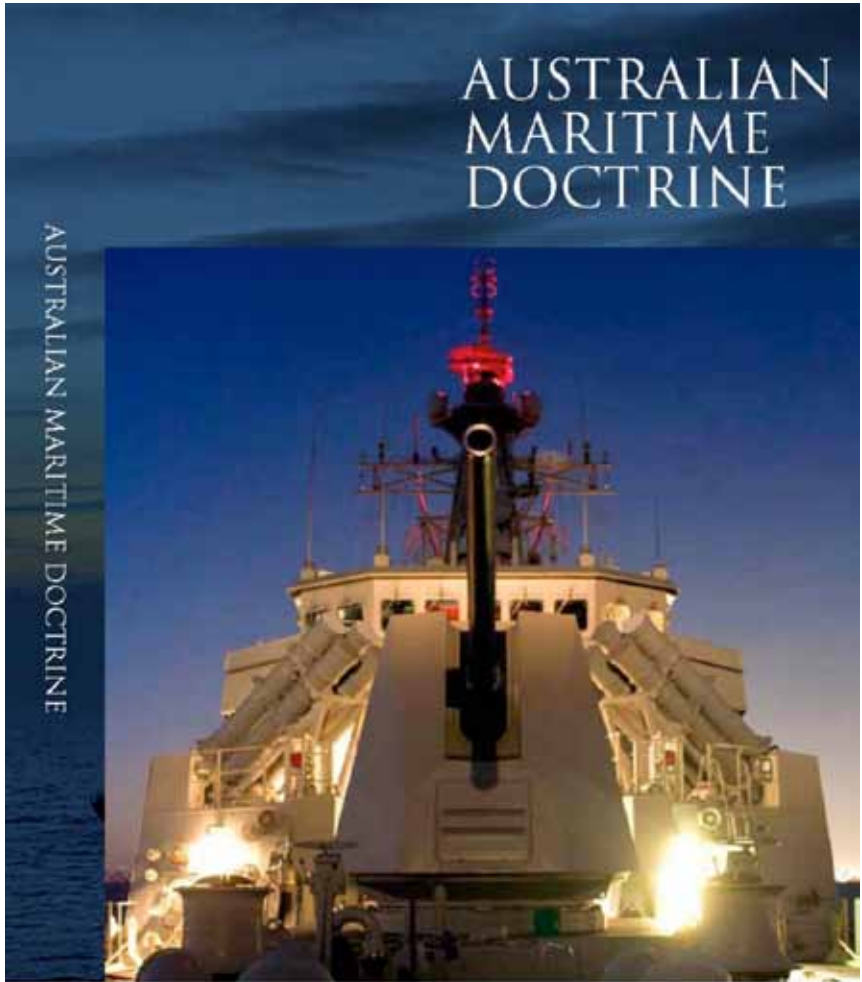
Then there is our broader maritime trade. Each year sees 27,000 ship calls in Australian ports. They annually exchange some 790 million tonnes of cargo with a value over \$300 billion. More important than even these figures indicate, however, is that we are an integral part of a global trading system. Globalisation remains primarily a maritime phenomenon, characterised by the constant free flow of ideas, capital, goods, services, information and people across national borders. It is a

system on which every nation depends, one which continues to expand, but one which also remains extremely sensitive to disruption. Defending the conditions that allow the system to flourish and eliminating vulnerabilities is essential. A single container ship may be carrying the GDP of a small nation. A single oil tanker might hold the equivalent of Australia's weekly oil consumption. Never has it been more true to say that our way of life is dependent upon good order at sea.

We are living in a maritime century. And the Asia-Pacific region is recognised as the globe's strategic hub. There still remain the traditional threats of inter and intra state conflict, the preservation of fish stocks and maritime crime. But today we must increasingly deal with additional challenges ranging from pollution response, through to the control of people smuggling and the prevention of global terrorism. Many of these imperatives overlap. New economic and social pressures are potentially enormous, tensions will undoubtedly rise and, in a world desperate for clean water and energy, competition for access is certain. The protection of the ocean itself may well be a future task. Whether we like it or not, this means increasing strategic, operational and tactical complexity at sea. It also means greater future calls on Australia's limited security resources. As, the 2009 White Paper, *Defending Australia in the Asia Pacific Century: Force 2030*, reminds us: 'We cannot have perfect knowledge of the future, and the range of uncertainties is disconcertingly wide'.²

Lawlessness and instability expand if not controlled. We, along with other responsible nations, can not afford to put areas of the ocean out of the rule of law. We do not have the luxury of saying it is all too hard. With the stakes so high, there is little or no room for discretionary involvement. Not only must we be able to enforce our authority in our vast ocean estate. We must also be able to deliver effects at a considerable distance from home. Not all situations will involve the projection of hard power. The spectrum of potential operations clearly requires flexibility of response. But no force is as responsive as a military force.

So where does the RAN fit within this scenario? We have more than a century of independent and sovereign action at sea behind us. Traditionally, our men and women have been very good at doing their job. The 'how' of being a navy. Yet, perhaps better known as 'The Silent Service', we have not been so good at explaining the 'why'. This is what *Australian Maritime Doctrine* does so well. It is the RAN's capstone work of doctrine. It brings together the key concepts and themes of sea power, places them in an Australian context and explains them in a clear and



AUSTRALIAN MARITIME DOCTRINE

AUSTRALIAN MARITIME DOCTRINE



Australian Maritime Doctrine

straightforward fashion. It effortlessly unravels the convolutions of the maritime environment for the general reader, providing a coherent story about why we need a balanced navy. *Australian Maritime Doctrine* is a guide to understanding the unique nature of the navy's contribution to Australia's national security. It shows why the navy has made a difference in the past and why we can expect it to make a difference in the future. It also lays out the ways in which the RAN operates as part of a joint and integrated ADF. But equally important, it describes an outlook and culture which informs the 'world view' of most global navies. When it comes to existing and potential challenges to maritime security, we are not alone in our concerns.



Vice Admiral Russ Crane launching the new edition of Australian Maritime Doctrine in Canberra

Much has happened in the maritime domain over the decade since the first edition of *Australian Maritime Doctrine* was released. There is now far greater recognition of shared interests, and broader awareness of the need for cooperative approaches. The RAN is just one of many allied and friendly navies to have signalled its commitment to the US-inspired Global Maritime Partnership. The RAN is also fully engaged in the ongoing endeavours of the Western Pacific Naval Symposium and, more recently, the Indian Ocean Naval Symposium to promote maritime security across the vast oceans that remain our bridges to the region and beyond. Counter-piracy operations off the Horn of Africa and continuing coalition operations in the Arabian Gulf provide key examples of how navies are working together to assure the flow of goods and services to the world economy.

Yet notwithstanding these developments, the RAN's doctrinal principles are enduring. This second edition of *Australian Maritime Doctrine* builds on the solid reputation established by the first and seeks to refine rather than rewrite. Sea control, sea denial and maritime power projection remain our key strategic concepts. The unique characteristics and attributes of sea power, such as access, flexibility, and sustained reach to name but a few, continue to inform our maritime operational concepts; guiding in turn our appreciation of the navy's military, diplomatic and constabulary roles. That these principles are enduring was recognised most recently in the 2009 Defence White Paper. And here we shift focus from the naval 'why' to its 'ways' and 'means'. The maritime assets required for *Force 2030*, and that we are working so hard to successfully introduce, are not just naval toys. They are the essential constituents of Australian sea power. Each has a distinct part to play as part of a joint or combined maritime force:

- Submarines excel in high-end warfighting tasks and provide significant deterrent value. Strategically potent, they can influence events ashore in their own right.
- The flexibility and versatility of surface combatants will often make them a first choice response in a crisis. The sea control they generate creates the freedom of action essential for follow on access.
- Amphibious forces can project hard or soft power throughout our region as circumstances dictate. They provide the maritime mobility and sustainment capability in joint operations.

- Patrol combatants are daily at sea as a response force. They represent the visible face of Australia's efforts to control its maritime domain.
- Support forces, whether logistic, mine warfare or maritime geospatial, represent vital force multipliers. They keep sea lines of communication open and will be necessary in any operation at a distance.
- But most important of all are our people. It is they who generate the real capabilities that ships, submarines and aircraft represent.

Acting together, these are the tools by which the navy can provide agile and adaptable maritime forces, responsive to political direction and matched to government requirements.

In sum, *Australian Maritime Doctrine* provides an authoritative guide to current naval thinking and is thus a vital component of the training and education of all the RAN's men and women. It has been written to appeal to the widest possible audience, not only those within both the navy and ADF, but also to all those who have responsibilities for or are interested in Australia's national security and its instruments. It is fundamental to improving our knowledge of ourselves and our Service, and likewise a key element in our work to ensure that all Australians understand better the continuing importance to their nation of the sea and sea power.

I expect all the members of the RAN to read *Australian Maritime Doctrine*, and I urge them to discuss its contents with each other, with other members of the ADF and with the Australian public. The better informed we all are, the better able we will be to confront the strategic, social and technological challenges of the future. I commend this second edition of *Australian Maritime Doctrine* to everyone in this audience, but just as our Service evolves to meet the new challenges I have described, so too will our doctrine continue to change and develop. It is now with great pleasure that I officially launch, *Australian Maritime Doctrine*.

Published as Semaphore Issue 6, 2010

A video of the Chief of Navy's speech is available at:

www.navy.gov.au/Australian_Maritime_Doctrine_2010_Launch

An online version of *Australian Maritime Doctrine* is available at:

www.navy.gov.au/Publication:Australian_Maritime_Doctrine

Notes

1. Royal Australian Navy, *Australian Maritime Doctrine*, Sea Power Centre - Australia, Canberra, 2010, p. 1.
2. Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, Canberra, 2009, p. 28.



What does this number mean, exactly?

AWD, Hobart, MFU or DDGH: What's in a Name?

Captain Gordon Andrew, RAN

The Government will proceed with the acquisition of three Air Warfare Destroyers (AWD) ...

Defending Australia in the Asia Pacific Century: Force 2030

DDGH - Destroyer, Helo Capable, Guided Missile - Major surface combatant in range of about 95 to 140 metres whole, general mission is to conduct operations with strike, ASW and amphibious forces, and to perform screening and convoy duties. Fitted with one or more force guided missile system. Fitted with a flight deck with a primary mission of operating and maintaining helicopters.

Standard Ship Designator System (STANAG) 1166

The process for naming individual ships of the RAN and the history behind some of our more famous ship names was described in *Semaphore* 4 of 2007. However, the more prosaic method of identifying ships, by designation and/or pennant number - HMAS *Sydney* (IV) can be identified as F03 and HMAS *Balikpapan* as L126 - is explained below.

A Short History of Ship Designators

The system of pennant numbers in the Royal Navy (RN) began before World War I to distinguish ships of a similar class and thereby improve rapid recognition and visual communications. Initially a ship was distinguished by a single letter pennant signifying a flotilla or a particular type of vessel such as a red burgee for torpedo boats and the pennant 'H' for torpedo boat destroyers. Beneath each pennant was a unique number identifying the individual vessel. The allocation of pennant numbers was prepared within each fleet until the *Navy Pennant List* in 1910 standardised numbers across the RN. After World War II the RN further rationalised the system's letter designators resulting in R for aircraft carrier, D for destroyer, F for frigate, L for amphibious vessels, M for mine warfare vessels, etc.

The US Navy had in the meantime been developing its own system. In the 1890s, the US Navy began using a ship type and a one up numbering system. Hence USS *Indiana* was referred to as Battleship No. 1 which was soon shortened to B-1. In 1920 the US Navy standardised its system and expanded it to include all US Coast Guard cutters. This system allocated two- or three-letter class designators to each ship type, and

retained the one up numbering system. The first aircraft carrier, USS *Langley*, thus became CV1, while USS *Bainbridge*, the first US Navy destroyer, became DD1 and the first submarine, USS *Holland*, received the designation SS1.

The system endures, but the designations have evolved over time as new ship types incorporating advanced technologies have been commissioned. USS *George H W Bush*, for example, is designated CVN77, as she is both the 76th carrier planned since *Langley* and uses nuclear propulsion. Inconsistencies nevertheless arise due to changing roles and capabilities. Thus USS *Mitscher*, although planned as DD927, commissioned in 1953 as DL (destroyer leader) 2, then was finally redesignated DDG (guided missile destroyer) 35 in 1968. Further gaps in the numbering system have occurred due to construction cancellations and building programs for other navies. Hence, having allocated DDG25-27 to the three RAN *Perth* class DDGs, the US Navy did not use these designations in its own fleet. *The Classifications of Naval Ships and Craft (SECNAVINST 5030.8)* provides the latest iteration of all US Navy definitions.¹

Ship Type Designators

Today, the RAN, like most Western navies, employs the NATO standard for describing and comparing the broad roles and capabilities of naval vessels. This system is contained in the NATO Standardization Agency publication *STANAG 1166 MAROPS (Edition 7) - Standard Ship Designator System*. *STANAG* is not publicly available, but reference publications such as *Jane's Fighting Ships* routinely adopt the NATO standard and provide similar information.

STANAG broadly groups both naval and non-naval vessels as either combatants or non-combatants. Combatants are vessels which possess some sort of inherent armed or combat capability primarily intended for offensive use. They are further defined as submarines, principal surface combatants, patrol vessels, river/roadstead patrol vessels, mine warfare vessels, amphibious warfare vessels or coast guard. Non-combatants tend to be role-specific vessels, and may possess an armed or combat capability intended primarily for self-defence. They are further grouped as auxiliary, service and support, government-owned, merchant or recreational.²

For each of these groups a system of two-, three- or four-letter designators exists which defines a ship or submarine's category and principal role. In addition to the letter N, which as already noted signifies nuclear propulsion, other common suffixes include: G - a unit equipped with one or more force guided missile systems and H - a unit equipped with a helicopter, or capable of operating a helicopter or vertical or short take-off and landing aircraft.



The RAN's new surface combatants are variously referred to as AWDs, Hobart class destroyers and MFUs, but the most accurate designation is DDGH (AWD Alliance)

A conventional submarine fitted with underwater-to-surface or surface-to-surface missiles is therefore designated a SSG, which is consequently the designation used for the RAN's *Collins* class submarines. The US Navy's submarine fleet on the other hand, consists not only of SSGNs (nuclear powered guided missile capable attack submarines) but also SSBNs (nuclear powered, ballistic missile submarines).

The surface combatant designator which currently best applies to RAN vessels is FFGH, which is defined as:

A surface combatant in size range of about 75-150 meters. Generally has lighter armament than a DD. Fitted with one or more force guided missile systems. Fitted with a flight deck with a primary mission of operating and maintaining helicopters.

With their current and planned equipment fits, both the *Anzac* and *Adelaide* classes should therefore be included within this definition, notwithstanding their more commonly used simplified designators as FFH and FFG respectively.

Under *STANAG*, support craft and non-commissioned single purpose vessels within naval bases are also allocated designators. For example, Defence Maritime Service *Wattle* class stores lighters based in Sydney and Darwin are designated YE (lighter, ammunition), and the sail training vessel *Young Endeavour* is designated as AXS (training ship sail (naval)).

In addition to the standard designators, the prefix and suffix system further delineates the role, ownership or characteristics of a vessel. The prefix Z is most applicable to Australia and denotes a non-Defence but government owned vessel. The Australian Customs and Border Protection Service *Bay* class patrol vessels would be designated as ZPB and defined as a:

Government owned coastal patrol unit intended for basically coastal guarding function. Includes any coastal patrol ship under 45 metres which cannot qualify as a PG in armament. May be unarmed.

Australian Pennant Numbers

Pennant numbers are identification numbers painted prominently on most naval vessels. The RAN largely followed the RN system until 1964, and then fully adopted US Navy style pennant numbers in 1969. The RAN draws these numbers from a block allocation made in Annex B of the *Call Sign Book for Ships* (ACP113, Edition AH).³ These blocks of numbers are allocated by ship type and country. For example, the *Anzac* class are numbered 150-157 because the frigate hull numbers from 150 to 168 are allocated to Australia, as are 01-07, 20-23, 442-449 and 531-539. Similarly, the three new *Hobart* class destroyers have been allocated numbers from within Australia's destroyer block 38-42. The process is not entirely random, however, and to maintain a tangible connection with the previous DDGs HMAS *Hobart* (II) and HMAS *Brisbane* (II), the decision has been made to again use 39 for *Hobart* (III), and 41 for HMAS *Brisbane* (III). HMAS *Sydney* (V) has been allocated 42.



MFU HMAS Tobruk displaying her pennant number L50. The two new LHDs (amphibious ship, multi-purpose), HMA Ships Adelaide and Canberra, will wear the numbers L01 and L02 from within Australia's ACP 113 allocation

The allocation by both type and country explains why there can be duplication in hull numbers. Australia currently has patrol combatant 83 (HMAS *Armidale*) and mine hunter 83 (HMAS *Hawkesbury*) in commission simultaneously. There are a number of similar examples in our recent past including HMAS *Jervis Bay* (I) and HMAS *Fremantle* (II) which both wore 203, and HMAS *Tobruk* (II) and HMAS *Swan* (II) which both wore 50.

With the notable absence of the US and Canada, other countries that use the ACP113 allocation include Belgium, Germany, Denmark, France, United Kingdom, Greece, Italy, Kenya, Malaysia, Netherlands, Norway, New Zealand, Poland, Portugal, Spain and Turkey. Each nation is responsible for the avoidance of visual call sign duplication, but such overlaps do still occur. Thus HMAS *Benalla*, HMNZS *Kahua* and the Spanish ship *Martin Posadillo* all carry the pennant number A04.

AWD, MFU and other TLA (Three Letter Acronyms)

The armed forces have always favoured acronyms as a form of linguistic shorthand, jargon which is often indecipherable to outsiders. This has led to a range of classifications for ships which are not covered by *STANAG* but have found their way into common usage.

In the early stages of a defence project when the exact form of a ship is yet to be determined, a generic descriptor of its purpose suffices. The AWD was accordingly a ship highly capable in air warfare, while the 'modular, multi-role class' included in the 2009 Defence White Paper is currently known as the offshore combatant vessel (OCV). The AWD project is set to deliver the *Hobart* class DDGH from 2014 and the OCV designator will become clearer as the project progresses.

For many years, commissioned RAN ships have been defined as:

- MFU (major fleet units) 'a vessel such as an aircraft carrier, fleet replenishment vessel, destroyer tender, guided missile destroyer, guided missile frigate, destroyer escort, designated training ship, landing ships heavy, or hydrographic and oceanographic research vessel'
- MWV (minor war vessel), 'a vessel such as mine countermeasures vessel, patrol boat, landing craft heavy, survey motor launch, or craft of opportunity'.⁴

The terms MFU and MWV are of largely administrative significance. They allow for categorising levels of command, remuneration and career progression, structuring training continuums for both individual and collective training, and delegating financial responsibilities. The words minor and major are not intended to imply a hierarchy of operational 'usefulness' – all RAN units contribute to a balanced force that is able to undertake the full spectrum of operations in the maritime domain.

Conclusion

Warships are among the most complex machines ever created by humans. Any sailor will know that individually they are quite distinct, yet commonalities of role, equipment and size lend themselves to a myriad of systems of taxonomy and classification. While attempts will always be made to impose order through a standard method of designation, class and hull number, the inherent complexity of the task will continue to impose limitations. In truth, mariners will always feel compelled to invent their own systems for their own purposes, and give their ship its own particular place in the wider scheme of things.

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Notes

1. Navy Department, *Classifications of Naval Ships and Craft, SECNAVINST 5030.8*, Washington DC, 2006, <www.history.navy.mil/danfs/secnav_2006.htm> (30 July 2010).
2. NATO, *Standard Ship Designator System (STANAG 1166)*, (7th edn), 2007, pp A-1, A-2.
3. <jcs.dtic.mil/j6/cceb/acps/acp113/>
4. Department of Defence, *Australian Defence Glossary*, version 5.1.7.3, Canberra, 2010.

A 'Minor Episode' During World War II

Commander Greg Swinden, RAN

In October 1939, shortly after the outbreak of World War II (WWII), the light cruiser HMAS *Hobart*, commanded by Captain HL 'Harry' Howden, RAN, left Australia to operate in the Northern Arabian Sea. Based at Aden, the importance of her presence increased substantially after Italy's entry into the war on Germany's side on 10 June 1940 and the subsequent fall of France. With the Mediterranean thereafter closed to through traffic, all supplies and reinforcements for Allied forces in the Middle East had to use the Red Sea route. Even then, Italian air and naval forces remained well placed to attack since, with the exception of the 644km stretch of British Somaliland, virtually the whole East African coast was in enemy or enemy-supportive hands.

The threat of a major Italian attack on British Somaliland increased throughout July, until 3 August 1940 when 17 enemy infantry battalions with artillery, armour and air support invaded from Abyssinia (now Ethiopia). Commonwealth forces (mainly British and African colonial troops) were outnumbered and soon in full retreat.¹ Only at sea did the Allies possess numerical strength. Yet with the simultaneous requirement to protect dispersed shipping and maintain watch on Italian territory, even these resources were over-stretched. Moreover, in the lead up the Italian invasion, the Royal Navy's Red Sea Force, which included *Hobart*, was increasingly required to escort troopships bringing reinforcements to British Somaliland through the sole available port at Berbera.

A historian has described the subsequent events at Berbera as a 'minor episode', which is perhaps true in comparison with some other WWII actions fought by the RAN.² However, *Hobart's* varied activities certainly showed the inherent flexibility of naval forces, and more particularly their capability to project power and influence operations ashore. In addition to escort duties, and surface and air surveillance, *Hobart's* tasks soon included sea lift; air defence; the provision of medical, naval gunfire and offensive air support; the maintenance of command, control and communications; and the deployment of naval landing parties.

A port in name only, Berbera possessed just two rudimentary piers and limited support infrastructure. Having carried out a reconnaissance of potential Italian coastal approach routes between 3-5 August, *Hobart* returned to Berbera where her boats were kept busy ferrying refugees and disembarking troops. In the early morning of 8 August three Italian fighters staged a raid. Quick to retaliate, Howden sent *Hobart's* Walrus seaplane to attack the Italian airbase at Zeila with hopes of catching the enemy aircraft re-fuelling. Finding no better targets, the Walrus bombed what appeared to be a headquarters building then strafed the base, wrecking enemy vehicles and silencing two machine gun posts. The aircraft returned with two bullet holes; *Hobart's* first battle scars.³



The men of HMAS Hobart (I) performed distinguished service in the evacuation of British Somaliland

Italian forces continued their advance through British Somaliland, and by 9 August the situation was desperate. That evening, Army authorities asked if *Hobart* could provide a suitable gun for use as an anti-tank weapon. Howden accepted the challenge and soon the ship's three pounder Hotchkiss saluting gun was fitted with an improvised mounting made from a 40 gallon oil drum reinforced with welded steel plating. Also provided were 64 rounds of ammunition (32 each of steel shell and high explosive) along with three volunteer gunners: Petty Officer Hugh Jones and able seamen Hugh Sweeney and William Hurren. Issued with military uniform, the following morning each man reported for duty at the frontline near the Tug Argan Gap, to the south of Berbera. The gap was overrun on 15 August and the three ratings were subsequently posted as 'Missing - Believed Killed'. Only later did the Italians advise the Red Cross that the Australians were prisoners of war. Fortunately, their period in captivity was relatively brief and came to an end when British forces liberated their camp in Eritrea in April 1941. All three later received a Mention in Despatches for 'Good service with the Somaliland Force in *Hobart* during the evacuation of Berbera'.⁴ General Archibald Wavell, Commander in Chief Middle East is reputed to have said that 'their presence and conduct were of the utmost value to the morale of the garrison'.⁵

On 10 August, *Hobart* returned to Aden to re-store, particularly with ammunition, before returning to Berbera four days later. The military situation ashore had continued to deteriorate and Wavell ordered the evacuation of British Somaliland the following morning. Onboard *Hobart*, Howden became the Senior Naval Officer, Berbera, and set up his day and dining cabins as a Combined Operations Room staffed by all three Services. The ship's wireless and signal systems thereafter became essential for the command and control of the dispersed military units fighting rear-guard actions, while also attempting to maintain communications with Aden. In addition, Howden disembarked three signalmen to maintain communications between the shore and ships in harbour. *Hobart's* remaining signalmen, under the command of Chief Yeoman of Signals VM Griffiths, were no less busy, processing nearly 900 visual signals in four days, many of which had to be repeated up to five times to other ships in company.⁶



The transfer of troops to HMAS Hobart during the Berbera operation

Howden frequently sought first hand knowledge of the situation ashore, enabling him to make informed decisions concerning the best use of his ship's company. Their tasks were as varied as those performed onboard, and included the provision of beachmasters to control the flow of evacuees, the construction of an additional pier and the landing of two security platoons. Italian air attacks were continuous and Howden himself surveyed numerous beaches to assess their viability as evacuation points in case the harbour became too dangerous.⁷

Howden had more than a dozen vessels under his command including destroyers, sloops, trawlers, hospital ships and merchantmen. Additionally, the cruiser, HMS *Carlisle*, operated outside the harbour using her radar to provide early warning of enemy air attack. All available ships' boats were pressed into service for the evacuation, and *Hobart's* sailors also took over the operation of two harbour tugs, *Queen* and *Zeila*, to tow boats and lighters from shore. Due to the constant air raids, both tugs received Lewis guns. Adding to the difficulties were the strong winds known as the Kharif, which blew for twelve hours each night, often reaching gale force and severely restricting visibility and hampering small boat operations.⁸

On 17 August, Howden sent Lieutenant (later Acting Captain) Timothy Synnot, RAN, ashore with a small team of signalmen and wireless telegraphists to provide a forward observation post. Based in the Government House tower they kept a look out for stragglers, then arranged for cars and trucks to escort them to the piers for embarkation. The vehicles were driven by local Somali's under the control of Signalman Cyril Martin who in civil life had been a lorry driver. He kept the rag tag fleet of vehicles operational and frequently drove a rescue lorry into unknown country himself. One of *Hobart's* men later wrote:

The next three days showed us an army in retreat. The bridge had been blown up before our troops could retire and many had to make a wide detour. They staggered in - in twos and threes. Some had been wandering in that hell of a desert for two days without food and water. Our trucks were constantly running into the desert to search for survivors. All were utterly exhausted and as they reached the pier were embarked to the ships. Our sick bay and waists were full of wounded on stretchers and medical staff were busy operating constantly.⁹

On the morning of 18 August, Howden had *Hobart's* aircraft catapulted off to perform a final reconnaissance of the surrounding countryside. That afternoon and evening the ship's demolition parties began setting fire to buildings, vehicles and piers. By 0745 the next morning the evacuation was complete with over 5700 military personnel and 1300 civilians relocated, and several guns and heavy vehicles saved. Using her 6-inch main armament, *Hobart* then completed the destruction, with key structures such as government buildings, barracks and storehouses the primary targets. During the bombardment a last small group of British soldiers found their way to the beach near

the Berbera lighthouse. Howden ordered Synnot to take a motor boat in to pick them up. Nearing the shore Synnot realised that he could not safely land due to the prevailing seas and winds, so anchoring, he and Able Seaman Vivian Lewis swam the remaining distance. On the beach they found three exhausted and badly dehydrated men from the Kings African Rifles and, after supplying them with fresh water, guided them through the surf to safety. Howden later wrote that this was 'A most creditable performance'.¹⁰

At 0845 on 19 August, *Hobart* sailed from Berbera, escaping with only slight splinter damage from Italian bombs. No damage or casualties were experienced in any of the other ships, and Howden had even compensated the Somali truck drivers by offering them passage. The cruiser steamed directly across the Red Sea and arrived at Aden at 1500. The tug *Zeila* also escaped, with *Hobart's* Chief Petty Officer W Grigor in command.¹¹ Again, one of *Hobart's* men recorded the final scenes:

On Sunday night all cars and stores on shore were fired. We watched the shore for stragglers as Berbera burned. Until we left, our fast motor boat skirted the shore for survivors and a keen watch was maintained from the ship. As we steamed out we could see the Italian forces in the hollow of distant hills waiting to move in when our guns had finished firing and as we steamed away we watched eagerly to see if there might not be one more man to be saved from the shore before it receded from our sight.

Despite the Italian success, the navy's action in supporting the forces ashore and organising and controlling an orderly evacuation, remained a highlight. Howden was made a Commander of the Order of the British Empire 'For good services in the Somaliland Force whilst in command of HMAS *Hobart* and as Senior Naval Officer, Berbera.'¹² In typical Howden style he ensured that those under his command received equivalent recognition. Chief Petty Officer Grigor and Chief Yeoman Griffiths each received British Empire Medals, while several of the tug and boat crews, including Synnot, received a Mention in Despatches for their skill and courage.¹³ Ultimately the Navy's function at Berbera was to act as an enabler, without which an effective evacuation of friendly military forces could never have been conducted. For this alone, the incident is worth recalling.

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Notes

1. G Hermon Gill, *Royal Australian Navy 1939-1942*, vol. 1, Australian War Memorial, Canberra, 1957, pp. 201-203.
2. C Coulthard-Clark, *Where Australians Fought: the Encyclopedia of Australia's Battles*, Allen & Unwin, Sydney, 1988, pp. 174-175.
3. HMAS *Hobart*, 'Report on the Evacuation of British Somaliland', Australian Archives (AA), MP1185/9, 406/201/71.
4. JJ Atkinson, *By Skill and Valour: Honours and Awards to the RAN for the First and Second World Wars*, Spink & Son, Sydney, 1986, pp. 165, 167, 196; individual services records in AA Series A6770.
5. LJ Lind & MA Payne, *HMAS HOBART*, The Naval Historical Society of Australia, Garden Island, 1979, p. 13.
6. HMAS *Hobart*, 'Report on the Evacuation of British Somaliland'.
7. HMAS *Hobart*, 'Report on the Evacuation of British Somaliland'.
8. Gill, *Royal Australian Navy 1939-1942*, p. 203.
9. Lind & Payne, *HMAS HOBART*, p. 17.
10. HMAS *Hobart*, 'Report on the Evacuation of British Somaliland'.
11. The smaller *Queen*, was inadvertently scuttled on 18 August due to some miscommunication.
12. Atkinson, *By Skill and Valour*, p. 74; individual services records in AA Series A6769.
13. GP Gilbert (ed), *Australian Naval Personalities: Lives from the Australian Dictionary of Biography*, Papers in Australian Maritime Affairs No 17, Sea Power Centre - Australia, Canberra, 2006, p. 110; Atkinson, *By Skill and Valour*, various pages.

The Korean War: 60 Years On

Mr Petar Djokovic

In the first decade of the 20th century, the Korean Peninsula was something of a pawn in power struggles between greater expansionist powers; primarily Japan and Russia. In 1910, after five years of provisional Japanese rule, Korea was annexed by Japan and a harsh colonial rule ensued. The Korean plight was largely ignored internationally until an agreement was reached at the Cairo Conference in December 1943 making Korean independence an Allied war aim. Later discussions at Yalta and Potsdam led the United States (US) and the Soviet Union to an agreement that Korea, upon the defeat of Japan, should be divided at the 38th parallel in order that the occupying Japanese could be disarmed. The type of government to be installed was not discussed.¹

The decision to divide Korea had an unforeseen, and ultimately disastrous, consequence. A Soviet-backed communist regime was established in North Korea under Kim Il-sung, while United Nations (UN) sponsored democratic elections were held in the South. Relations between the two Korean governments were tense until finally, at 0400 hours on 25 June 1950, North Korean forces crossed the 38th Parallel and invaded the South. Two days later the UN Security Council requested assistance to defend South Korean sovereignty. Within days HMA Ships *Shoalhaven* (Commander Ian McDonald, RAN) and *Bataan* (Commander William Marks, RAN), along with the Royal Australian Air Force's No. 77 Squadron, were placed at the disposal of the UN Commander, the US Army's General Douglas MacArthur.

Kim Il-sung had hoped that the North's initial superiority over the South on land and in the air would achieve a swift victory.² Thus, the UN's complete control of the sea was critical in preventing the immediate fall of South Korea, enabling the UN to enforce a blockade, land ground forces, re-supply units, bombard coastal targets and maintain a carrier-based air campaign.

Korea's geography, a peninsula with a mountainous central region and thousands of islands littering the coastline, makes the country particularly susceptible to influence from the sea. This does not mean that a maritime campaign is easy. Korea's east coast is characterised by deep waters and a few islands making the area excellent for naval bombardment and the establishment of off-shore raiding bases. The west coast, however, is characterised by shallow waters, extensive mud flats and islands, and large tidal movements that not only made navigation difficult, but also made it highly suitable for mine use by the North, a tactic that was employed with a measure of success. Most RAN operations were conducted along the difficult west coast.

At the outbreak of hostilities, *Shoalhaven* was deployed as the Australian naval contingent to the British Commonwealth Occupation Force (BCOF) in Japan while *Bataan* was en route to relieve her. Both ships were placed at General MacArthur's disposal on 29 June 1950 and were immediately allocated to the Commonwealth naval force commanded by Rear Admiral William Andrewes, RN, which was later augmented by ships from Canada, New Zealand, the Netherlands and France. This contingent operated primarily on the west coast though a number of frigates, including *Shoalhaven*, also performed escort duties in the east.

On 1 July, six days after the invasion, *Shoalhaven* had the distinction of being the first Australian unit to carry out an operation, escorting the American ammunition ship USNS *Sergeant George D Keathley* into Pusan Harbour on 1 July. It was *Bataan*, however, that fired the RAN's first shot when, on 1 August 1950, she engaged an enemy shore battery near Haeju, north-west of Inchon. *Bataan* had been taken by surprise by the gun battery while attempting to intercept some junks that were making for the coast at around 1800. *Bataan* returned fire and after a brief, but fierce, gun battle, made good her escape. The coxswain, Chief Petty Officer William Roe, was awarded the Distinguished Service Medal and Commander Marks was Mentioned in Despatches for their parts in the action. All RAN ships undertook extensive shore bombardments throughout the course of the war.

HMAS *Warramunga* (Commander Otto Becher, DSC*) departed Sydney for the war zone on 6 August 1950 to relieve *Shoalhaven*. *Shoalhaven* had been attached to the BCOF for five months prior to being deployed to Korea and was badly in need of a refit. She was released on 1 September and *Warramunga* joined *Bataan* as part of the screening force for the aircraft carrier, HMS *Triumph*.

No sooner had *Warramunga* arrived in the war zone than the Australian Commonwealth Naval Board began considering further rotations. The initial intention was for the ships to serve six months in Korean waters, however, just five years after the end of World War II, it became evident that maintaining two destroyers on station for six-month deployments was going to be extremely difficult. On 11 September, the decision was made to extend deployments to a full year.³

On 15 September, *Bataan* and *Warramunga* formed part of the covering force supporting amphibious landings at Inchon, engaging enemy coastal installations and gun batteries. The Inchon landings proceeded against the advice of General MacArthur's senior staff officers and naval commanders who considered the risk of failure, and the possible consequences, to be too high. The landings turned out to be a resounding, if fortunate, success and thereafter resulted in significant Communist forces being tied down in coastal defence rather than reinforcing the main battleline. Large scale amphibious landings were not employed any further during the war, in spite of the UN forces' obvious superiority, due to political concerns about the possible expansion of the conflict.⁴



HMAS Warramunga conducts a shore bombardment



A Firefly over Inchon

Mine warfare was employed extensively by North Korean forces in the early months of the war. Mine-clearing was particularly hazardous on the west coast due to the large tidal movements and the tendency of moored mines to 'walk'. Soviet made North Korean mines sank or damaged 13 UN ships in 1950. *Warramunga's* Executive Officer, Lieutenant Commander Geoffrey Gladstone, RAN, was awarded both a bar to his Distinguished Service Cross (DSC) and the US Bronze Star for his skill and bravery in continually entering minefields in small boats to clear them.⁵

In addition to combat operations, RAN ships were also involved in humanitarian operations providing food and other supplies to islanders on the west coast who were struggling to survive in the midst of a war zone.

In early November 1950 with UN forces sweeping northwards, a swift end to the conflict appeared likely. However, China's intervention in strength brought significant reversals on land before the end of the year, and by 4 January 1951 Seoul was back in Communist hands. *Warramunga* and *Bataan* were involved in the evacuations of Chinnampo and Inchon, which included a large number of civilian refugees. The difficulties of navigating the west coast were illustrated during the evacuation of Chinnampo when *Warramunga* temporarily ran aground where charts indicated that the ship should have had 3m of water beneath her.

As UN forces launched a counter-offensive early in 1951 and Communist forces were slowly pushed back over the 38th Parallel, a stalemate ensued. Peace talks began on 10 July 1951 but would drag on for two years. A show of naval strength in the Han River estuary was ordered to pressure the North Korean delegation into a cease-fire. A small area just north of the estuary was the only part of South Korea still under Communist control. On 25 July 1951, the frigate HMAS *Murchison* (Lieutenant Commander Allan Dollard, RAN), which had relieved *Bataan* in May, began eight successive days of bombardment operations in the estuary attacking enemy installations, troop concentrations, gun batteries and shore dumps. As well as dealing with a multitude of navigational hazards, *Murchison* came under heavy return fire during those eight days and suffered a number of hits, though of her complement only three were injured. Lieutenant Commander Dollard and *Murchison's* navigator, Lieutenant James Kelly, RAN, were both awarded the DSC for their part in the operation.

Australia was one of just three nations to contribute a naval aviation component to the war effort. HMAS *Sydney's* (Captain David Harries, RAN) deployment in October 1951, along with the Fleet Air Arm (FAA) squadrons 805, 808 and 817, was a high priority for the RAN coming, as it did, so soon after the establishment of the FAA. *Sydney* conducted seven patrols, typically of nine flying days and one replenishment day, off both coasts during the course of the war.

Flying operations began on 5 October and six days later, *Sydney's* Carrier Air Group set a light fleet carrier record by flying 89 sorties in one day.⁶ *Sydney's* main responsibilities included armed reconnaissance, army cooperation, naval gunfire spotting and combat

air patrols. Most aircraft attacks concentrated on the enemy's lines of communication and targets were typically things like railways, bridges and tunnels. The deployment was an unqualified success due in no small part to the efforts of flight deck and maintenance crews who worked exceedingly long hours in all weather conditions to ensure a high level of aircraft availability.

The Korean War ended with the signing of an armistice agreement on 27 July 1953. By conflict's end, more than 4500 men aboard nine Australian warships had served in the operational area.⁷ In the conflict's three years:

- 3 RAN members, all pilots from 805 Squadron, lost their lives
- 6 were wounded
- 62 received commendations.⁸

As a proportion of the Commonwealth contingent, the Australian contribution was third only to that of the Royal Navy and Royal Canadian Navy.

RAN warships continued post-armistice patrols until June 1954. Fortunately, the Korean War never expanded into the global conflict that many feared at the time but it did provide the RAN with extensive tactical and logistic experience as part of a maritime coalition, experience which continues to serve the RAN well to this day.

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Notes

1. Woodbridge Bingham, Hilary Conroy & Frank W Iklé, *A History of Asia Volume Two Second Edition*, Allyn & Bacon, Boston, 1974, p. 659.
2. Robert O'Neill, *Australia in the Korean War 1950-53 Volume II: Combat Operations*, Australian War Memorial, Canberra, 1985, p. 413.
3. O'Neill, *Australia in the Korean War 1950-53 Volume II*, pp. 425-426.
4. O'Neill, *Australia in the Korean War 1950-53 Volume II*, p. 423.
5. O'Neill, *Australia in the Korean War 1950-53 Volume II*, pp. 430-431.
6. David Stevens (ed), *The Royal Australian Navy: The Australian Centenary History of Defence Volume III*, Oxford University Press, Melbourne, 2001, p. 177.
7. Stevens, *The Royal Australian Navy*, p. 173.
8. Two other sailors, both from HMAS *Sydney*, died of illness contracted while in the Area of Operations.



*Clearance diver teams are an essential component
of the RAN's mine warfare capability*

Australian Naval Mine Warfare

Low-technology mines are one of the most cost-effective weapons in existence.¹

Vice Admiral Stanley Arthur, USN, 1991

The sea mine is a sea denial weapon. The laying of even a limited minefield in port approaches, focal areas or in choke points can deny an adversary free access. A known or suspected minefield will compel an adversary to either accept the loss of access and associated costs or commit resources to lengthy and costly mine countermeasures (MCM) operations. Minefields can be used protectively in support of allied shipping or aggressively against an adversary. A mining threat will affect an adversary through disruption of plans, hindrance of maritime activity, lowering of morale, and disruption of national economy.

Australia is dependent on maritime trade, and mining an Australian port or its approaches would effectively close that port to shipping. Effective MCM assets provide the only practical means to reopen it. The defence of Australia requires an effective and balanced mine warfare force incorporating a combination of minehunting, minesweeping and clearance diving. The ideal should be to acquire a mine warfare force capable of deployment as required to support Australia's strategic interests and objectives.

MCM Ships and Units

The RAN currently employs the following ships and units in the conduct of defensive MCM.

The deployable Commander Mine Warfare and Clearance Diving Task Group, including the Mine Warfare Command Support System. This is a deployable headquarters capable of planning and executing MCM operations from either a sea or shore based headquarters. Small components of the headquarters may be deployed as part of a multinational headquarters. The task group regularly conducts exercises with Five Power Defence Arrangement nations, the Royal Navy, Royal Canadian Navy and the US Navy, both in Australia and abroad.

***Huon* class coastal minehunter (MHC).** The six *Huon* class vessels (two maintained in Extended Readiness) are capable of conducting minehunting to a maximum depth of 200m and performing both mechanical and influence minesweeping operations. MHCs carry clearance divers to provide an identification and disposal capability.

Minesweepers. Three remotely-controlled minesweeping drone units capable of conducting precursor operations to sweep mines using mini dyads and the Australian Acoustic Generator.

Clearance Diving Teams (CDTs). The two permanent RAN CDTs have the ability to locate, identify, dispose of and exploit mines in the shallow and very shallow water regions. A third CDT is formed and deployed for specific military operations. All CDTs may be employed in advance force operations, port and wharf clearances, and in support of MHC operations. They also possess unique specialist diving, salvage, demolition, explosive ordnance disposal (EOD) and improvised explosive device disposal (IEDD) skills that can be used in other operations such as:

- underwater and land-based EOD and improvised explosive device disposal
- support to amphibious operations by undertaking:
 - landing site reconnaissance and survey
 - landing site sea mine and obstacle survey and clearance in very shallow water
 - other maritime tactical operations as required
- contributing to advanced force operations such as rapid environmental assessment
- undertaking other specialist diving operations assigned (eg placing and recovery of underwater sensors, offshore maritime counter-terrorist)
- limited underwater battle damage patching, repair and salvage capability to assist a damaged ship to return to a support facility for more comprehensive repairs.

Naval Reserve Diving Teams. The seven naval reserve dive teams have a limited diving and salvage capability that, assuming training and currency requirements are met, can be used to supplement the CDTs or to backfill roles when the CDTs are deployed.

Maritime Geospatial Deployable Support Team (MGDST). The unit provides technical and performance analysis of MCM operations, evaluation of MCM effort, intelligence and forward-based logistics support to deployed MCM forces. MGDST operates MDSU and Autonomous Underwater Vehicles for support of MCM operations.

Naval Reserve Mine Warfare Groups. Among other tasks, the two groups have the ability to supplement headquarters staff and provide additional personnel to the MGDST.



The coastal minehunter, HMAS Gascoyne. Current proposals envision these units being replaced by offshore vessels equipped with a rapidly deployable mine countermeasures system

Military Tasks

The advantages of employing the sea mine include:

- engaging an adversary at minimal risk to own units; providing the possibility of delivering a pre-emptive defensive attack
- engaging an adversary with a covert weapon that maintains a continuous threat
- forcing an adversary to operate both military and commercial shipping in areas that make them more vulnerable to other weapons
- forcing an adversary to maintain an MCM capability
- presenting an adversary with a significant psychological threat.

The sea mine threat may be described under two main categories. Moored mines are positively buoyant, attached to the seabed, floating at a pre-determined depth below the sea surface, and may be laid in depths down to 300m or greater. Ground mines are negatively buoyant, resting on the seabed, and are laid in water depths in excess of 200m. The diversity of sea mine types available to an adversary means that the planners of MCM operations need to consider a number of different approaches. MCM operations may be divided into offensive and defensive. Offensive MCM operations are carried out to prevent an adversary from successfully laying sea mines and may include:

- strategic strike against an adversary's mine warfare infrastructure
- maritime strike against an adversary's seaborne minelayers en route to the mine laying areas
- air attack against an adversary's airborne minelayers en route to the mine laying areas.

The Australian Defence Force (ADF) does not possess an offensive mining capability, and for the majority of ADF military operations some form of defensive MCM will be required. For example, defensive MCM operations are needed to protect expeditionary forces used for maritime power projection, to defend sea control forces operating in the littorals, and to counter an enemy's efforts to deny Australia the use of the sea. Defensive MCM operations are carried out to remove or reduce the threat after sea mines have been laid and include:

- passive measures, such as the localisation, identification and avoidance of the threat through intelligence; mine and obstacle avoidance sonar; peacetime route survey operations, route selection and publication of mine danger areas
- active measures, such as the use of MCM assets to remove, destroy or neutralise the mines, or delineate the probable limits of the minefield.

The two main measures are minesweeping and minehunting. Minesweeping techniques use either influence or mechanical sweeps towed behind the minesweeper. Influence sweeps are designed to emulate the magnetic and/or acoustic signatures of a surface or sub-surface target and explode the mine. Mechanical sweeps are designed to cut the mooring cables of buoyant mines, using explosive cutters attached to the sweep wire, allowing the mine to float to the surface for subsequent disposal. Influence minesweeping is conducted by towing a specially designed rig astern of a minesweeper. These can be used in any combination to precisely emulate the magnetic and acoustic signature of the target vessel to these types of mine.

Minehunting involves detecting and classifying sea mines using high definition sonar. Once classified as a 'possible' mine, remotely controlled underwater mine disposal vehicles or clearance divers can be deployed to identify and destroy or neutralise the mine. The principal advantage of minehunting over minesweeping is that minehunters use forward-looking sonar, which enables the vessel to avoid passing over a mine while searching. It is currently the only practical MCM technique to counter the pressure mine.

The effectiveness of the MCM effort is expressed in terms of risk to the transitor and/or levels of confidence. For example, the outcome of a clearance operation may result in a 90 per cent confidence level that the first transitor would not interact with a mine. Therefore a mixture of the risk that is acceptable to supported commanders, the clearance required to reduce that risk and the time taken to achieve that clearance, determines

the end state of operations. In some cases the required level of clearance may not be achievable in the time required and the supported commander will have to make the decision to either accept the higher risk or extend the time allowed for the operation.

Constabulary and Diplomatic Tasks

In addition to their primary military functions, RAN MCM ships and units can contribute a wide range of constabulary tasks such as search and rescue (SAR), ADF aid to civilian authorities, environmental and resource protection, and peace operations. The CDTs possess specialist underwater search and deep water diving support capabilities, which also makes them well suited to performing SAR operations or assisting police divers in this task. The RAN also provides clearance divers to the Australian Army Tactical Assault Group East for the conduct of maritime counter-terrorism operations, support to major fleet unit operations for an enhanced boarding capability and for EOD/IEDD support to operations in Afghanistan. MCM units also provide an underwater or land-based EOD and IEDD device disposal capability to assist police. MCM ships can contribute to fisheries protection and the prevention of illegal immigration, by supplementing patrol combatant and surface combatant patrol operations. In addition MCM ships have contributed in recent years to ADF and coalition peacekeeping and peacebuilding operations in Bougainville, East Timor and the Solomon Islands, by providing a stabilising presence and contributing to patrols intended to monitor ceasefires.

RAN MCM ships and units also contribute to a range of diplomatic tasks including assistance to allied and friendly nations, evacuation operations, and humanitarian assistance and disaster relief. MCM ships and units can conduct preliminary reconnaissance, survey and, if necessary, clearance of approaches to beach landing sites used in operations undertaken to protect or evacuate Australian nationals during regional crises. Since 1945, RAN MCM units have also cleared enormous quantities of mines and unexploded ordnance from Southeast Asia, Papua New Guinea, and the South West Pacific islands. Each year CDTs respond to a variety of EOD taskings in Australia involving the discovery of mines laid during World War II (WWII). They also provide EOD assistance to other nations within the region to deal with discarded WWII ordnance. Additionally, they have contributed to regional disaster relief operations and the clearing of passages through reefs.

An Eye on the Future

The future direction and concepts for MCM will be shaped by an understanding of the expeditionary capabilities currently being delivered to the ADF. Certainly, mine warfare will not be less important in future. The opposite is the case, since mine warfare will permeate across all activities that the ADF undertakes at sea. The RAN does not just rely upon a few specialist personnel operating a small number of MCM vessels but rather deploys mine warfare specialists across the fleet to undertake passive and

active countermeasures at home and abroad. The current mine warfare force is evolving and navy people are currently working hard re-examining mine warfare concepts and doctrine in an effort to guide the future capability.

Published as Semaphore Issue 10, 2010

Notes

1. Stanely R Arthur and Marvin Pokrant, 'Desert Storm at Sea', US Naval Institute *Proceedings*, May, 1991, p. 86.

Submarines In Australia's Future Maritime Strategy

Rear Admiral James Goldrick, AM, CSC, RAN

The following is an edited version of a speech given by Rear Admiral James Goldrick, RAN, on 11 November 2010 at the Submarine Institute of Australia Conference in Fremantle, Western Australia.¹

My intent is to outline some key aspects of the role of submarines within Australia's future maritime strategy. I will explain how submarine capabilities will be significant to every element and stage of the implementation of that strategy. Let me add three riders. First, I do not intend to focus on detailed scenarios, but on concepts. Second, my discussion, so far as it relates to technology, will focus on what is available or nearly here. This is because it is the ability to exploit technology that provides capability and, however 'pure' the strategic concepts, their execution is defined by the extent and limits of the capability available. Third, I intend to focus on the warfighting roles of military forces in discussing submarines and national strategy. If we think of the span of maritime tasks as encompassing diplomatic, constabulary and military roles, it is clear that submarines find most of their work - though not all - in the military and higher stakes diplomatic aspects.²

The 2009 Defence White Paper

The 2009 Defence White Paper, *Defending Australia in the Asia Pacific Century: Force 2030*, lays down a clear requirement for the Australian Defence Force (ADF) to 'control our air and sea approaches against credible adversaries ... to the extent required to safeguard our territory, critical sea lanes, population and infrastructure'. This strategy does not entail a purely defensive or reactive approach. If necessary, Australia intends to conduct proactive combat operations against an adversary's military bases, staging areas and forces in transit. Our operations will be conducted to achieve as precise an application of force as possible in ways that the adversary is not expecting.

This is not a strategy of denial, but one of control. Increasing recognition of the importance of sea control has been a feature of the progressive development of Australian strategic thought and policy over the last

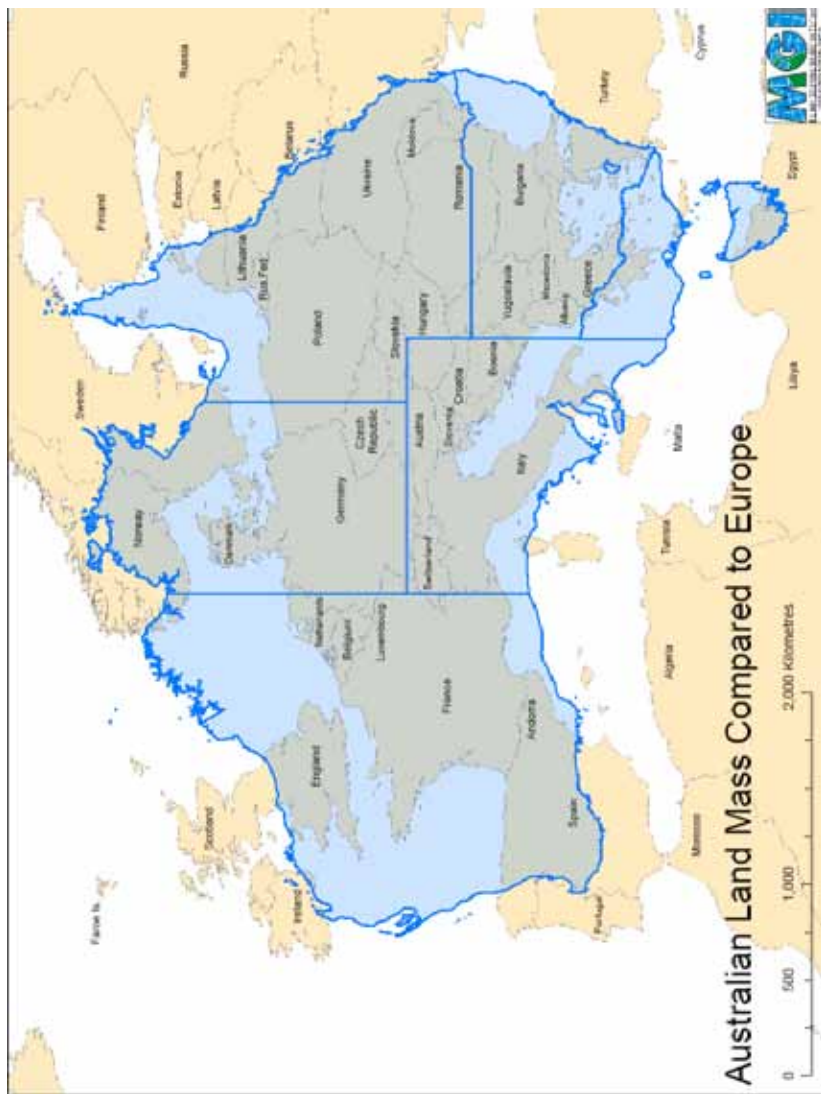
decade. Of particular note, the White Paper specifically mentions not only territory but 'critical sea lanes', in which Australia has an interest. This interest was very recently reaffirmed by the Minister for Defence at the ASEAN-Plus meeting. The White Paper deliberately does not prescribe exact boundaries of action but declares that operations will be carried as far from Australia as possible.³

The White Paper lays out other aspects of our Defence strategy which will depend significantly upon our maritime capabilities, particularly at the higher level. These include the ability:

To contribute to military contingencies in the Asia-Pacific region, including ... assisting our Southeast Asian partners to meet external challenges, and to meeting our alliance obligations to the United States.

East Asia lives by seaborne trade, its population resides by or near the sea, there is increasing dependence upon offshore resources and our dependence upon the quality of the maritime environment remains critical. Thus, it is highly likely that calls for Australian involvement in a contingency would have a significant if not a predominantly maritime element. Many of the requirements of such contingencies in terms of naval operations could well be similar, whether the situation involves the defence of Australia or our wider interests.

The following discussion provides an over-view of those requirements without attempting to break them down into a 'national' or a 'coalition' situation. That said, it is appropriate to highlight the reality of Australia's strategic geography, summed up by Geoffrey Blainey's phrase 'the tyranny of distance'. Whether the military problem is within the immediate vicinity or further afield, *any* Australian military capabilities must possess substantial range and endurance to accomplish their tasking. Dealing with this reality is one of the central challenges we face in determining the form and size of the future submarine, just as it is for our surface and air assets. It is not something that is well understood by all in the strategic studies community or the media. Indeed it is arguable that one of the key problems with Australian strategic thought is not so much that it has often been 'continental' rather than 'maritime', but that it has been unconsciously founded in northwest European ideas of distance with consequential assumptions about strategic and operational reach and what is needed to achieve them.



The tyranny of distance

Submarines and the Network

What will be the submarine's place in the implementation of the declared strategy? It is important to dispel one popular misunderstanding about the nature of submarine warfare – a misunderstanding relating as much to the history of submarines as it does to their present and future. Submarines have seldom been 'independent' in action. Certainly, in terms of tactical engagements this has often been the case. But submarines in reality have *always* been elements of networked forces and able to exploit their full potential *only* through their access to the knowledge network. Because of their nature, submarines benefit most from information which can be provided without the need to endanger their covert situation. This is particularly true for conventional submarines because of their more limited ability than nuclear powered units to reposition themselves to exploit opportunities. The better the picture that a submarine possesses the more likely it is that it will be in the right place at the right time.

The 'network' underlay both the Allied and the Axis submarine campaigns of World War II and it underlay the long and still largely unknown undersea campaign of the Cold War. The network underlies and will become even more critical to the execution of any operations which the ADF may undertake in the future. Submarines are, of course, also key contributors to the network through their own capacity to gather information, but providing such information, even with access to the most sophisticated of low probability of interception communication systems, also carries certain risks of detection. In many circumstances, submarines work best when they can draw quietly from a comprehensive intelligence, surveillance and reconnaissance picture which is externally provided.

Submarines and the Maritime Campaign

Submarines will have a vital contribution to make through all the elements of the maritime campaign, and here numbers do count. Whatever the contingency, it is clear that there will be demands from many directions.

As a situation develops, submarines will not only be able to act as intelligence gatherers, but also as potential signals of national resolve; signals which have the advantage of being ambiguous, which can imply a high degree of determination, but which do not irrevocably commit a government to the use of force. Both these missions place a premium on

range and, particularly, endurance. The latter is not simply a matter of fuel capacity, but one which involves a whole range of other factors from equipment sustainability through to individual and collective human stamina. Such missions also benefit significantly from the greater unit availability possible in a large force because the known presence of one submarine in a particular area does not mean that other localities are necessarily safe for the potential adversary.

It is worth noting that submarines are more valuable as components of a balanced force. Their ability to complicate an adversary's problem is all the greater when there are other complicators – such as airborne and surface assets. The cumulative effect of complication may either confine or completely eliminate an adversary's options.

Submarines and Sea Denial

Submarines can thus contribute to the achievement of sea denial – preventing the adversary from using the sea for their own purposes – particularly if the opposition's undersea warfare capabilities are limited. If direct action is required, then submarines are potential minelayers, insertion platforms for special forces or land attack missile launchers – and a ship at a wharf or aircraft on a runway can be targeted in the same way as buildings and permanent infrastructure. If the enemy does sail, then the submarine can deploy torpedoes or anti-ship missiles. The more options that are available to the boat, the more effective it can be in closing off options to the enemy – a strong argument for a significant weapons capacity.

Submarines and Sea Control

In our strategic concept, denial will have a role, but generally one that is a subset of sea control. And again submarines have other parts to play in achieving the degree of control that will be required to use the sea for our own purposes. If necessary, they can provide cover for other forces by surveilling and patrolling focal areas. Their ability to remain covert for extended periods is particularly useful in these circumstances, as is their ability to develop a high level of understanding and awareness of what is taking place in the surrounding water mass. In sufficient numbers and operating in coordination, submarines may provide similar coverage for relatively large sea areas, acting to cover the flank of other operations.

Submarines also have much to offer when operating in direct cooperation with surface forces. Better communications, precise navigation systems and improved sensors are creating new opportunities for achieving direct support. Given the likely developments in networking, greater integration of surface, air and sub-surface assets is likely to be a key theme of future operations.

Submarines and Maritime Power Projection

As a launch platform for land attack missiles and special forces, the submarine is a unit for power projection in its own right. But my own view is that submarines will tend to deploy these capabilities more to ensure the free access of other forces into a designated area. They have particular strengths in dealing with anti-access forces, as well as assisting with precursor environmental assessment. Again, numbers count because such operations may be required not only within the intended locality into which, for example, a land force may be inserted, but further afield, to deal with forces which might otherwise intervene. Some operations can certainly be sequenced and separated, but the dynamic nature of maritime operations often means that denial, control and projection activities are taking place at the same time – and if necessary for extended periods.

Conclusion

This survey of the roles of submarines and their place in Australia's future maritime strategy has necessarily been broad brush. Nevertheless it should be clear that submarines form a key part of the execution of that strategy. Submarines represent an integral and abiding component of any defence force which seeks to exert any real measure of influence and control over conflict at sea, but it must be remembered that the maritime environment is too complex for any single asset, however sophisticated, to provide a universal answer.

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Notes

1. See www.submarineinstitute.com.
2. See Royal Australian Navy, *Australian Maritime Doctrine*, (2nd edn), Sea Power Centre - Australia, Canberra, 2010, chap. 10.
3. Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, Canberra, 2009, p. 53.



HMAS Pysche under way in Southeast Asia

HMAS *Psyche* – The Forgotten Cruiser

Mr Petar Djokovic

HMS *Psyche* (pronounced *Sigh-kee*), a *Pelorus* class protected cruiser named after the Greek mythological depiction of the soul, was laid down for the Royal Navy (RN) at the Devonport Dockyards on 15 November 1887 and was completed three years later. She served on the Australia Station from December 1903 and was one of just three RN cruisers still serving on the station when the Australian Fleet Unit arrived in Sydney on 4 October 1913. She departed Australia shortly afterwards and was serving in New Zealand waters at the outbreak of World War I on 4 August 1914.¹

The early months of the war were busy for *Psyche* as the cruiser was involved in the capture of the German Protectorate of Samoa as well as other German assets in the Pacific Ocean. She also formed part of the escort force for troop convoys bound for the Middle East from New Zealand. She decommissioned on 22 January 1915 and was laid up in Sydney.²

On 13 May 1915, the Prime Minister's Department requested that the Admiralty loan *Psyche* to the RAN as a training vessel. The Admiralty responded positively on 1 June and exactly a month later HMAS *Psyche* commissioned into the RAN under the command of Commander (later Rear Admiral) Henry Feakes, RAN.³

Before *Psyche* could be commissioned, however, the Admiralty enquired with the Australian Commonwealth Naval Board as to whether the cruiser might take a more active role in the war in Asia. Although the Middle and Far East were remote from the European theatres of war, Germany had been actively fomenting sedition in India and Burma as early as 1911, controlled primarily through the German Embassy in Washington, even planning to smuggle arms and propaganda in support of a general uprising.⁴

While the Allies were aware that such activity was taking place, they remained unaware of its specifics. *Psyche* and HMAS *Fantome* (Lieutenant Commander Lewis Jones, RN), at that time an unarmed survey ship, were hastily prepared to form part of a patrol in the Bay of Bengal. Both ships were necessarily manned by sailors still under training, augmented by experienced petty officers. *Psyche* departed Sydney on 16 August for Asian waters where she would remain for the next two years.

Psyche arrived at Singapore on 4 September and departed two days later for Rangoon with orders to organise a patrol scheme for the Burmese coast. Upon his arrival at Rangoon on 10 September, Feakes found three vessels of the British India Steam Navigation Company's fleet had already been taken up and were fitting out for patrol duties, each commanded by an officer of the Royal Indian Marine. He established a coastal patrol the very next day with a military detachment aboard each vessel.



HMAS Psyche

Following a brief visit to Mandalay, where Feakes discussed his patrol scheme with the General Officer Commanding, Rangoon (Major-General Sir Herbert Raitt, KCIE, CB), *Psyche* returned to Rangoon and set about correcting various engine room defects. Upon HMS *Diana's* arrival on 20 September, Captain George Hutton, RN, assumed command of the Burma Coast Patrol and appointed Feakes as Senior Naval Officer, Burma, with the 3 armed patrol vessels and 10 coastal patrol launches under his command. *Psyche* proceeded to sea for her first patrol and inspection on 22 September.

Patrol and inspection duties remained the norm for *Psyche* for the remainder of the year. Patrols were typically of 10 to 12 days duration, at the conclusion of which the ship would return to Rangoon for two to four days for coal. Training classes, drills, evolutions and gunnery exercises continued during the patrols, while variations in the weather, ranging from extreme heat in the north to heavy storms in the south, made conditions very difficult for the crew. A general malaise affected the ship during this period. From 14 October to 2 November, 12 crew-members were admitted to hospital for various ailments while a further 14 were sick on board.⁵

Psyche returned to Rangoon on 17 January 1916 where orders were received to demobilise the Burma Coast Patrol, which was completed a week later. By this time it had become apparent that any German plots in India and Burma had collapsed and that the centres of intrigue had shifted to the neutral territories of the Malay Peninsula.⁶ *Psyche* proceeded to Penang, where she arrived on 28 January, to await further orders. The following day eight ratings and an engineer midshipman were discharged to the sloop HMAS *Una* for passage back to Australia having been found unfit for service in the tropics. *Psyche* departed Penang at the end of the month for Port Blair where she was placed at short notice for service in the area as well as conducting periodical patrols off the east and west coasts of Sumatra.

On 12 February, while visiting Port Swettenham (Kelang), tensions aboard ship finally came to a head and seven stokers refused duty, an action that eventually led to their respective court martials. There were a number of issues that led to this incident: *Psyche* was an old ship with little to alleviate the difficult conditions experienced in the tropics; the long and monotonous hours spent on patrol; an intensive training program; the malaise that affected the crew almost from commissioning; but the one thing that eventually brought these tensions to the surface was food.

Complaints about the food on board were common virtually from the time *Psyche* left Australian waters. Tinned fish, green or rotten meat and rotten eggs were all too common in *Psyche's* mess with one stoker testifying that the food he obtained whilst in port was of a better quality than that served up by the mess.

At 2200 on 12 February, Stoker Albert Hummerston refused duty in protest at the standard of food on board and was consequently placed under sentry's charge. Over the course of the evening six more stokers refused duty and all were consequently placed under sentry's charge. All seven were found guilty of wilful disobedience of a lawful command and received sentences ranging from 12- to 24-months imprisonment as well as dismissal from the RAN. With the stokehold operating with a reduced complement, 15 native stokers were taken on in Singapore until a draft of 10 RAN stokers joined the ship on 25 April.



Western Australian sailors aboard HMAS Psyche circa 1916

Psyche returned to patrol duties in the Gulf of Siam on 7 March before returning to Singapore on 17 March. She departed Singapore once again two weeks later acting as escort for a convoy of Russian military transports headed for Europe. Relieved by HMS *Venus* on 4 April, *Psyche* returned to Port Blair for patrol duties in the Bay of Bengal. Whilst at Port Blair, the opportunity was taken to land one watch every day, weather permitting, for rifle drills or a route march, and sea bathing. It was the monsoon season, however, and strong winds and heavy rain were common.

Psyche continued on patrol duties until 2 July when she arrived at Hong Kong for her annual inspection and refit. During this period, 6 officers and more than 70 ratings were landed to the naval hospital at Hong Kong for treatment of various ailments. Combined with some 40 more ratings and an officer sick on board, around half of *Psyche's* complement were incapacitated due to illness. The situation prompted the ship's surgeon, Clifford Henry, to report that the crew was in urgent need of a spell in a cold climate.⁷

Meanwhile on 6 July, Lieutenant Herbert Teale, RN, commissioned HMS *Moorhen* for local river service, crewed by 36 ratings from *Psyche* with Surgeon Henry acting as the ship's medical officer. *Moorhen* decommissioned on 23 July and the crew rejoined *Psyche*, which, based at Hong Kong, recommenced patrol duties off the south coast of China on 14 August. These operations, once again, proved to be long and arduous, though Feakes was pleased to report a general improvement in the overall health of the ship's company, possibly due to the cooler conditions off the Chinese coast.⁸

Operations in Chinese waters continued until 14 October 1916 when the ship was ordered to Singapore. Patrols in the Bay of Bengal and off the coast of Sumatra recommenced on 20 October, beginning with a patrol and flag-showing cruise taking in Penang, Port Blair, Rangoon, Calcutta, Madras and Colombo. These operations continued until late March 1917 when *Psyche* was detached for escort duties for military transports between Burma and India, which continued through April and May, before returning to patrol duties in June.

On 16 July 1917, *Psyche* returned to Singapore where she remained awaiting the arrival of her relief, the cruiser HMS *Suffolk*. *Suffolk* arrived on 11 August and *Psyche* departed Singapore on 31 August for Sydney via Dili, Thursday Island, Townsville and Brisbane. She arrived in Sydney, in dire need of a refit, on 28 September and decommissioned on 16 October.

Psyche's service in Asia had come to an end more than two years after she had departed Sydney, and the ship had not fired a shot in anger. The crew, however, had performed an arduous task, preventative in nature and typical of naval patrol work. On the surface, the lack of enemy encounters may lead some to question the value of the work done by *Psyche* in Asia. Indeed, the crew themselves questioned its value and wondered what contribution had they made to the war effort. However, considering

the evidence of German supported seditious activity which emerged after the war, that lack of enemy action is proof of the success of Allied operations in the area. The presence of *Psyche* and other Allied ships became well known in the Bay of Bengal and played a central role in preventing the very real possibility of a general uprising, which probably would have resulted in the redeployment of Allied forces away from the decisive struggle in Europe.

Psyche recommissioned again on 20 November 1917 under the command of Commander George Curtis, RAN, for patrol duties primarily off the Queensland coast, prompted by the actions of German raiders in and around Australian waters. After a brief and largely uneventful commission of just five months, *Psyche* decommissioned for the last time on 26 March 1918.

Psyche remained moored in Sydney Harbour and was eventually sold as a timber lighter on 21 July 1922. She later sank in Salamander Bay, Port Stephens.

Published as Hindsight Issue 12, 2010

Notes

1. John Bastock, *Australia's Ships of War*, Angus and Robertson, Sydney, 1975, p. 51.
2. Bastock, *Australia's Ships of War*, p. 51.
3. Telegrams between Commonwealth of Australia Prime Minister's Department and Admiralty, 13/5/1915 and 01/6/1915.
4. Arthur W Jose, *The Official History of Australia in the War of 1914-18 Vol IX*, Angus and Robertson, Sydney, Chap. VIII.
5. HMAS *Psyche*, Report of Proceedings, 04/11/1915.
6. Jose, *The Official History of Australia in the War of 1914-18 Vol IX*, p. 219.
7. HMAS *Psyche*, Report of Proceedings, 12/7/1916-16/8/1916.
8. HMAS *Psyche*, Report of Proceedings, 04/10/1916.

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