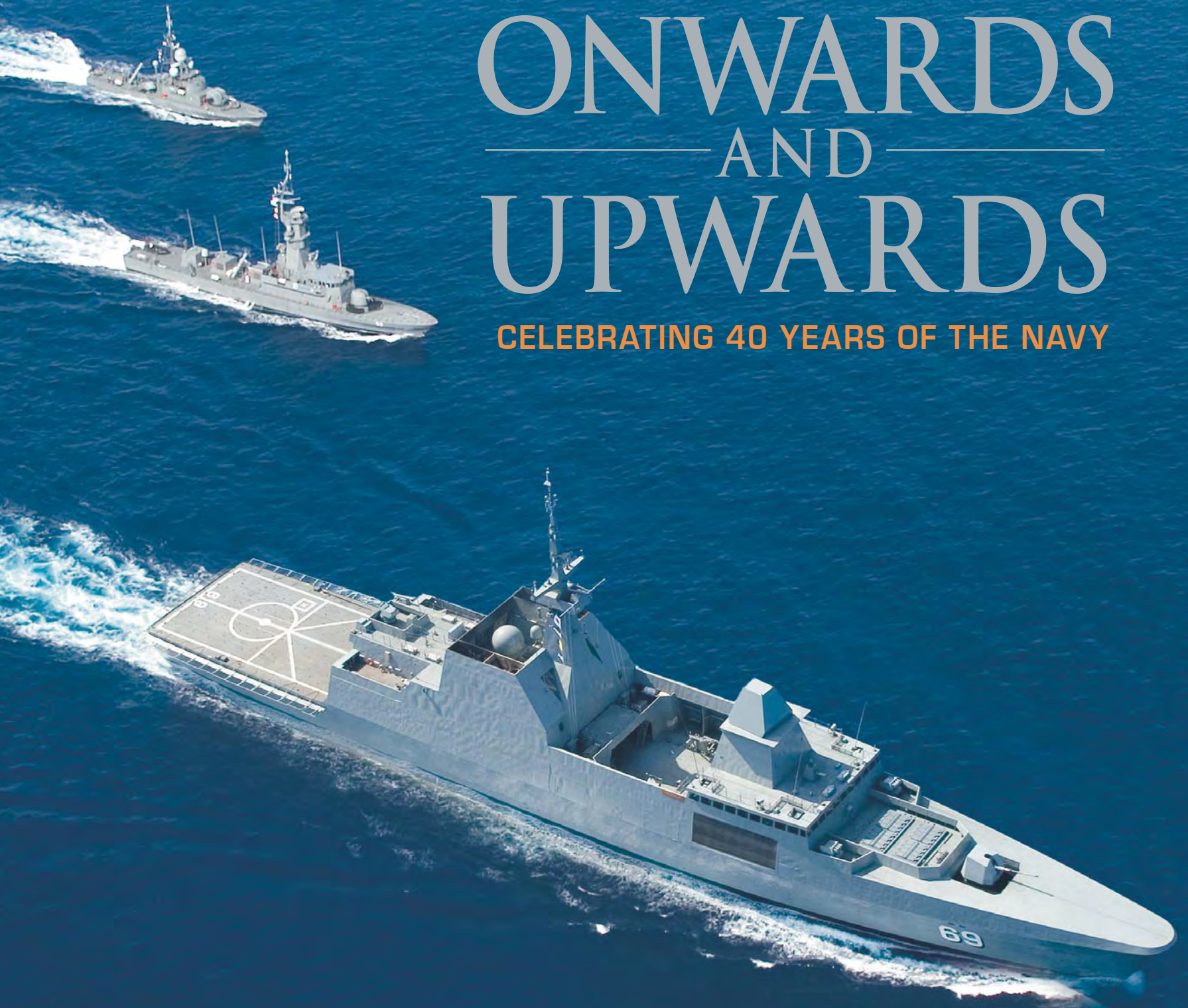


REPUBLIC OF SINGAPORE NAVY

ONWARDS — AND — UPWARDS

CELEBRATING 40 YEARS OF THE NAVY





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FOREWORD



THE SINGAPORE NAVY came from humble beginnings. Those present at the birth of the Singapore Navy on that historic day on 5 May 1967 would have had high aspirations for the Navy when they saw the Navy Ensign raised for the very first time at Telok Ayer Basin. The challenges that lay ahead must have been daunting. But they took up the challenges and pressed on. In just 40 years, the Navy has grown from operating two wooden ships to be a modern balanced force.

The Navy's transformation has been impressive and mirrors Singapore's transformation. Indeed, their destinies are linked. The sea is Singapore's lifeline and the foundation on which rests Singapore's continued economic progress and viability as an independent nation. A strong Navy, operating as an integral part of a very capable SAF, plays a pivotal role in protecting Singapore's freedom of access to the sea.

The Navy has dealt with the challenges at each stage of its development with vision and fortitude. Having personally witnessed how the Navy has risen each time to the call of duty, I am confident that the Navy will continue to play its role as a vital force that stands ever ready to safeguard Singapore's national interests, in a complex and fast changing world.

That the Navy has come so far in 40 years is because of the unstinting service and sacrifices of her men and women, past and present. Looking ahead, the fine values embodied by the servicemen and women of the Navy will serve as an inspiration to all who are serving in the Navy today and in the future. I congratulate the RSN on its 40th Anniversary, and I wish the men and women of the Navy success and fulfilment as they work to move the Navy "*Onwards and Upwards*" in the service of our nation.

Teo Chee Hean
Minister for Defence



PREFACE

FOUR DECADES HAVE COME AND GONE since the first raising of the Navy Ensign that marked the birth of the Republic of Singapore Navy. 40 years is a timely juncture to look back on our Navy's progress and achievements, reflect on the crucible moments that have strengthened the Navy, and celebrate the things that the Navy has done right, even as we chart the Navy's directions for tomorrow.

This book tells the Navy story. The Navy Song has been used as the frame to tell this story because it aptly characterises the different themes of the chapters in the book. This book speaks of the Navy's beginnings, the "storms" it weathered, the development of the Navy, its operations, and how it works with the rest of the SAF and other defence partners to secure the peace and protect Singapore's waters and Sea Lines of Communications.

This book also celebrates the spirit and achievements of the Navy's people. It pays tribute to those who have served and are serving in the Navy. From the early pioneers, whose unwavering and adventurous spirit inspires us still, to the energetic recruits of today who hold the future of the Navy in their hands. Even as we celebrate together the proud and joyous occasion of the Navy's 40th Anniversary, we look forward with excitement and anticipation to the future.

Finally, I would like to thank the team led by LTC Timothy Lo for conceptualising, writing, editing and designing this book, as well as the many people who willingly contributed stories and photographs to make it more interesting and insightful. Indeed, this book has been a collective enterprise that we can proudly say is "a book of the Navy, written by people from the Navy". This book is dedicated not only to Singapore's "Sons of the Sea" – past, present and future – but also to our families, whose support and encouragement have allowed us to go about our duties diligently and wholeheartedly.

RADM Ronnie Tay
Chief of Navy

NAVY SONG

*From a humble beginning the day we were born,
Onwards and upwards we've moved on and on.
Never looking back we'll always grow.
Onwards and upwards the best we'll show.*

Chorus:

*We're the ones the sons of the sea.
Mighty men of the Singapore Navy.
We will stand for the right,
We will fight to the end.
We will always be true to our land.*

*Our waters to guard to ensure they are safe.
It's a great task only meant for the brave.
It does make us proud to know that we
All play a part to protect our seas.*

*With our comrades in arms from the Land and the Air,
Together we stand in defence of our land.
Never flagging in adversity,
Forward we'll march on to VICTORY.*



THIS WAS ORIGINALLY the Midshipman Song and was written in 1974 by two Midshipmen, Melvin Huang and Lionel Liew. This song was refined, and a third stanza added by RADM(Ret) Teo Chee Hean, Minister for Defence, when he was the Chief of Staff (Naval Staff) and Director, Joint Operations and Planning Directorate in 1989. It was eventually adopted by the Republic of Singapore Navy (RSN) as the Navy Song.

Sung at all major Navy events, this song is etched into the psyche of the men and women of the RSN. It is a timeless creed that defines the RSN. It stands as a reminder of the Navy's humble beginnings, its identity, its missions, its values, and its commitment to integrated operations with the rest of the SAF.

This book uses the Navy Song as the frame to tell the RSN Story. Chapter 1 (From A Humble Beginning...) talks about life in the fledgling Navy, its early struggles and the Navy's development till the 1980s. Chapter 2 (Never Looking Back We'll Always Grow...) traces the RSN's rapid development and transformation since the 1980s and also provides a glimpse into some of the future capabilities of the RSN.

Chapter 3 (With Our Comrades In Arms...) highlights the expanding spectrum of operations that the RSN needs to contend with. It talks about how and why the RSN needs to work closely with not only the rest of the SAF, but also with other agencies within Singapore and with other navies for a whole range of operations. Chapter 4 (All Play A Part To Protect Our Seas...) points out the many engagements between the RSN and other friendly navies. It explains how such engagements build friendships, mutual confidence and inter-operability, and how working with other navies helps to shape a more secure regional environment.

Chapter 5 (Mighty Men of the Singapore Navy...) features the strong ties that knit the Navy Family together as one. It weaves together human interest stories that tell of the tenacity, values, passion and commitment of its people. Chapter 6 (Onwards and Upwards) has the Chief of Navy reflecting on the development of the RSN and highlighting the key focus areas that the RSN will need to pay attention to. The book ends with an epilogue, where junior sailors and young officers – who form the future of the Navy – voice their hopes and aspirations for the RSN.

PROLOGUE

SINGAPORE is a very small dot on the world map. It would have been difficult in the early 1820s to imagine how the small sleepy fishing village that Sir Stamford Raffles stepped foot on in January 1819 subsequently became numbered amongst the foremost of Britain's Crown Jewels. Yet Raffles had the foresight back in 1819 to declare that Singapore would one day become Britain's "most important station in the East, and of higher value than whole continents or territories."

That Singapore could become a small dot like no other stems from the sea. Singapore's borders are maritime. Its neighbourhood is maritime. The sea is Singapore's lifeline and link to the outside world. A maritime nation like Singapore relies on the freedom of access to the sea for its prosperity and depends on the sea lanes to ensure an unbroken supply of daily necessities. Singapore owed its rapid development and economic success in no small measure to the good fortune of being strategically located astride the world's key and busiest shipping lanes. This enabled Singapore to flourish, first as a classical emporium built on the foundation of entrepôt trade and now, as a maritime hub of world-class standards. Singapore is today the world's busiest container port and the largest transshipment port across the globe, connected to more than 600 ports in 120 countries around the world.



Security, Survival and Success: Singapore and the sea are indivisible.

Singapore's security, survival and success continues to be inextricably linked to the sea. Singapore and the sea are indivisible. Cut off from the sea, Singapore would be effectively landlocked and choked off, its survival hanging thinly in the balance. This point struck home starkly in October 1914 when the German warship *Emden* sank many allied ships in the seas around Singapore. *Emden* disrupted Singapore's trade for a brief period. Prices of basic necessities in Singapore soared. Allied ships did not feel safe to sail in this region until the *Emden* menace was removed. This episode gave added weight to the argument for building a major naval base in Singapore to protect Britain's possessions in the Far East and their freedom of access to the sea. Singapore became the "Gibraltar of the East".

Today, the vital tasks of ensuring Singapore's seaward defence and protecting its Sea Lines of Communication (SLOCs) are the *raison d'être* of the Republic of Singapore Navy. It is a high calling. In the words of the Singapore Navy song, it is "a great task only meant for the brave". This book tells the story of how the Singapore Navy transformed itself in a space of 40 years from a two-ship Navy to a well-balanced and strong naval force, capable of fulfilling a full range of missions spanning peace to war. It testifies to the unflinching spirit of "never flagging in adversity" that characterises the men and women of the Singapore Navy, past, present and future.



CHAPTER 1

FROM A HUMBLE BEGINNING

BUILDING THE NAVY IN THE INITIAL YEARS

STARTING FROM SCRATCH

IT WAS 5 MAY 1967. Contingents of men and women from the Singapore Naval Volunteer Force (SNVF) stood proudly at attention at RSS *Singapura*, the Headquarters of the SNVF. Parading in smartly starched white uniforms, they were to witness for the first time ever the raising of the new white-and-red naval ensign that bore the nation's crescent moon and five stars and an eight-pointed mariner's star. Ensign fluttering softly in the wind, that day was to go down in history as the beginning of the Singapore Navy (although the name, Republic of Singapore Navy, was only adopted on 1 April 1975).



5 May 1967: Ensign hoisting ceremony at RSS *Singapura*, the headquarters of the Singapore Naval Volunteer Force (SNVF).



Like the young nation of Singapore, the Singapore Navy was born in tumultuous times. The separation from Malaysia had just taken place. Many did not give Singapore much chance of surviving, let alone prospering. However, the government and people remained undaunted and resolute. They were determined for Singapore to succeed and to protect the independence that was thrust upon them. With memories of World War II and *Konfrontasi* fresh in their minds, securing the fledgling nation's sovereignty was never more pressing. Security was of utmost priority. Yet, there was hardly any defence force to speak of. All Singapore had at independence were two army battalions and two wooden ships. There was no Air Force.

Singapore had to build its defence force from scratch. It was a Herculean task, made even tougher when the British announced in January 1968 that by the end of 1971, they would pull out of their military bases east of the Suez. The hope that the British would stay on to give Singapore time to build up a credible defence force was shattered. The nation had to defend itself on land, in the air and at sea. It had to build up its defence forces fast.

With Singapore completely surrounded by water, the need for a Navy was clear. Aside from securing its sovereignty, the Republic also had to combat threats posed by sea robbers operating in the waters around Singapore. The SNVF became responsible for the defence of the sea. With only a handful of volunteers and two wooden ships (RSS *Panglima*, a Ford-class patrol craft; and RSS *Bedok*, a former police patrol craft), it was a tall order.

These lightly armed ships had a top speed of 15 knots (28km/h) and were only suited for constabulary duties. While their presence was felt in the Singapore Strait, they would have been hard pressed to pursue sea robbers in high-speed boats, let alone stand a chance against warships of that era.

Plans were drawn up to develop a Navy that would better safeguard Singapore's waters. The Navy needed more capable ships, needed to "regularise" its volunteer force, and needed to recruit and train more men and women.

In June 1968, a S\$30-million contract for the construction of six patrol craft was signed. The first two of these craft were built in Portsmouth, England and the remaining four built locally. These 110-foot craft were touted as Singapore's "Super Boats" and were set to be the nascent Navy's most well-armed patrol craft, capable of speeds greater than 30 knots. They would form the backbone of the Navy, playing a key role in maintaining security, deterring and preventing smuggling, sea robberies and the infiltration of illegal immigrants.



▲ **Pioneer Defenders of Our Seas:** RSS *Panglima* and RSS *Bedok* – Singapore's first two naval ships were entrusted with the mammoth task of defending Singapore's waters in the early days.

▼ **Strengthening the Early Navy:** Singapore's *Independence*-class Patrol Craft, ordered in 1968, were able to achieve speeds in excess of 30 knots. They formed the backbone of the early Navy.



To build a professional navy, sailors had to be well-trained, disciplined and leaders in their own right. But first, the Navy had to recruit sailors to fill its ranks. Sailors were drawn from all walks of life. So long as they were between 17½ and 23 years old, possessed at least a Secondary Two certificate, were physically fit and had good eyesight, they fitted the bill. Recruits joined for a variety of reasons. Some joined for the adventure. Others joined to learn a new trade. Yet others joined simply to earn a living.

"I joined the Navy as a Missile Control Artificer. I didn't know what a missile was then, but the promise that I would learn a skill made me join the Navy. I could say that the Navy literally 'picked me up from the drains' and gave me a career!" SWO Goh Huat Chye, Head Training Branch, HQ Naval Logistics Command (NALCOM), recounts.



Interestingly, another recalled that he was too short to be a pilot. While that may have been true, he certainly did not fall short in his career in the Navy. He distinguished himself as a naval officer, and eventually rose through the ranks to become the Chief of Navy from 1992 to 1996. RADM(Ret) Kwek Siew Jin recounts, "The recruitment officer said, 'Sorry, we cannot take you in as a pilot, but would you like me to put you in for the post of Midshipman?' I said, 'Midshipman? What is a Midshipman?' The recruitment officer said, 'I don't know. But it is a post in the Navy. It is an officer appointment.' So I said, 'Okay, put my name in, nothing to lose'."

Despite the variety of circumstances under which they may have joined, these people made the Navy their career and became pioneers of the Navy.



▲ **Making the Navy their Career:** Regardless of their background, our pioneers established their careers within the Navy.

◀ **Our Pioneer Sailors:** Pioneer sailors from all walks of life, who became a part of the Navy Family.



◀ **Charting the Future of the Navy:** Midshipmen undergoing navigation training in the early days.

OUR PIONEERS

By early 1969, the first batch of 160 naval recruits comprising 20 electricians, 20 engineers and 120 seamen had begun their formal naval training. Training was provided by instructors from the Royal New Zealand Navy because Singapore did not have any naval experts. While training for seamen and naval technicians was conducted locally, Midshipmen were sent abroad to Britain, Australia, New Zealand and Canada to learn from established navies and to gain operational exposure.

The future of the Navy was in the hands of these pioneers, who instinctively took on the mantle of pathfinders. RADM(Ret) Kwek, who was one of those sent abroad to train with the Royal Australian Navy in 1969, summed it up when he said, "It was for us to put together a Navy of our own."



▲ **Learning from Established Navies:** Our pioneers abroad, training with other sailors from established foreign navies.

TRAINING IN THE EARLY DAYS

The first training school the Navy had was on board RSS *Singapura*, an ex-Japanese Minelayer. She also acted as the headquarters for the SNVF, and was berthed at Telok Ayer Basin.



▲ **Where Training Began:** Naval training school at Pulau Blakang Mati.

When the British returned Pulau Blakang Mati to the Singapore government, the Naval Training School was set up on the island, with help from the Royal New Zealand Navy. On loan for three years as part of a special New Zealand "aid package" was one officer, Lieutenant Commander A G Rhodes, assisted by ten instructors from the Royal New Zealand Navy. Their task did not stop at assisting in the set-up of a naval training school and drawing up the training schedule for the specialists. It included instruction in seamanship, communications, radar, gunnery, electronics and marine engineering. "Being assigned the task of building from scratch a navy – it was a challenge," LCDR Rhodes said.



◀ **Battle Stations! Loaded, Trained and Ready:** Our sailors manning the main gun of RSS *Panglima*.

▼ **Shining Their Ship:** After each sailing, sailors would spend time cleaning up their ship to ensure that it stayed “ship-shape”. A sailor is seen here polishing the name plate of RSS *Panglima*.

LIFE IN THE EARLY NAVY

Starting with the two wooden boats, the pioneers went about their work. Patrolling was typically a four-day affair. These wooden ships were augmented by the *Dolphin*-class harbour launches (also known as “Papa boats”). Together, they patrolled the stretch of the Singapore Strait from Sultan Shoal in the West to Horsburgh Lighthouse in the East. Tracking ships plying the Strait relied solely on rudimentary visual and radar means. With limited assets and capabilities, there was no way of getting a good situational picture of the entire Singapore Strait. Furthermore, whenever the weather deteriorated, the ships had to seek refuge near Raffles Lighthouse.

After four days of patrolling, the ship’s side would be dirtied with soot and grime (known as “tiger stripes” in Navy parlance). The ship’s deck would also be covered with salt from the sea spray. Once the ship returned to base, the crew would wash down their ship. Climbing onto a plank stage, they would reach over the ships’ sides and scrub away the “tiger stripes”. Decks would be

scrubbed till they shone, using a slurry of sand and coral affectionately known as “Holy Stone”. Brass fittings were “brasso-ed” till they sparkled.



“Life was different then. We accepted what was given to us. When the rice came out half-cooked, and that was quite common, we still ate it. We did not know how to complain. We thought it was supposed to be like that,” SWO Kwok Peng Choon, Chief Warrant Officer of Training Command (TRACOM) recounts with a laugh, on the rations they received. “Welfare was not fantastic,

but compared to the Army, our food wasn’t too bad. We looked forward to Fridays because it was ‘chicken day’, and we were entitled to a drumstick each.”

Tough conditions notwithstanding, the Navy Family spirit was slowly but surely forged in the furnace of hard work. “The ship was not just a place of work, she was home and meant a lot to us. Everybody had an eye for detail about how the ship was, how she was faring, how every part of her was maintained,” LTC(Ret) Namasevayam fondly reminisces. Time spent working on board together, cooking together and sharing confined spaces drew everyone closer as one big family.

Although our pioneers went about their work with gusto, the idea of operational readiness and what it really meant needed time to be internalised. Just imagine – ships got extra patrolling duties not because their guns could not fire, but because their ships’ sides were dirty! Things didn’t always work properly in those early days. It was rumoured that a gunner once kept the ship’s breech block in his cupboard to prevent it from rusting.



▲ **Life Before SMS (Short Message Service):** Communicating with other ships via visual signalling. But some things do not change. Flashing at sea remains a time honoured skill that continues to be practised by navies the world over.

One day, that gunner went on leave and the ship sailed, not knowing that this essential piece of equipment was conveniently stowed away!

SWO(Ret) Hussain recounts, “It took a little while for people to understand the weighty implications of their roles and responsibilities. However, things changed with the return of those who trained overseas. We started to develop a serious sense of purpose.”



▶ **Forging the Navy Family Spirit:** The ship is a compact environment where sailors work and live in close proximity. Working, sharing and looking out for one another created a unique sense of camaraderie. Pictured here is an early group of sailors unwinding after a hard day’s work.



▲ **Gaining Independence:** The first Patrol Craft, RSS *Independence*, was commissioned in December 1970.

EARLY MILESTONES

The pioneers had much to look forward to. A new naval base was being constructed on Pulau Brani. Uniquely navy beige uniforms with blue berets replaced the “Temasek Greens”. Most importantly, the first Patrol Craft (PC), RSS *Independence*, was commissioned in December 1970.

The introduction of the PC was an uplifting experience. SWO Kwok shared his thoughts. “It was brand new and what made an immediate impact was the air-conditioning! I thought to myself, ‘*Shiok ah* (colloquial term for ‘comfortable and a wonderful feeling’), aircon very powerful!’ Everybody was looking forward to serving on board!” Of course, the air-conditioning was installed to cool the electronic equipment and weaponry on board, and not so much for human comfort. But that did not matter. The PCs generated quite a buzz and heralded the Navy’s entry into the electronic age.

SINGAPORE’S “SUPER BOATS”



▲ **Sailing in Formation:** The Singapore Navy’s Patrol Craft participating in an exercise with ships from the Royal Malaysian Navy.

“With these, our Navy will be better equipped to maintain the security of our territorial waters,” said then Permanent Secretary of the Defence and Interior Ministry, Mr G E Bogaars, when he signed the contract for the building of the *Vosper Thornycroft* Patrol Craft in June 1968.

These Patrol Craft (PCs) came in two classes. A-class PCs were fitted with a 40mm Bofors gun forward and a 20mm Oerlikon gun aft, both capable of engaging air and surface targets. B-class PCs were fitted with a 76.2mm Bofors gun forward, which had a surface and shore bombardment capability, and a 20mm Oerlikon gun at the aft.

With all six PCs commissioned by January 1972, the Navy was able to sustain patrols in the Singapore Strait and fill a small part of the vacuum left by the British withdrawal in 1971. While operationalising the PCs gave the Navy its first real taste of managing seaward security, moving to Brani finally gave the Navy a home it could truly call its own. In January 1974, Brani Naval Base was officially opened by then Prime Minister Lee Kuan Yew.

At Brani Naval Base, ships could now be berthed next to the operational headquarters, along with logistics elements such as the workshops and the Naval Technical Training School (NTTS). Previously, Navy ships were moored offshore, while the headquarters was located ashore on Pulau Blakang Mati (now called Sentosa).

Brani was special in the hearts of many. Every morning, while on their way to work, the crew saw their ships bobbing alongside the wharf. Every evening, while they waited together for the ferry to arrive, they sometimes adjourned to the messes to wind down after a busy day. These unique circumstances fostered a strong esprit de corps within the Navy.

“The Navy’s a close-knit community and we knew each other quite well. When you got married, you’d end

TIME FOR A NEW HOME

With the expansion of the Navy, it was time to move to a modern base. Leaving the simple moorings off Pulau Blakang Mati, the site of choice was Pulau Brani. The selection of this location was simple: Pulau Brani was well-situated in a central location from which Navy ships could be quickly deployed anywhere within the Singapore Strait.

up inviting almost the entire Navy!” RADM(Ret) Kwek added. Other pioneers also related how they often helped out at one another’s weddings, an unspoken tradition that continues to this day.



▲ **Unveiling the Navy’s New Home:** Brani Naval Base was officially opened in January 1974 by then Prime Minister Lee Kuan Yew. Pictured below are RSN ships alongside Brani Naval Base.





◀ **Singapore's Pocket Battleships – The Missile Gunboats:** Although small in size, the MGBs were big in power, equipped with the latest radars, electronics and missiles.

▶ **On Target!** In 1974, the Singapore Navy became the first Navy in the region to successfully fire an anti-ship missile, when the MGB fired the Gabriel Surface-to-Surface Missile (SSM). It marked the Navy's entry into the missile age.



MISSILE GUNBOATS – USHERING IN A NEW ERA

As the heartware of the Navy grew, so did its hardware. The six PCs, designed for constabulary duties, lacked reach and a lethal punch. In 1968, the late LTC James Aeria, who was then the Commander of Maritime Command, led a team to choose a suitable strike craft for the Navy. They found that the Missile Gunboats (MGBs) from the Lürssen Shipyard in Germany fitted the bill.

The acquisition of the MGBs was a watershed for the Navy. Small but nimble, the MGBs were equipped

◀ **High Tempo at Sea:** A UH1H helicopter carrying out a personnel transfer with a MGB at sea. Joint operations between the Navy and the Air Force started in the early 1970s.

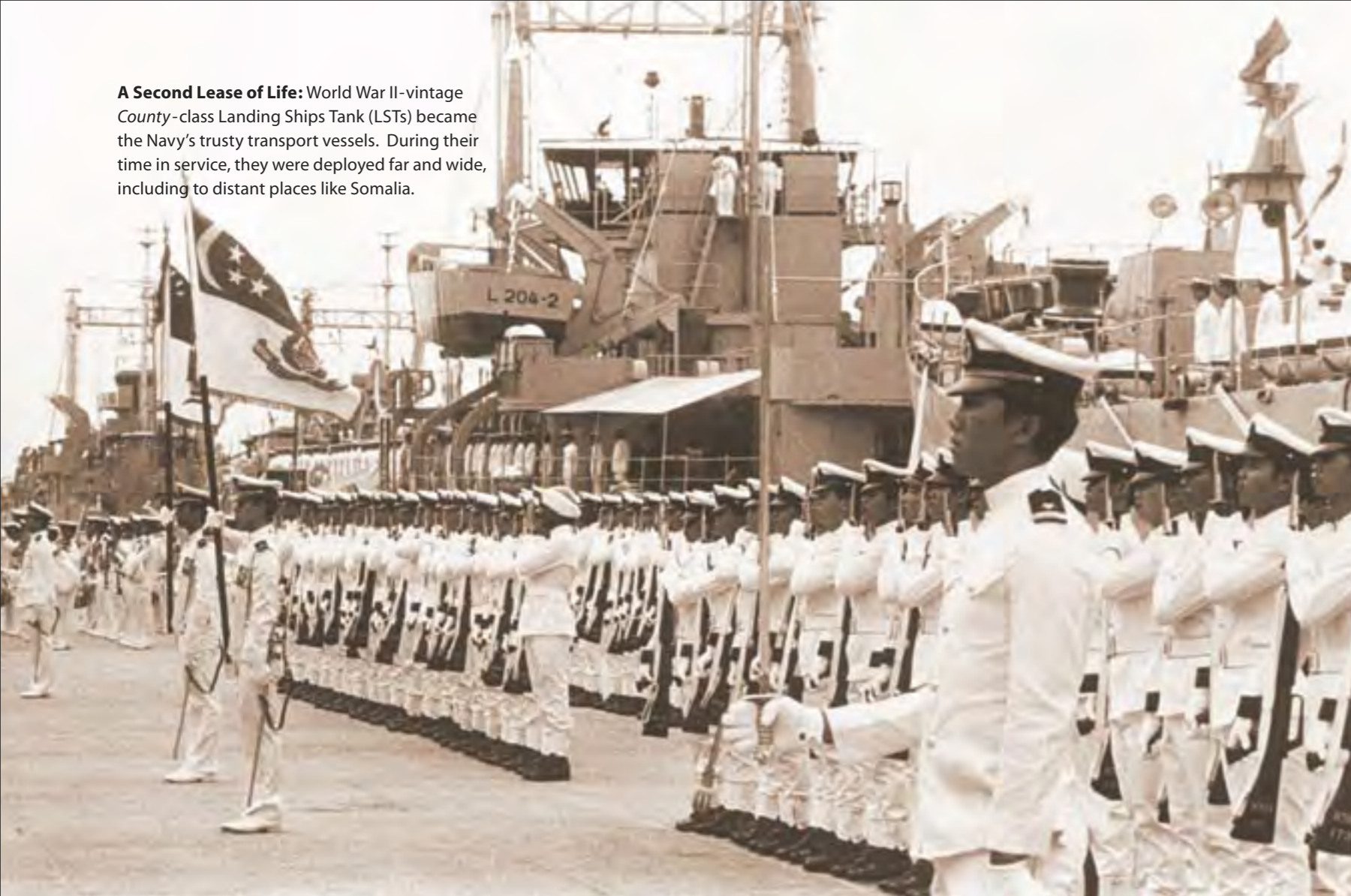
with the latest radars, electronics and missiles. Likened to small “pocket battleships”, they were packed with an arsenal that could sink warships many times their size. Configured for quick, decisive strikes, the MGBs marked the Navy's first foray into maritime warfare.

The MGBs were armed with Gabriel anti-ship missiles. Chief Defence Scientist, Professor Lui Pao Chuen, recalled that “the Gabriel missile was chosen for its ability to accurately strike hostile vessels in close proximity to neutral ships, even though its range was shorter than that of some other missiles that were then available on the market.” Unlike most missiles of its

generation, it was accurate enough to give the Navy confidence that if fired, collateral damage in congested shipping lanes would be kept to an absolute minimum.

In January 1975, the first three MGBs were commissioned, followed by the remaining three a year later, in February 1976. This was the culmination of more than two years of sea trials and crew training. The hard work paid off. Witnessed by Dr Goh Keng Swee, who was then the Defence Minister, RSS *Sea Wolf* conducted the first Gabriel missile firing in 1974. Both missiles hit their targets. The Singapore Navy had become the first Navy in the region to successfully fire an anti-ship missile.

A Second Lease of Life: World War II-vintage *County*-class Landing Ships Tank (LSTs) became the Navy's trusty transport vessels. During their time in service, they were deployed far and wide, including to distant places like Somalia.



OTHER EARLY DEVELOPMENTS

The LSTs and the Minesweepers

In building up the Singapore Army's core capabilities, there was a need to train overseas to overcome space constraints in Singapore. Overseas training played a significant role in helping to hone a credible Army that was central to the SAF's "poison-shrimp" strategy of the 1970s.¹ Overseas training provided the Army more space to conduct realistic manoeuvre exercises, artillery live-firing, and to fully test its equipment and operating

doctrines. The Army needed to transport its heavy equipment to and from these overseas training areas. A squadron of World War II *County*-class Landing Ships Tank (LSTs), bought at a token price of a dollar each from the United States, was entrusted to undertake this task.

To provide the Navy with a minesweeping capability, two old Coastal Minesweepers were procured from the United States. These small ships sailed 13,000 km from San Francisco to Singapore. It was a journey of almost epic proportions for a tiny Navy. A US Navy sailor commented that it took "crazy and very brave men" to

make the journey on these Minesweepers. He was right on the second count. The crew not only had to cope with numerous mechanical and technical problems during their more than two-month long voyage, but they also had to battle the fiery forces of nature. RSS *Mercury* and RSS *Jupiter* encountered three super typhoons – Nancy, Olga and Pamela – from Guam to Subic Bay.

"When we arrived at Subic Bay, Olga was coming in. Two to three days later, Olga struck the Philippines. We

stayed there for two weeks but Olga persisted. However, we had to go home. So, we left Subic Bay, braving the huge storm and very choppy seas. The day after we left, the weather cleared up and the US Navy sent a P3 aircraft to look for us, to see if we were still afloat. When the P3 found us, it flew very low, down to bridge height, and the pilot saluted." RADM(Ret) Kwek, the first CO of RSS *Jupiter*, recalled with great pride. "Looking back, such difficult moments truly defined the Navy."

HEMCOMING OF RSS *MERCURY* AND RSS *JUPITER*

The journey of RSS *Mercury* and RSS *Jupiter* from San Francisco to Singapore, was a once in a lifetime experience for many, in more ways than one. Not only was it the first overseas trip halfway across the world for many of the crew, it was the first-ever sailback across the Pacific.

The crew arrived in the United States months before for training in minesweeping. They also carried out intensive shipboard training to prepare them for the long journey ahead. Shipboard processes were worked out, drills practised repeatedly. But nothing prepared them for the typhoons which they encountered on their way home.

"When we were at Guam, the super typhoon Pamela was already closing in to Guam. The US Navy asked if we wanted to stay in Guam and wait out the storm. Looking around, we did not see much shelter in the base, and decided to press on – to go out and face the open seas. We left, and two days later, Pamela hit Guam. We heard reports on the aftermath and it was horrific – all the ships that had been tied up in the harbour at Guam were sunk," remembers RADM(Ret) Kwek.



▲ **Across the Pacific in 63 Days:** RSS *Mercury* and RSS *Jupiter* arrived in Singapore on 4 June 1976, having braved three super typhoons during the journey home.

In addition to the typhoons, the ships encountered many mechanical and technical problems. In fact, the moment RSS *Jupiter* pulled out of Pearl Harbour, its steering gear broke down and the ship had to steer out of the channel using just its main engines.

RSS *Mercury* and RSS *Jupiter* arrived in Singapore on 4 June 1976 after a 63-day journey. RSS *Mercury* was decommissioned on 31 March 1993. RSS *Jupiter* was scrapped on 15 August 1986. Timber from RSS *Mercury* now lines the deck of the Wardroom in Tuas Naval Base.

¹ This strategy is a defence posture based on the idea of making any potential aggressor pay a hefty price for attacking Singapore.



Formation of the Naval Diving Unit

With the introduction of more ships into the Navy's Order of Battle (ORBAT), the Navy needed the capability to do rudimentary underwater repair work. The SAF Diving Centre was formed in 1971, comprising a small group of 16 divers. Its equipment included a 10-man and a 1-man decompression chamber, a two-storey low-pressure compressor and three hangars.

It was renamed the Naval Diving Unit (NDU) in 1975. In the 1980s, NDU started to move beyond a support role, to include combat diving and mine clearance operations. Naval divers were sent overseas for courses like the Basic Underwater Demolition, Explosive Ordnance Disposal (EOD) and the elite Sea Air Land (SEAL) course.



Warriors of the Deep: Tough training is the hallmark of the naval divers from Day One. "The only easy day was yesterday" is a creed that all naval divers from the RSN live by. Their training equips them with fear-busting courage and prepares them for above normal physical exertion in operations.



Formation of the Midshipman School

As the Navy grew, a critical mass of officers was needed. Although ratings were already trained locally, officers continued to be trained overseas. Professional training in the Navy reached a new milestone when the Midshipman School was formed in April 1974. This was long overdue as overseas training billets were insufficient to produce enough officers for the Navy. The Class of 1974 consisted of 12 Regulars and 30 National Servicemen. This pioneer cohort of 42 Midshipmen far exceeded the number trained overseas annually. Since its inception, hundreds of Midshipmen have passed through Midshipman School to provide sterling service to the Navy.

▲ **Made in Singapore – The First Batch of Locally Trained Midshipmen:** The Midshipman School was established in 1974 to train naval officers locally.

▼ **Midshipmen Today:** Sea training deployments today allow Midshipmen to venture far and wide, to places like Auckland, New York and Plymouth.



THE NAVY IN THE MID-1970S

The Navy rapidly moved out of a decade of infancy. Training schools for both ratings and Midshipmen produced a steady stream of qualified personnel to man the Navy. Morale was high. Those in the Navy were excited to be part of a growing vital force. They saw meaning and significance in what they did. They were committed to their tasks and to one another.

Operationally, the Navy kept up its tempo of daily patrols. When duty called during the *Laju* hijack incident

in 1974, the Navy performed well and its four ships deployed for this operation effected a cordon around the *Laju* to prevent the terrorists from escaping.

With the Navy's coming of age, it was time to give it due recognition. On 1 April 1975, the Singapore Maritime Command was renamed the Republic of Singapore Navy (RSN). The future of the Navy seemed bright. However, dark clouds were gathering over the horizon. South Vietnam fell to the communists. The Navy would soon undergo its baptism of fire.

THE LAJU AFFAIR

On 31 January 1974, four men armed with submachine guns and explosives attacked the Shell oil refinery complex on Pulau Bukom. Their goal – to disrupt the oil supply from Singapore to other countries.

They managed to reach the shore of Pulau Bukom and detonated three of the 12 explosives they were carrying. To escape, they hijacked the ferry *Laju* at the Bukom jetty and held five crew members hostage. This led to a chase and *Laju* was quickly surrounded by Marine Police boats and the Navy ships – RSS *Sea Hawk*, RSS *Independence*, RSS *Sovereignty* and RSS *Daring*.

The terrorists agreed to release the remaining crew members in exchange for safe passage to the Middle East. They were accompanied by a 12-man party, comprising SAF Commandos and government officials. This delegation was led by our current President, Mr S R Nathan, who was then a senior official in MINDEF.



▲ **A Test of Mettle – The *Laju* Hijack Incident (1974):** RSS *Sea Hawk*, RSS *Independence*, RSS *Sovereignty* and RSS *Daring*, together with the Marine Police boats, successfully surrounded the ferry *Laju*, preventing the terrorists from escaping.

THE NAVY'S BAPTISM OF FIRE

Operation THUNDERSTORM

2 May 1975 – the first SOS signal was picked up from a ship carrying 300 people from Indo-China. Later that day, several more vessels from Indo-China were sighted and they continued to stream in over the next 13 days. A total of some 64 ships and 8,408 "boat people" arrived during this period. The Navy was called upon to manage the mammoth task of providing the "boat people" with food and fuel, as well as repairing their vessels before sending them on their way.

Although the operation itself lasted only 13 days, the Navy was tasked to continue these surveillance patrols right through the early 1980s, as such boats continued to trickle in.

Operation THUNDERSTORM was a defining operational experience, but it was a huge drain on the fledgling Navy. The RSN had 14 ships capable of such

PERSONAL ACCOUNTS FROM OPERATION THUNDERSTORM

"I got married on 14 May 1975 and my CO graciously gave me 10 hours off to get married. I reported back to my ship after the ceremony. My wife cried."

– LTC(Ret) Namasevayam

"THUNDERSTORM taught me that being in the Navy was no longer just a matter of bringing your travelling bag, going for a few days of patrol and then returning home to rest. The experience set me and my colleagues thinking about what it really meant to defend the nation after seeing the suffering of those who had lost their homeland."

– SWO(Ret) Hussain





◀ **Braving the Storm:** Operation *THUNDERSTORM* was a defining operational experience, but it came at a huge cost to the Navy's development.

running, or two out of four engines working. Base technicians were simply not able to keep up with the maintenance. Due to taxing operational demands, many of the ships' crew also ended up not firing their weapons in months. Professionalism slipped. Training standards and readiness levels dropped drastically.

On the ground, morale dipped to an all-time low. Many were affected by the long and unpredictable hours away from their families. Fortunately, the Navy had good Commanding Officers (COs) and Coxswains. These men remained true to the cause and executed their tasks professionally. Through their exemplary conduct, they motivated their men to soldier on. The people in the Navy held together. They drew closer as a family.

Operation *THUNDERSTORM* also revealed some organisational shortfalls of the Navy, and to a certain extent, the larger SAF. This included the lack of a central Command and Control (C2) system needed to orchestrate operations at both the Navy and the SAF levels. After Operation *THUNDERSTORM*, then Defence Minister Dr Goh Keng Swee became convinced of the urgent need to build a centralised C2 system for the SAF. There was an added impetus to ensure that Navy ships be networked via datalink for good situational awareness. These upgrades would come, but only after it had weathered the crisis of confidence in the Navy following Operation *THUNDERSTORM*.

operations – six MGBs, six PCs, RSS *Panglima* and RSS *Endeavour* (a 135-foot patrol boat). They were typically scheduled for 10 patrolling days a month, and also had standby duties to perform. Each time a boat was intercepted, one ship would be assigned to deal with it and the standby ship would be activated to sail. It was not uncommon for a ship to end up with 14–15 patrolling days in a month. Things were unpredictable and exhausting, and plans kept changing.

Everything outside of this operation was set aside. No one was spared. There was no time for training, no time for maintenance, no time for doctrine development. The protracted task of dealing with the influx of “boat people” marked the start of a difficult chapter in the Navy's history.

Although the ships spent a lot of time at sea, many combat systems were not working well. Pressing operational demands forced the RSN to deploy ships like the MGB to sea with only two out of three generators

A Crisis of Confidence

Looking at the RSN today, one would scarcely have imagined that there was a point in time when the very future of the Navy hung in the balance.

Following Operation *THUNDERSTORM*, the Navy was buffeted by a series of setbacks. The tempo of anti-illegal immigrant operations had to be sustained. Several COs who served in the late 1970s spoke about the huge challenges of such operations. The problem for the Navy was the absence of a comprehensive shipping picture in the Singapore Strait. There were many illegal immigrant boats. However, on a sustained basis, the RSN could have only two ships on patrol each day. Although many of these boats were stopped by the Navy, some slipped through the Navy's net and were intercepted by the Marine Police. COs often had to be called in to see the Fleet Commander with their charts and ship's logs because Headquarters had demanded an explanation!

As a result, the operational utility of the Navy beyond the Singapore Strait was in serious question. Mr Peter Ho, Head of Civil Service and Permanent Secretary (Foreign Affairs), who was then a junior officer in the Navy, describes the Navy's predicament at that time. “Despite having several ships armed with the Gabriel missiles, the Navy performed poorly, and that served to reinforce the view that the Navy was just an ‘appendage’ of the SAF when dealing with the illegal immigrant problem.”

THE MISSILE THAT WOULDN'T FIND ITS TARGET

After the first few successful Gabriel missile firings, the missiles started to develop problems and were unable to hit their targets. Nobody knew what was wrong. SWO Goh Huat Chye, a Gabriel missile subject matter expert, recounts, “The system designers from overseas were perplexed. But giving up was never an option.”

It was with this sheer determination and resolve that SWO Goh and his team of weapon specialists took on the tedious process of circuit line tracing to establish the root cause of the problem.

“We stripped the entire missile apart and put it back together again to see what was wrong. The problem was finally isolated to the reliability of the rocket motors! Once that problem was fixed, the missiles began to hit their targets again. The fact that we isolated and rectified the problem ourselves earned us the respect of the system designers.”

Defence planners in MINDEF gradually formed the view that there was only a very limited role for the Navy. Some quarters in MINDEF even felt that the Navy only needed barges fitted with 20mm guns, towed out to sea. The RSN was in a dismal state. Capability and doctrine development were in a hiatus.

RADM(Ret) Richard Lim, Chief Executive of the Defence Science and Technology Agency (DSTA) and former Chief of Navy (1996–1999), adds, “In the late 1970s, the Navy put up a proposal to buy three more missile gunboats (codenamed Project *Albatross*) but the proposal was turned down. This was because there were competing demands for a limited defence budget and the Navy was not able to effectively articulate the significance of the contribution of these craft to the overall defence strategy. It was argued that a squadron of Skyhawks would better meet the requirements of the SAF than these missile craft.” The Navy was facing an uphill task to establish its strategic role. Higher Headquarters could not see a role for the Navy that could warrant improving its capabilities significantly. This was the sorry state of the Navy as it entered the 1980s. It was a stark contrast to the Navy of the early 1970s. Morale was low. Many good people left.

OUT OF THE REFINER’S FIRE

Redefining the Navy’s Strategic Role

But for those who stayed to weather the storm, brighter skies lay ahead. The breakthrough came when the RSN started to examine from first principles why Singapore needed a Navy. Mr Peter Ho stated matter-of-factly, “The answer came in an ‘Eureka moment’. I was looking

at Singapore’s trade statistics. Singapore’s trade dependency ratio at that time was approximately 4:1, meaning that the economic well-being of Singapore depended critically on trade, most of which came by sea. From there, it became unmistakable that the protection of the Sea Lines of Communications (SLOCs) was vital for sustaining Singapore’s economic well-being. The next step was to figure out whether this could be better achieved by ships or by aircraft. And our argument was that while aircraft had certain strengths, they did not have persistence and could not maintain a prolonged presence.”

With the recognition that Singapore could be “choked” to death by economic strangulation, the need for the Navy to secure Singapore’s SLOCs became a strategic mission of the RSN. MINDEF and the SAF also accepted that this mission of protecting our SLOCs was best accomplished by sea power.

BACK ON TRACK!

By the early 1980s, with its mission refocused and its strategy redefined, the Navy embarked on a process of revitalisation. This coincided with the time when the SAF started to look at scenarios where maritime and air power played a bigger role. Against this backdrop, the Navy started developing a balanced set of capabilities to support the larger objectives of the SAF.

FORCE DEVELOPMENT PROJECTS IN THE 1980S AND 1990S

CPC Acquisition

The decision to acquire 12 Coastal Patrol Craft (CPC) was significant in contributing to the revitalisation of the Navy. Designed and built locally, they were commissioned in October 1981. Although they did not contribute to the higher-end capabilities of the RSN, the CPCs helped to relieve the MGBs from the task of daily patrols. RADM(Ret) Teo Chee Hean, Minister for Defence, who was Chief of Navy (1991–1992), explains, “The CPCs released time and energy for the strike squadron to revitalise itself. It is important to have ‘workhorses’ to undertake peacetime operations.” These CPCs created the capacity within the rest of the Navy to pick up where it had left off in the mid-1970s.



TRUSTY WORKHORSES OF THE NAVY

The 12 CPCs each had a complement of 15 crew and their primary role was patrolling the strait. They provided invaluable training for trainee officers, ratings and NSmen. It was on the CPCs that many of the Navy’s young officers had their first taste of command. The CPCs were subsequently transferred to the Police Coast Guard, where they remain in service to this day.



- ▲ **CPCs – Creating Capacity for the Navy:** The CPCs relieved the MGBs from having to undertake patrols. It created capacity for the strike squadron to rejuvenate itself and focus on honing its war-fighting skills.
- ◀ **Protecting Our Waters:** The primary role of the CPCs was to patrol the Singapore Strait. When the RSN acquired new Patrol Vessels, the CPCs were transferred to the Police Coast Guard in the 1990s.



MGB Upgrading

Although Project *Albatross* never took off, parts of the project did make it through, in the form of an upgrade to the MGBs. This saw the MGBs being equipped with long-range, hard-hitting Harpoon missiles. Other systems introduced included the Action Information System (AIS) that allowed the MGBs to track and display other vessels. Together with the secured digital communications and datalink upgrade, the MGBs were able to share a common tactical picture at sea. These new systems tremendously increased the MGBs' ability to fight coherently as a force.

Upgrading to Give the MGBs Greater Strike and Command and Control Capabilities:

▲ MGB before the upgrade.

▼ MGBs after the upgrade.



MCMVs, MPAs and MCVs

The Navy made plans for more diverse hardware like the Mine Countermeasure Vessels (MCMVs) and the Maritime Patrol Aircraft (MPAs). It also received the go-ahead to build a squadron of six Missile Corvettes (MCVs). The MCVs were the first RSN ships designed to deal with the underwater threat posed by submarines. Armed with the latest weaponry including anti-submarine torpedoes and Harpoon missiles, and equipped with the latest sensors, the MCVs put to sea within eight years of project approval.



Building a Balanced Navy (clockwise from top right): The Maritime Patrol Aircraft (MPAs), the Missile Corvettes (MCVs) and the Mine Countermeasure Vessels (MCMVs) were added to the Navy's growing spectrum of capabilities in the 1990s.





▲ **Entering the Realm of Tactical Training:** The Tactical Training Centre provided the foundation for the Navy to develop its footing in war-fighting doctrines and tactics. This picture shows the pioneer team of officers and men from the Tactical Training Centre.

MAKING THE LEAP FROM PROCEDURAL TO TACTICAL WAR-FIGHTING

Tactical Training Centre

In tandem with the hardware purchases, the software also had to be developed. Investment in the first-generation Tactical Training Centre (TTC) proved vital. RADM(Ret) Teo Chee Hean, who was Project Director for the TTC project, explains, "The introduction of the TTC enabled us to focus our minds on tactical war-fighting and training. On the MGBs, there wasn't any real tactical training; only technical training at best. We did not have any tactical doctrine. In fact, my first experience of having to think tactically was inside another navy's tactical trainer. That was the first time I had to think through fighting considerations. I had to think through simple things like when to turn the radar on and off; whether to close in or stay out. It was quite eye-opening."

The TTC provided the foundation for the Navy to move up. It allowed the Navy to hone the tactical sense of its officers and provided a testing ground to refine the doctrines and tactical procedures that were being developed. TTC shaped the way the Navy was going to fight. It was instrumental in transforming the Navy into a well-oiled fighting force. TTC put the RSN on a footing that brought up professional standards in a fundamental way and paved the way for more to come.

LOOKING BACK, STEPPING FORWARD

In retrospect, had it not been for the difficult times during Operation *THUNDERSTORM*, and had the go-ahead actually been given for Project *Albatross*, the Navy could well have been content with just nine Missile Gunboats. The Navy might then have become the proverbial frog in the well, never imagining nor realising the formidable capabilities of today's RSN.

The Navy accepted from very early on that it had to operate with a numerical disadvantage. Therefore, it became an early adopter of technology, networks and datalinks to overcome this problem. As the service with the smallest slice of the budget in the 1970s, it could not afford expensive off-the-shelf solutions. To develop cost-effective solutions, it worked with the Defence Science Organisation (DSO) (previously known as the MINDEF Electronics Test Centre) to devise indigenous capabilities to meet its unique requirements in areas ranging from Electronic Warfare (EW) to stealth and guided weapons. According to Mr Quek Gim Pew, Chief Executive Officer of DSO National Laboratories, "Partnership with the Navy helped build up a generation of experienced engineers within DSO in areas like networks, EW and guided weapons." EW, networks and guided weapons are key capability areas needed to actualise the 3rd Generation SAF.

Through tough times, it was the persistence of its people that made the difference. One veteran, whose

► **Pushing the Technology Frontier, Breaking New Grounds:** The close collaboration between DSO National Laboratories and the Navy in the 1980s allowed the development of customised combat systems in areas like electronic warfare. This close collaboration continues today.



sentiments were echoed by many others, puts it this way, "Bad times are not necessarily lousy times. When the family goes through difficult times together, the bond becomes stronger, knowing that you can count on those standing beside you." What kept the Navy going in the difficult years of the 1970s was the untiring dedication of its people.

RADM(Ret) James Leo pointed out that the struggles in those initial years had made the leadership in the Navy stronger. An important lesson was the need for communication across the ranks. "In moments of setback, it has been and will always be important for the commander himself to discuss issues at hand with those under his charge. I remember gathering the officers after a failed Gabriel missile firing to talk about what had happened. We did that each time we encountered problems or when we were not entirely satisfied with the results. That was how we made known to each other our expectations. There was openness and trust. This set us apart."

Such was the spirit of the Navy pioneers. It is well encapsulated in the third verse of the Navy Song, "Never flagging in adversity, forward we'll march on to *VICTORY*." The people who chose not to lose heart eventually managed to put the RSN back on a firm footing in the 1980s.

From humble beginnings, the Navy overcame daunting challenges. With its mission clearly defined, the stage was set for the Navy's next phase of development.



CHAPTER 2

NEVER LOOKING BACK WE'LL ALWAYS GROW

**BALANCED NAVY WITH
MULTI-DIMENSIONAL CAPABILITIES**

“The Navy should always be a modern, balanced force capable of defending Singapore’s interests and of making a significant contribution to the stability of the region.”

– RADM(Ret) Teo Chee Hean, in *Navy: The Vital Force*

BY THE MID-1980s, the debate on the wider role of the RSN had been settled. The need to protect Singapore’s Sea Lines of Communication (SLOCs) had become clear. Since then, the Navy has steadily grown its ability to carry out a wide range of missions from peace to war. In slightly over two decades, the RSN transformed into a “Balanced Navy”.



◀ **Striking Over the Horizon:** The Harpoon missile gives RSN ships a potent anti-surface capability, allowing them to strike much further and more accurately.

Today, the Navy is able to carry out a wide range of operations. Aside from the ability to counter conventional threats, it is also capable of carrying out maritime security operations to ensure the safety and security of Singapore's waters, as well as various types of Operations Other Than War (OOTW) such as Humanitarian Assistance and Disaster Relief (HADR) and Peace Support Operations (PSO). This is made possible by strong capabilities in the areas of logistics, training and medical support. These ensure that ships deployed at sea are at the highest level of readiness.

THE FIGHTING NAVY

The Navy's capabilities can be categorised into three main areas: *strike*, *maritime security* and *sealift*. When "mixed-and-matched", these capabilities come together in a potent mix to enable the Navy to effectively fulfil a wide range of missions.

Strike

Strike refers to the "sharp end" of the Navy's capabilities. It provides deterrence against any potential aggressor and, should deterrence fail, enables the Navy to quickly and effectively eliminate threats, be they underwater, on the sea surface or in the air.

Surface Dimension

Surface Warfare refers to action taken against other naval ships. The primary weapon of modern surface warfare is the Surface-to-Surface Missile (SSM), a highly accurate weapon capable of delivering a deadly knock-out blow. The Gabriel missile on board the Missile Gunboats (MGBs) allows the Navy to strike from outside the enemy's gun range. With the acquisition of the Harpoon missile in the late 1980s, the Navy's surface strike reach was extended to 100 km and beyond. The Harpoon missile is fitted on board the upgraded MGBs, the Missile



▶ **Far Seeing Eyes:** The Maritime Patrol Aircraft provide the RSN task force and shore headquarters with a good wide-area sea situational picture. In war, they enable early detection and identification of enemy ships, allowing RSN ships to engage hostile ships well beyond the horizon. In peace, they are deployed for a range of missions such as search and locate and maritime surveillance operations.

Corvettes (MCVs), and most recently, on the *Formidable*-class frigates. Besides surface combatants, the Maritime Patrol Aircraft (MPA) is also equipped with the Harpoon missile, which gives it a maritime strike capability. The Republic of Singapore Air Force's fighters also possess significant anti-ship strike capabilities.

Modern naval surface warfare often takes place at vast distances, beyond visual range. This requires surveillance of a wide area of the sea and is achieved through the "far seeing eye" of the MPA. Travelling at up to 200 knots, MPAs are able to cover large areas hundreds of miles ahead of naval ships. In the words of Professor Lui Pao Chuen, the MPAs are crucial assets because "they allow the Navy to see far beyond the surface radar horizon and to break loose from the 'tyranny' of the earth's curvature." In addition, modern electronic warfare suites fitted on board the Navy's ships provide early sensing of hostile radar emissions. Together, these provide the RSN and the SAF with a comprehensive picture of the maritime domain.

Information from the MPA and other sensors is then shared via data-link, allowing shore HQ, ships and MPAs to "see" a common tactical picture. This shared awareness enables individual units to understand what the whole force is collectively facing. Such networking allows the Navy and the SAF to leverage on multiple sensors and shooters distributed across the battlespace to bring overwhelming force to bear at the right place and time.

Closer to the fighting ships, Sikorsky S-70B naval helicopters will be operated off the *Formidable*-class frigates to provide task groups (TGs) at sea with an organic surveillance capability. These naval helicopters can perform various functions such as providing timely surveillance in between windows when MPAs are unavailable, or projecting presence and force at significant distances from surface ships. When operationalised, ship-launched unmanned aerial vehicles (UAVs) and unmanned surface vessels (USVs) will also contribute significantly towards building an accurate picture of the seas around our TGs.

Air Dimension

Threats from the air include anti-ship missiles and munitions delivered from enemy aircraft. Travelling at extremely high speeds, they afford little reaction time and necessitate rapid and decisive action by the ship being attacked.

The first significant anti-air missile capability the RSN acquired was the Mistral Surface-to-Air Missile (SAM). This is fitted on board the MGBs, Patrol Vessels (PVs) and Landing Ships Tank (LSTs) to defend them against hostile aircraft and helicopters. A more significant anti-air capability in the form of the Barak Anti-Missile Missile (AMM) was fitted on board the MCVs in the late-1990s. Besides having a greater range than the Mistral missiles, the Barak has the additional capability of intercepting anti-ship missiles headed for the ship. This provides a short-range anti-missile "shield" around the MCVs.

The *Formidable*-class frigates bring greatly improved anti-air capabilities to the Navy, enhancing the Navy's ability to influence the air domain. The frigate's advanced Multi-Function Radar (MFR) can detect aircraft and missiles at much greater ranges. Coupled



One Shot, One Kill: The highly accurate Barak (above) and Mistral (below) missiles provide protection against aircraft and missile threats.

with the extended engagement envelope provided by the Aster SAMs, the frigates are able to provide an area air defence capability. Working in concert with the RSAF, the frigates can orchestrate anti-air operations over the maritime domain.

► **Forward with Fortitude:** The frigate represents a quantum leap in the Navy's operational capability. It points the way to the future and provides a glimpse of the 3rd Generation fighting force.

MAKING WAVES, SURGING AHEAD – THE RSN'S FRIGATE PROGRAMME

In March 2000, MINDEF signed a contract with Direction des Constructions Navales (DCN) of France for the construction of six frigates. The first frigate, RSS *Formidable*, was built in France, while the remaining frigates were built by Singapore Technologies Marine (STM) under a technology transfer agreement with DCN.

Replacing the RSN's MGBs which are over 30 years old, the frigates will significantly bolster the RSN's fleet of warships in defending Singapore's waters and protecting its SLOCs.

RSS *Formidable*, the first-of-class, has successfully undergone an intensive period of installation, checkout, integration and testing (ICIT) and has been rigorously worked up to its full operational capability. The other five frigates (RSS *Intrepid*, *Steadfast*, *Tenacious*, *Stalwart* and *Supreme*) are at various stages of outfitting and operationalisation.

The frigate programme breaks new ground in many areas. It is the most complex programme that the RSN has embarked on to date. The arduous task of integrating the frigate's sophisticated combat systems is done in-country by Defence Science and Technology Agency (DSTA), so as to better customise the frigate to meet the RSN's specific operational requirements. Overall, the programme presents a rigorous test for the RSN, DSTA, DSO National Laboratories and the wider defence industrial base in Singapore. The good progress made in the frigate programme is testament to the strong collaboration between the various parties involved.



Serving on board the frigate has become an aspiration for many RSN officers and WOSRs alike. MWO Richard Goh, Coxswain of RSS *Formidable*, has been with the frigate programme since its inception in 2000. Describing his experience on board RSS *Formidable* to date, he says, "I am privileged to have had the opportunity to witness the frigate evolve from a paper design to a well-built 3000-plus tonne ship sailing the high seas. When we sailed the RSS *Formidable* back from France in July 2005, the feeling was quite indescribable. It dawned on me, right there and then, that the RSN's transformation into a 3rd Generation Navy was well and truly underway. Time flies. The crew has been working very hard over the past two years to operationalise the frigate. We have experimented with many new processes along the way, and our understanding of the frigate's capabilities has grown steadily. Just last year during the Fleet Concentration Period 2006, we saw our hard work pay off. RSS *Formidable*'s impressive performance as the BLUE force CTG (Commander Task Group) platform was highly commended by all the other exercise participants. We witnessed a significant leap in the RSN's ability to command and control friendly units widely dispersed at sea, and to orchestrate force-level effects. That said, we reckon that the display only offered a glimpse of things to come. We've yet to realise the frigate's full potential. I am still discovering something new about the frigate every day. I count myself very privileged to be a part of the RSN's transformation journey."

Never Looking Back We'll Always Grow



STEALTHY AND DEADLY: WATCH OUT FOR THE *FORMIDABLE*-CLASS FRIGATES!

The *Formidable*-class frigates are spearheading the RSN's transformation into the 3rd Generation Navy and represent one of the transformational capabilities that will shape the SAF into a more lethal 3rd Generation fighting force. Based on the French *La Fayette*-class design, the frigates are highly capable warships equipped with state-of-the-art combat systems that allow them to perform a wide spectrum of missions and deal with a range of threats in all dimensions of naval warfare. The frigates are also leanly manned, with a crew size of only 71. This is achieved by leveraging on a high level of automation and enhanced work processes.

For example, the Integrated Bridge System and the Ship Management System incorporate many advanced features to enable safe and effective monitoring and control of the machinery and systems on board.

In terms of platform capability, the frigates can stay at sea and sustain high-tempo operations for long periods. To increase survivability, stealth technology has been incorporated in the frigates' design. Their low radar cross section signature makes it harder for them to be detected by radar. It is said that the *Formidable*-class frigates can actually pass off as small fishing vessels on an adversary's radar!

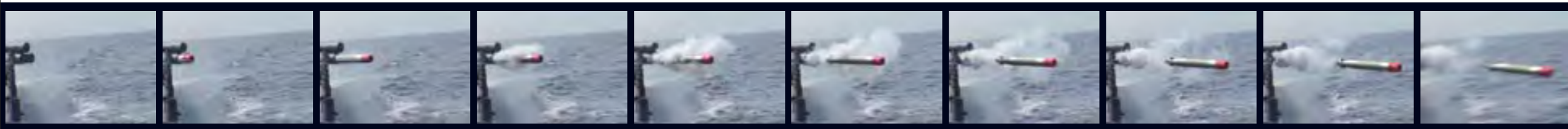
The frigates possess a balanced and potent suite of capabilities. They are equipped with the Thales Herakles E/F-band passive phased-array multi-function radar, which provides 3-D surveillance and missile guidance up-link facilities and operates in concert with MBDA's Aster active radar-homing SAM. The frigates can maintain air surveillance up to a range of more than 200km and provide effective area air defence for friendly maritime forces. This represents a quantum leap in AAW capability for the RSN. This can also be used to extend the SAF's air defence umbrella and afford more protection-in-depth for Singapore against air threats. The frigates' AAW effectiveness does not rest on advanced hardware alone, but also on modern software found in the indigenously produced Combat Management System (CMS). The CMS uses cutting-edge decision support engines to make track management, target identification and weapon assignment more efficient and effective. This is vital in AAW where just one second can make all the difference between success and failure.

In the underwater arena, the frigates' active low-frequency towed array system enables detection of adversary

submarines at extended ranges. This UW surveillance capability is complemented by the stand-off detection and attack capability afforded by S-70B naval helicopters that will be operated off the frigates. The S-70B naval helicopters can also perform anti-surface warfare roles. In the surface arena, the Oto Melara 76mm Gun provides both attack and defence capabilities at closer ranges, while the Harpoon missile is the primary anti-surface weapon against longer-range targets.

In the area of Command, Control and Communications (C3), the frigates will feature centrally in any RSN Task Group. With their advanced C3 suite, they will be able to network other RSN assets throughout the entire maritime battlespace, orchestrate sensors and weapons at the force level, and help realise a system-of-systems capability at sea. Beyond the RSN, the frigates are a key node in the SAF's Integrated Knowledge-based Command and Control (IKC2) network warfare system. They offer many options for the larger SAF campaign and increase the range of effects that the SAF can bring to bear on any adversary. Indeed, the *Formidable*-class frigates will transform the way the RSN and the SAF fight in the future!





▲ **“Torpedo Left Launcher!”** The Whitehead torpedo is designed to destroy submarines.

Underwater Dimension

The seas are as deep as they are wide and submarines can lurk undetected, if not for the anti-submarine warfare capabilities that the RSN has steadily developed over the years.

The MCVs, equipped with variable depth sonars and lightweight torpedoes, provided the Navy with its first set of ASW capabilities. These were enhanced by the six Anti-Submarine Patrol Vessels (APVs) acquired in the mid-1990s, equipped with hull-mounted sonars.

Besides assisting in the surface dimension, the S-70B naval helicopters also extend the Navy’s underwater reach. These naval helicopters are equipped with state-of-the-art dipping sonars, and can also be equipped with other sensors like sonobuoys to detect submarines. Armed with torpedoes, they will be able to neutralise any submarine long before it poses a threat to Singapore’s vital shipping.

The RSN’s underwater capabilities took a major step forward with the acquisition of four *Challenger*-class submarines in the 1990s. Submarines are a key component of a balanced and capable Navy. Armed with modern wire-guided heavyweight torpedoes, submarines are able to deal a lethal blow to the enemy surface fleet. A submarine’s stealth makes it difficult to be tracked and hunted down. Often, disproportionate resources need to be deployed to locate a submarine. Its stealth and “unseen” nature also gives it a crucial psychological edge, as reinforced by stories of the U-Boat menace in World Wars I and II.

Additionally, submarines provide the Navy an added level of realism in training and exercises. RSN ships can hone and perfect their ASW tactics against a submarine instead of a simulated target. The Navy’s submarine force will be augmented when its two *Västergötland*-class submarines, procured in 2005 from Sweden, join the Fleet at the end of the decade.



▲ **Launching of RSS Conqueror and RSS Centurion:** The *Challenger*-class submarines’ stealthy nature, coupled with their modern wire-guided torpedoes, makes them a difficult foe to contend with.



MEN OF THE SILENT SERVICE

Written by a group of submariners...

Secretive. Uncouth. Smelly creatures who live in the depths of the ocean. These are some of the less flattering terms used to describe submariners. But why do we volunteer to serve in a small steel tube and spend weeks, or even months, underwater without fresh air and sunshine? It’s all about passion – a fervour for challenges, a desire to test ourselves under extreme conditions, and pride in what we do.

Their “unseen nature” makes submarines well suited for covert operations. As the nature of our work is highly sensitive, we seldom talk about what we do – our deployments, our exercises, and even our training. This is another reason why we are called the **Silent Service**.

On a submarine, any mistake may prove to be fatal and survival depends on mutual trust and constant attention to detail. Demand for excellence and absolute intolerance for incompetence makes us an exacting lot. Like our brethren sailors who serve on ships, we entrust our lives to the hands of our boat-mates. The bonds built through years of tough training are hard to break and the characters moulded through many challenges are hard to unshape. This unique fraternity that we truly call home is the very reason why we chose to join the **Silent Service**.

Never Looking Back We’ll Always Grow



GOING DEEP – BUILDING A SUBMARINE CAPABILITY



▲ **Eye on Target:** Here is a periscope picture from a *Challenger*-class submarine with its “eyes” trained on its prey.

The RSN’s submarine journey can be traced back to the late 1980s when eight RSN officers were sent to Eckernforde in Germany for a three-week submarine operating course. At that time, the RSN knew next to nothing about operating submarines. To learn more about submarine operations, RSN personnel were sent to train with well-reputed submarine forces.

Among the early submarine pioneers was MAJ (now COL) Tan Wei Ming. It was an adventure of a lifetime, a journey into the depths of the ocean and the unknown, an experience that he thoroughly relished. He spent three years in Germany, and topped the Torpedo Officer’s Course. The highlights of his training in Germany include keeping independent watches on board the German U19 submarine and successfully firing an exercise torpedo at a small tugboat.

In 1996, the RSN embarked on a submarine training programme conducted by the Royal Swedish Navy (RSwN). Four *Sjöörman*-class submarines (renamed the *Challenger*-class submarines by the RSN) were also acquired from the RSwN subsequently. The Swedes have a long history of operating submarines and they readily imparted their extensive knowledge and experience to the RSN crew. The RSN’s pioneer submarine crew trained in the deep and cold waters of the Baltic and the fiords around Sweden. Training was tough, both physically and mentally. Being cooped up in the confined space of a submarine and being deprived of sunlight and fresh air for days on end added to the pressure. The crew had to scale a steep learning curve. Operating submarines was a completely different ball game from operating surface ships.

The pioneer crew persisted, never giving up even when the going got very tough. Their progress impressed the Swedes. In less than two years, operating procedures were established, proficiencies honed, emergency measures practised, and torpedoes fired. More importantly, the training inculcated confidence and pride – in the crew themselves, their crewmates, and their boat. Training ended with a three-week inspection sortie by the Swedish submarine flotilla commander. During this sortie, the crew was subjected to the most stringent tests and sleep deprivation. They held together as a team. Every RSN submarine crew passed this gruelling test. The crew also gained more than just professional expertise – it was also a time of family growth, with a total of 28 children conceived in Sweden!

Perhaps one of the most memorable experiences in Sweden was the sortie where RADM(Ret) Teo (then 2nd Minister for Defence) and Chief Defence Scientist, Professor Lui Pao Chuen sailed on board RSS *Challenger* in 1999. The VIPs observed how the RSN crew fired a torpedo at sea and evaded an exercise torpedo fired from a Swedish helicopter. They also experienced firsthand the effects of depth charges exploding around the submarine.

On 2 May 2000, RSS *Conqueror* became the first submarine to arrive home in Singapore. Over the next few months, RSS *Conqueror* made many dives in local waters. The crew gained valuable experience in operating in the congested shipping lanes and shallow waters of the South China Sea, which present very difficult operating conditions even to seasoned submariners.

During Singapore’s 35th National Day, a Maritime Review was held off Marina Bay, in full view of the many guests present and the general public. The programme sheet listed the ships participating in the Review. No submarine was mentioned.

But after the last ship had sailed past, a red and white flare shot out from the sea, barely 500 metres from the last ship. Seconds later, a black hull emerged from the sea. It was RSS *Conqueror*, surfacing after her “reconnaissance” mission, surprising all present. At her conning tower were two smartly dressed Navy officers, one saluting and the other waving a Singapore flag.

Over the following few years, the other three submarines, RSS *Centurion*, *Chieftain* and *Challenger*, returned to Singapore, together with their trained crews. In less than eight years, the initial submarine training programme in Sweden was successfully completed.



▲ **An Idyllic Day...** RSS *Challenger* after a successful torpedo firing in Sweden.

The *Challenger*-class submarines’ crews have since been honing their capability in local waters, pitting their skills against RSN ships as well as those of friendly navies, including aircraft carriers.

In 2005, Singapore signed a contract to acquire two *Västergötland*-class submarines from Sweden, which are scheduled for delivery in 2010. The crew identified to man the first *Västergötland*-class submarine left for training in Sweden in early 2007 and the crew for the second submarine will be leaving for Sweden in 2008. The submarine adventure continues.



▲ **Conquering the Underwater Dimension:** Armed with heavyweight torpedoes, these submarines are able to deal a lethal blow against potential adversaries.



Safe on My Watch: COSCOM operators ashore (above), on the Patrol Vessels (right) and Mine Countermeasure Vessels (below) at sea, work together to ensure that the Singapore Strait remains safe, day and night.



Maritime Security

Singapore's SLOCs are its economic lifelines. Hence, the vital importance of maritime security to ensure that its waters are safe and its ports accessible.

Coastal Command (COSCOM) is responsible for all operations within the Singapore Strait and the approaches to Singapore. It maintains a close watch of all that is happening within the Strait. Working closely with the Police Coast Guard and the Maritime and Port Authority, COSCOM plays an important role in ensuring that the busy Singapore Strait remains safe.

COSCOM deploys its PVs and APVs to deal with any threat that may arise within the Singapore Strait. These are the front-line ships tasked with carrying out



operational patrols. Deployed 24 hours a day, seven days a week (24/7), ships from COSCOM stand ready to perform numerous security tasks such as protection of vital shipping, anti-sea robbery and anti-illegal immigrant operations.

The presence of underwater mines is another major threat to the waterways. These explosive devices could easily cripple traffic in the Strait and severely impact Singapore's economic well-being.

The Navy's ability to deal with this underwater menace was bolstered with the acquisition of four *Bedok*-class Mine Countermeasure Vessels (MCMVs). These ships are designed and fitted with advanced equipment to enable them to carry out this demanding mission.

CLEARING MINES IS NO EASY TASK!

Going into harm's way to disable an explosive device is already a tricky job on land. This task is made even more challenging in the sea environment. The MCMVs, with their glass-fibre reinforced plastic hulls, are adapted and designed to be manoeuvrable, stable, well-protected and stealthy to underwater mines. Vital to the mine disposal task is the Mine Disposal Vehicles or MDVs for short. These look like miniature yellow submarines. Launched and operated from the MCMVs, they are capable of detecting, locating, identifying and destroying modern sea mines.



▲ **"Yellow Submarines":** Mine Disposal Vehicles, which look like miniature yellow submarines, are used to detect, locate, identify and destroy modern sea mines.



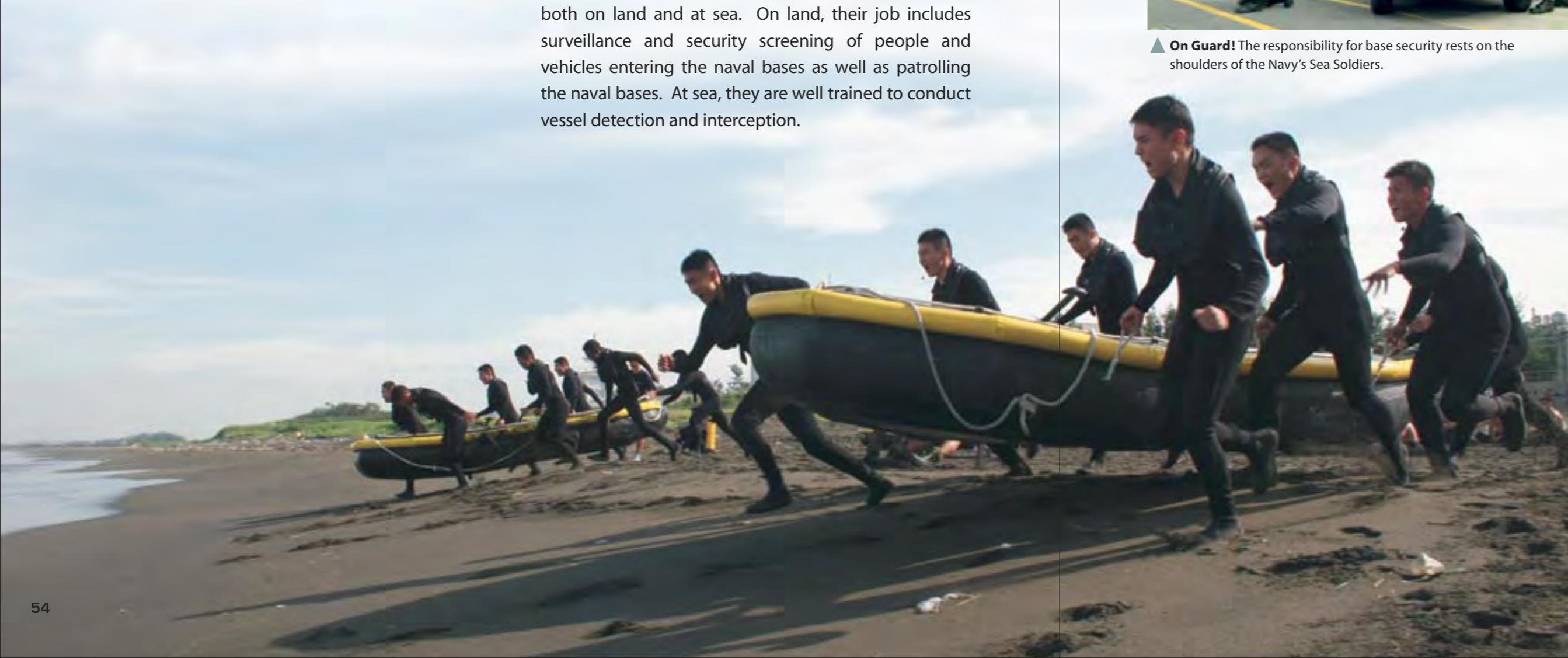
Nothing Stands in Our Way: The Naval Diving Unit has a wide range of capabilities. The pictures show different facets of the Navy's divers in action (above and below).

Complementing the MCMVs in mine disposal are the Explosive Ordnance Disposal (EOD) divers from the Naval Diving Unit (NDU). Originally set up to support underwater repair and salvage operations, NDU has grown into a full-fledged formation. Today, it has built up a wide range of capabilities including salvage diving, explosive ordnance disposal, force protection, ship boarding as well as other combat diving operations. They play a vital role in maritime security.

Besides ensuring the security of the Singapore Strait, the Navy also needs to ensure that its home bases are "hardened" against terrorist attacks. This is the job of its Sea Soldiers, who are adept at base security operations both on land and at sea. On land, their job includes surveillance and security screening of people and vehicles entering the naval bases as well as patrolling the naval bases. At sea, they are well trained to conduct vessel detection and interception.



▲ **On Guard!** The responsibility for base security rests on the shoulders of the Navy's Sea Soldiers.



MAN OF STEEL

CPT Wong Foo Chan belongs to a rare breed of individuals with the honour of excelling in two US Special Operations Courses. In 1999, he topped the US Navy SEAL Commando Course. In 2001, CPT Wong won the best trainee award in the Green Beret Course. This was no mean feat, given that he had to contend with two serious injuries sustained during his Green Beret training.

During the initial phase of his course, a truck that was transporting some trainees back from an exercise met with an accident. CPT Wong, who was one of the passengers, sustained an injury as a result of another trainee's helmet slamming into his chest. He recalls, "The pain was excruciating and breathing was hard and laboured." He suffered a broken rib, and the doctor recommended that CPT Wong quit the course. However, CPT Wong made the decision to continue with his training and was given medication to mask the pain. He continued with the field training which included carrying a rucksack that weighed more than 80kg.

Towards the end of the course, CPT Wong sustained a second injury during a parachute jump – a broken ankle due to a bad landing. After being seen by the same doctor, CPT Wong again made the decision to endure and complete the last two weeks of the course. Despite having to contend with a painful injury, CPT Wong said, "I just gritted my teeth and pressed on."

A BIG BANG – ALL IN A DAY’S WORK FOR AN EOD DIVER



▲ **Up Close and Personal:** NDU diver conducting mine clearance operations.

Disarming explosive devices is the domain of the Explosive Ordnance Disposal (EOD) diver. NDU EOD divers have been called upon on a number of occasions to dispose of WWII-era bombs. The largest-scale bomb disposal operation by



▲ **Ka-Boom!** The handiwork of our divers.

the EOD divers to date was the operation in 1990 to remove WWII-era bombs found in the channel off the former Brani Naval Base. Since then, there have been other operations to dispose of similar bombs. Two such operations took place in 2000.

On 14 December 2000, a WWII-vintage British 1000-lb air-dropped bomb was found lodged in the dredging bucket of the Russian dredger *Professor Gorjunov* that was doing dredging works in the Singapore Strait. NDU EOD divers had to move the bomb from the dredging bucket onto a safety net on the upper deck of the ship before placing a counter-charge on the bomb. The bomb, with counter-charge and detonating cord, was then carefully hoisted from the upper deck, lowered into the sea, and disposed of that evening.

Another was a British WWII 500-lb air-dropped bomb. On the date of the scheduled disposal, 27 December 2000, the weather and sea conditions were not favourable. A new moon and strong monsoon winds whipped up the tidal conditions. The bomb lay at a depth of 30 metres and visibility was almost zero. Undaunted, an EOD diver descended to the seabed while holding on to a rope. He then relied on his trained sense of touch to feel and place 20kg of plastic explosives next to the bomb. At exactly 9pm, a spectacular blast emanated from the site – the bomb had been successfully disposed of, without damaging the underwater infrastructure in the vicinity.

Sealift

In addition to strike and maritime security, the Navy has the ability to conduct sealift – transporting personnel and equipment across the sea. This is necessary not only to support the overseas training needs of the SAF, but also to ensure that materiel and critical cargo can be transported to Singapore in times of need. This capability has also allowed the Navy to respond to a number of HADR and PSO. The *Endurance*-class Landing Ships Tank (LSTs) are the Navy’s primary sealift assets. Augmenting the LSTs in sealift operations are a range of civil resource vessels, which can be deployed for sealift and transportation duties.

▼ **Excellence in Multi-Role Missions:** The *Endurance*-class LST has versatile capabilities, including embarking helicopters on her helideck and carrying fast craft in her well-dock.



▲ **Helo on Deck:** The heavy-lift Chinook helicopter landing on the deck of an LST.



Never Looking Back We'll Always Grow



◀ **Rolling On and Rolling Off:** The *Endurance*-class LST can have vehicles and cargo driven onto her Tank Deck via a ramp at the bow of the ship.

THE ENDURANCE-CLASS LST: READY AND VERSATILE

The *Endurance*-class LSTs were conceptualised and built locally in the late 1990s to replace the ageing *County*-class LSTs. These new LSTs were designed with a higher speed and greater lift capacity, making them better able to support the transportation needs of the SAF. They can operate a range of helicopters, including the SAF's Super Puma and heavy-lift Chinook helicopters. They also possess a well-dock that can be used to carry and operate different types of small craft, as well as large deck areas for stores and vehicles.

The capabilities and hardiness of this new platform were first demonstrated when *RSS Endurance* embarked on a four-month, round-the-world deployment in May 2000, soon after she had been commissioned. This was the longest and furthest any RSN vessel had ever sailed to date. During the four-month deployment, the crew braved heavy seas, including seven-metre-high waves during some legs of the journey. This deployment saw *RSS Endurance* take part in the 6th International Naval Review in New York, held in conjunction with the United States' Independence Day celebrations.

Besides port calls, *RSS Endurance* also took part in a number of exercises with various navies in harbour and while on passage. During the journey across the English Channel, the ship carried out helicopter landing exercises with the French Navy in heavy seas. This voyage also provided sea training for two batches of RSN Midshipmen.

The LSTs can embark a range of modular capabilities to support myriad missions. For example, they have performed the role of command ships during major intra-RSN exercises like the Fleet Concentration Period as well as in multilateral exercises and operations. In recent years, they have also been deployed for OOTW ranging from HADR to PSO.

In particular, the LSTs served with distinction during the relief operations in Aceh, Indonesia, following the 2004 Boxing Day tsunami disaster. Their sealift capacity was used to bring much-needed supplies, support equipment and vehicles to where they were most critically required. With their embarked fast craft and naval divers, the LSTs were able to quickly establish landing sites at the town of Meulaboh



▲ **Making Waves, Forging Global Friendships:** *RSS Endurance* calling at New York City.

and bring supplies ashore. The LSTs' ability to support helicopter operations enabled the SAF's Super Puma and Chinook helicopters to fly numerous missions in-theatre.

The LSTs have also been deployed to the Northern Arabian Gulf for PSO. Their organic logistics capacity enabled them to operate as an afloat forward staging base, while their on-board medical facilities facilitated the rendering of medical assistance. During the deployments, they also assumed the role of Surface Action Commander periodically, taking charge of other coalition warships.

Indeed, the *Endurance*-class LSTs have successfully undertaken many significant roles beyond the sea transportation and training support functions that they were originally envisaged to perform, testifying to the flexibility and versatility of this class of ships!

▼ **Round the World We Go:** *RSS Endurance* travelled 25,000 nm in its maiden voyage. Braving storms and enduring heavy seas, the crew went about their training, proving that they were truly worth their salt.



THE REPUBLIC OF SINGAPORE NAVY

Chief of Navy

Chief of Staff - Naval Staff

Naval Personnel Department Naval Intelligence Department Naval Operations Department Naval Logistics Department Naval Plans Department WARCENs Naval Surface Warfare Centre Naval Underwater Warfare Centre Naval Inspectorate Navy Medical Services

Coastal Command

Naval Logistics Command

Fleet

Naval Diving Unit

Training Command

Changi Maintenance Base Tuas Maintenance Base Naval Material and Transport Base Camp Commandant's Office - Changi Camp Commandant's Office - Tuas

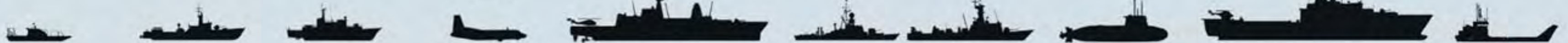
Institute of Maritime Warfare Institute of Maritime Operations and Systems
 Missile Corvette Combat Simulation Centre Tactical Training Centre Patrol Vessel Combat Simulation Centre

In Support

First Flotilla

Third Flotilla

180/181 Squadron 182 /189 Squadron 194 Squadron 121 Squadron (RSAF) 185 Squadron 188 Squadron 171 Squadron 191 Squadron 192/193 Squadron



ASSETs and Shipping Control Patrol Vessels/ Anti-Submarine Patrol Vessels Mine Countermeasure Vessels Maritime Patrol Aircraft Frigates Missile Gunboats Missile Corvettes Submarines Landing Ships Tank Civil Resource Vessels

SUPPORTING THE BALANCED NAVY

Naval Bases

Tuas Naval Base

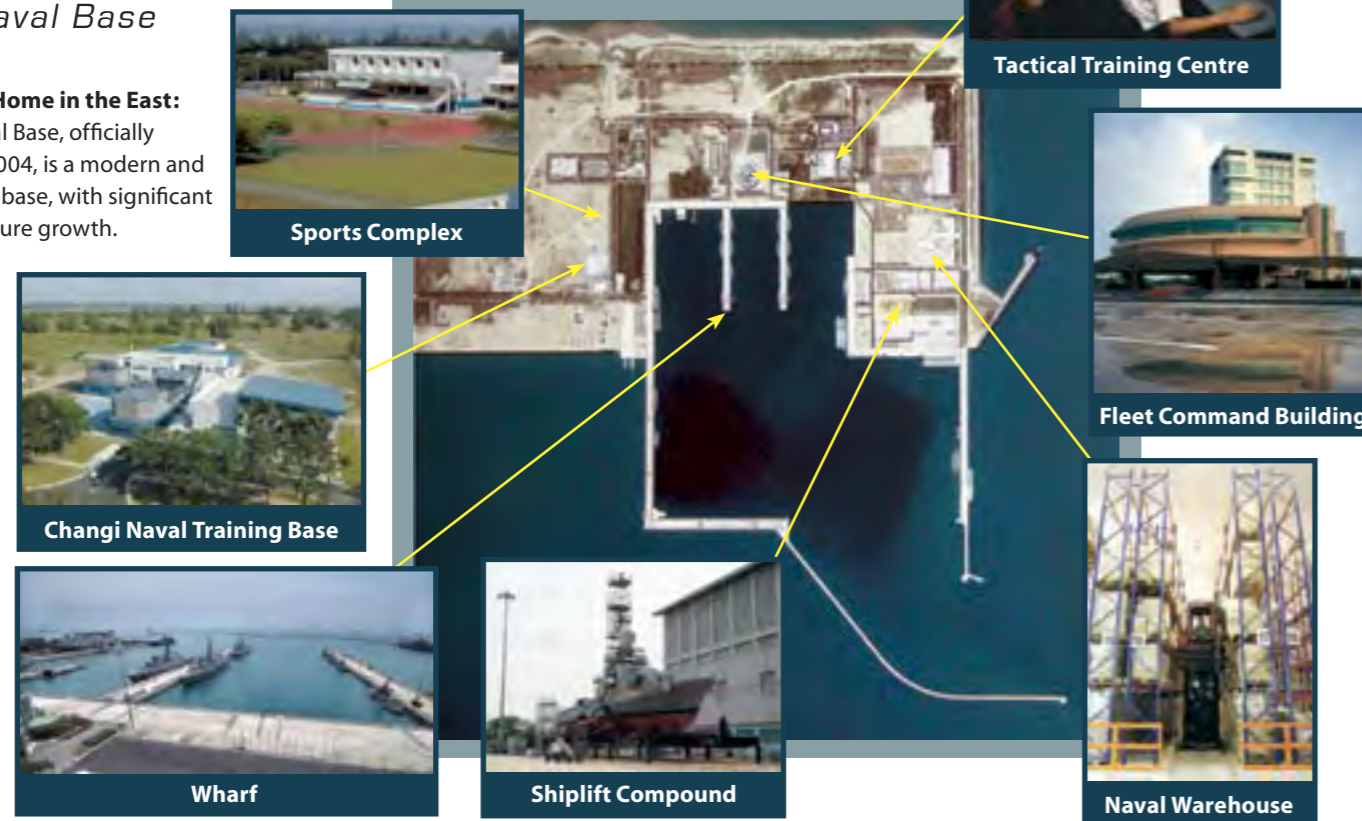


▲ **The RSN's Home in the West:** Tuas Naval Base, officially opened in 1994, provided additional space to house the growing Navy.

▲ **Making the Most of Limited Space:** The use of finger piers enabled Tuas Naval Base to maximise its wharf space.

Changi Naval Base

▶ **The RSN's Home in the East:** Changi Naval Base, officially opened in 2004, is a modern and "intelligent" base, with significant space for future growth.



◀ **For Ships of All Shapes and Sizes:** The wharves at CNB can accommodate the very large ships that periodically call at CNB, including aircraft carriers. CNB has had the privilege of hosting aircraft carriers from France, India, Thailand and the United States.



Logistics



◀ **All Systems Go!** The role of Naval Logistics is to ensure the combat readiness of the Navy's fighting units. Pictured here are (from left) the loading of a Harpoon missile onto the frigate, the loading of a Barak missile onto the MCV and the loading of a heavyweight torpedo onto the submarine.



▲ **Integrated Work Force – Working Symbiotically with Commercial Partners:** The Integrated Work Force leverages on commercial expertise to jointly undertake the maintenance tasks of the RSN.

◀ **Building Capacity – The Dual Role of Combat Technicians:** By training shipboard combat system operators to be both skilled operators as well as proficient maintainers of their combat systems, the Navy is able to maximise the contributions of its highly competent personnel and deploy them efficiently.

STORING EXPLOSIVES COMPACTLY AND SAFELY – THE RSN'S HIGH PERFORMANCE MAGAZINE

The Navy's High Performance Magazine (HPM) is the first fully automated ammunition storage facility in the SAF. Its design results in substantial land and manpower savings.

The HPM is designed to store ammunition underground. By making use of non-propagation walls made up of lightweight concrete filled with sand, the risk of chain detonation is greatly reduced. This allows ammunition to be stored in a more compact manner, resulting in a large reduction in land use.

The automation and technology within the HPM allows it to be operated with fewer people. The storage and retrieval sequences are automated and pre-programmed.



▲ **Safe Storage:** Harpoon missiles are among the explosive munitions stored in the HPM.



FINDING A NEEDLE IN A HAYSTACK? NO PROBLEM!

The latest in warehousing technologies is employed in the Changi Naval Warehouse. Occupying a plot of land about the size of a football field, the warehouse packs 17,000 square metres into three stories of floor space, which can hold and manage up to 17,000 pallets and 50,400 storage bins. Modern storage media such as the Very Narrow Aisle (VNA) maximises storage space, while the intelligent Warehouse Management System and the reliable Automated Identification Technology allow the warehouse to be run by a mere 25 men. The advanced Automated Storage and Retrieval System (ASRS) is able to store or retrieve any pallet using a mechanical arm in under 20 seconds, with just a push of the button.

▶ **Power-Packed!** The Changi Naval Base Warehouse has 17,000 cubic metres of storage space, while occupying an area of only one football field.

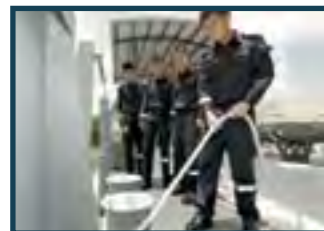
◀ **Enterprising Logistics:** The Naval Enterprise System is an integrated resource portal that utilises information technology to manage and support the wide range of RSN operations.

Training

Changi Naval Training Base (CNTB)



◆ **Learning the Ropes:**
The Ship System Training Complex (above) and the Basic Naval Trainer (below) provide sailors with hands-on training.



▶ **Forging Strong Fundamentals:** Training Command (TRACOM) is responsible for the vocational training of the Navy's specialists and warrant officers as well as warfare training at the operator, team and command team levels.



▶ **Going to Sea Without Leaving Harbour:** The Ship Handling Simulator is a shore-based trainer that recreates the sea environment ashore and allows ship teams to hone their navigation and ship-handling skills.



▼ **Taking a Dive, High and Dry:** The Submarine Simulator and Dive Trainer provides submariners with realistic dive scenarios and conditions.



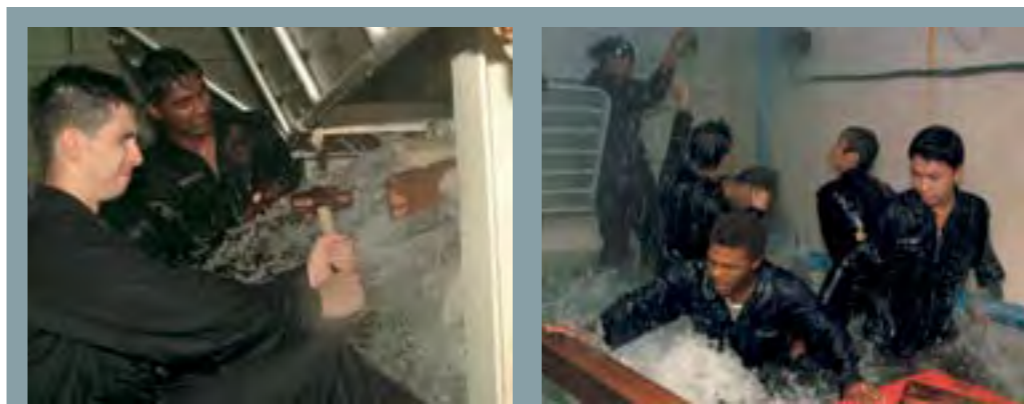
▲ **Training the Whole Force:** Tactical Trainers support individual team tactical training as well as larger scale Task Group and Task Force-level exercises.



▲ **Going to "War":** Combat system simulators at the Institute of Maritime Warfare (IMW) allow shipboard teams to hone their procedural and tactical skills in a realistic shore-based environment.



▲ **A Modern Learning Environment:** Modern teaching methodologies with a strong emphasis on self-directed and group learning have been introduced in TRACOM.



◀ **Plugging the Gaps!** The Damage Control Trainer provides sailors with training to "battle" realistic flooding scenarios.

FIRE AND FLOODING - EVERY SAILOR'S NIGHTMARE

The Damage Control trainer provides realistic and challenging training, simulating both flooding and fires on board a range of vessels. Sailors feel the heat and smoke, and experience the effect of continuous water flooding and burst pipes, giving them confidence to face all eventualities at sea.

Medical Support



HEALTH MATTERS!

Beyond medical support to the Navy, the Navy Medical Services (NMS) also participates in HADR and PSO missions. The NMS also functions as a national resource. The Naval Medicine and Hyperbaric Centre supported the construction of the Northeast MRT line (1998-2000) and Circle Line (2002 till present) by providing training in compressed air works to medical practitioners and conducting health and safety audits. It also offers hyperbaric oxygen treatment to the recreational and commercial diving community, with a dedicated hyperbaric chamber team always on standby.

▲ **Doctors on Call:** The NMS provides a wide range of services to the RSN, including quality healthcare to Navy personnel on a 24/7 basis. It also supports RSN missions at sea.



◀ **Envisioning the Future:** The Navy and DSO National Laboratories collaborating on an Advanced System Trial.

TRANSFORMATION – A CONTINUOUS JOURNEY

“The RSN has always been in a constant state of transformation, ever since it moved beyond its coastal constabulary roles.”

– Dr Tan Kim Siew,
Permanent Secretary (Defence Development)

Transformation is not a destination; it is a journey. Since its early days, the Navy has been on a journey of continual change and transformation. The pace of change picked up in the 1980s when the role of the Navy started to move beyond constabulary duties. In the area of war-fighting there has been acquisition of new technologies and the development of new doctrines and tactics. Organisationally, the Navy has evolved, renewed and re-balanced its structure to meet expanding operational needs. The Navy is also constantly preparing and transforming its people for the challenges ahead. The Navy continues to transform because it sees the future as an ever shifting horizon, where the only constant is change and preparation for change.

War-Fighting Transformation

The twin pillars of the Navy’s war-fighting transformation are the harnessing of technology and experimentation. These enable the development of unique and forward-looking war-fighting concepts.

Harnessing Technology as Force Multiplier

Being a small Navy, the RSN had to develop its operating concepts based on the need to fight and win against a force that might be numerically superior. Thus, the Navy has had to use technology as a force multiplier, starting with the Gabriel missile and investments in Electronic Warfare. By the mid-1980s, the Navy had gained enough experience to undertake complex systems integration, including the integration of the Barak missile, then an untested system, with the rest of the MCV’s combat systems.

Many of the technologies employed in the Navy are developed locally through a close working relationship with partners such as DSO National Laboratories and DSTA.

Today, harnessing of technology for war-fighting transformation is primarily aimed at increasing operational awareness and improving war-fighting superiority. Increased operational awareness will allow Navy units at sea to obtain a better appreciation of the battlespace around them. Navy ships will then be better able to detect, identify and engage enemy targets. Improved war-fighting superiority through the application of secret edge technologies and advanced combat systems will give the Navy the edge against any potential foe, anytime, anywhere.

The Navy has also invested heavily in decision support tools. For example, the frigate’s state-of-the-art Combat Management System houses several intelligent



▲ **Double the Protection:** The two Protector Unmanned Surface Vessels (USVs) shown in this picture are capable of performing varied tasks such as identification and interdiction of threats at stand-off distances.

engines for data fusion, track identification and threat evaluation. These serve to cut down routine operator tasks and help the frigate size up the battlespace much more efficiently and effectively.

Examples of other transformational technologies being introduced include unmanned systems and the SAF’s Integrated Knowledge-Based Command and Control (IKC2) system.

Unmanned Systems

Unmanned systems have started to play an important role in the modern battlefield. They give commanders a significantly greater awareness of the situation by collecting intelligence and can be employed in operations without putting servicemen in harm’s way.

The RSN was possibly one of the first few navies in the world to deploy USVs for actual operations. During RSS *Resolution’s* three-month deployment to the Northern Arabian Gulf in 2004, the Protector USV was used to assist in protecting critical infrastructure from terrorist attacks. The fishing dhows or traditional boats transiting the waters of the Northern Arabian Gulf were quite surprised to be intercepted by a craft with no one on board. They duly complied with the instructions

“AHOY THERE! ANYBODY ON BOARD?”

The fisherman looks quizzically at the strange vessel approaching his fishing boat from a distance. He turns to his fellow fisherman, who looks equally puzzled. As the vessel approaches, the two men notice a gun mounted at the front of the vessel. They also notice that there is nobody on board. When the vessel is within earshot, they hear a voice from the vessel telling them that they have encroached into a restricted area, and that they are to proceed out as fast as possible. The vessel remains in position, a few hundred metres away, pointing its gun menacingly at them. The first fisherman quickly proceeds to withdraw his nets from the water, while the second starts the boat’s engines. In no time, they are steering their boat away from this strange, unmanned vessel, out of the restricted area.

The Protector USV is a nine-metre-long Rigid Hulled Inflatable Boat (RHIB), remotely controlled by an operator on the mother ship. It is fitted with a camera that allows the operator to see what is going on in the immediate vicinity of the vessel. A loudspeaker and microphone also allow the operator to “speak” and to “hear”. The on-board machine gun system provides this small vessel with a lethal punch.

Increasingly, unmanned vessels like the Protector USV are proving their worth in operations. They provide a stand-off capability to ships and shore units. They can be fitted with different types of payloads tailored for different missions.



▲ **Collaborating with Partners:** The Spartan USV was developed in collaboration with the USN under the Advanced Concept Technology Demonstrator initiative.

▼ **An Unmanned Perspective:** UAVs will enhance the Navy's ability to conduct maritime surveillance.



issued by this mystery boat. But they were not the only ones surprised. "The *Protector* USV generated interest among the coalition forces, as USV technology is still relatively new and employment of such craft for security operations in an operational environment is quite novel," said COL Bernard Miranda, Commander Third Flotilla.

Looking ahead, the Navy is experimenting with different types of unmanned systems for various tasks. UAVs and USVs can be used for maritime surveillance, interception and force protection, while Unmanned Underwater Vehicle (UUV) systems can further expand the Navy's capabilities in the underwater dimension.

Integrated Knowledge-Based Command and Control (IKC2)

IKC2 is a new operating paradigm that aims to harness the power of intelligent networking as a force multiplier. IKC2 networks the SAF and RSN's sensors, shooters and communication nets across the entire battlespace. With IKC2, every combat system on every platform, as well as shore command and control systems, can work together as part of an integrated force that can see first, understand first, decide first and strike first. The RSN is transforming itself to become an integral part of the larger SAF-wide IKC2 network, one in which all three services will work seamlessly as one.

Experimentation

The culture of experimentation runs deep in the Navy. Besides acquiring new platforms and systems, the Navy has spent considerable time and effort undertaking trials on its equipment to ascertain their capability envelop. These have allowed the Navy to tailor and optimise its weapon systems to fit its unique requirements. For example, starting from the 1980s, extensive testing and firing of Gabriel missiles have allowed the Navy to fine-tune its Gabriel engagement criteria, to ensure an almost 100% hit probability against intended targets in the congested littoral environment. It has also enabled the Navy to devise operating concepts and doctrines to meet specific operating scenarios.

► **A Meeting of Minds:** The Flotilla Warfare Working Group (FWWG) meeting is an important forum for the development of new tactics and doctrines, bringing together personnel from the Navy, Air Force, Army, DSO and DSTA.



Beyond its shores, the Navy participates in collaborative experimentation programmes with other countries such as the United States, France and Sweden. This includes joint development of unmanned systems under the USN's Advanced Concept Technology Demonstration (ACTD) initiative, and exchanges on platform signature management with its counterparts from France. These experiments help the RSN redefine and transform its operating concepts to give it an added war-fighting edge.

Organisational Transformation

The Navy's organisational structure has changed significantly over the years. Formations within the RSN have undergone periodic restructuring and re-balancing to ensure their continued relevance to the SAF. Touching on this renewal ethos, Chief of Navy, RADM Ronnie Tay explains, "We need to adjust our organisational sails to remain relevant and effective, and create capacity to sustain our transformational efforts and deal with our widened spectrum of operations."

Warfare Centres

The Navy set up the Naval Underwater Warfare Centre in 2001 and the Naval Surface Warfare Centre in 2004. Warfare Centres (WARCENs) enable the RSN to reap cross-boundary synergies and to bring about greater integration between the operations, intelligence,

logistics, plans and technology communities. This was the Navy's form of "hubbing" to bring together expertise from the Plans, Logistics and Intelligence communities. Such an arrangement enables a more holistic approach towards capability development from the identification and specification of requirements, right up to the operationalisation of new capabilities. The WARCENs also act as knowledge repositories for the various combat systems of the Navy, ensuring that the rich experience and lessons painstakingly learnt over the years are captured, stored and disseminated.

Flotilla Warfare Working Groups

Cross-boundary "hubbing" within the Navy is not confined to the WARCENs. In the mid-1990s, the introduction of new assets and the procurement of new capabilities created a need to develop new tactics and doctrines to maximise their new capabilities. A number of Flotilla Warfare Working Groups (FWWGs) were created in the 1990s to meet this need.

FWWGs comprise Flotilla staff, shipboard officers, representatives from the DSTA, DSO National Laboratories, Naval Logistics and Plans communities. These groups are instrumental in doctrine and tactics development, the conduct of trials and experiments, and the tracking of combat systems effectiveness. Cross-Service Working Groups have also been formed to harness joint synergies.



◀ **Heartware to Unlock Our Hardware:** Quality people are integral to the Navy's transformation.

People Transformation

The Navy firmly believes that the key to unlocking its full transformation potential lies in its people. To get the most out of advanced equipment, the RSN needs to elicit the best from its specialists and officers who operate and maintain the hardware. Each and every

BUILDING THE KNOWLEDGE-CENTRIC NAVY

Knowledge Management (KM) initiatives have taken root within the Navy for some time. This includes knowledge capturing and sharing. More recently, KM was extended to "knowledge creation" (KC), involving aspects such as innovation, organisational learning, and sensemaking. The Navy has endeavoured to bring knowledge to the fore and operationalise new knowledge initiatives. Sensemaking systems are now used to aid decision-making in various areas including on board the frigates and coastal surveillance. Information Technology systems are used to help capture experience and lessons learnt, and to shorten the learning curve for new personnel. Expert Panels have been set-up to enhance knowledge within different professional areas.

serviceman and servicewoman matters. The Navy has therefore embarked on initiatives to transform its people to prepare them for future challenges.

Focus on Knowledge

Today, the Navy is dealing with equipment and concepts that are at the very cutting edge. There are few signposts out there to follow. The Navy needs to sail in uncharted waters, "sensemake" and innovate. It needs to experiment, test out new ideas and continually refine and adjust them so as to develop concepts that are imaginative and well tailored to its operating environments and requirements.

Information and knowledge are pivotal force multipliers in the modern battlespace. The ability to learn, share and create knowledge across the RSN and SAF are critical success factors in the Navy's transformation journey hereon. Knowledge and intellectual capital residing in the members of the Navy Family are the RSN's main sources of competitive edge.

To prepare its men and women for this change, the Navy has implemented a slew of Knowledge Management (KM) initiatives. This includes teaching KM methodologies in the classroom, encouraging innovation and creativity in the workplace and implementing technologies to enable a knowledge environment.

▶ **Empowered WOSRs:** CIC Supervisors ensure that the complex processes taking place in the CIC are run smoothly and efficiently.

Empowering our People

The Navy's Warrant Officers, Specialists and Ratings (WOSRs) of the early years were occupied essentially with seamanship and basic operator work. Today, they are vested with the weighty responsibility of being the Navy's experts in their respective fields. The Navy has always believed in the tremendous potential of its WOSRs. Over the years, it has systematically empowered them and enlarged their contributions.

One milestone initiative was the CIC Supervisor – a senior WOSR charged with the smooth running of the ship's Combat Information Centre (CIC). Another initiative underway is the creation of warfare supervisor roles on board the frigates, where WOSRs are empowered to supervise various clusters of systems. This frees up bandwidth for officers to take a step back and fight the battle at the Task Group level.

* * * * *

The Navy today is an effective operational force, capable of fulfilling a wide spectrum of missions to secure and advance Singapore's national interests. The balanced and capable Navy of today has been realised through careful planning, far-sighted visioning and meticulous execution, as well as through the hard work and sheer grit of every man and woman in the Navy.



THE WARFARE SUPERVISOR – INSTRUMENTAL IN ENHANCING CIC PERFORMANCE

The Warfare Supervisor is a new shipboard appointment and is a key initiative in the RSN's endeavour to enlarge the roles and contributions of its WOSRs. Warfare Supervisors support the Principal Warfare Officer (PWO) in managing and directing the Combat Information Centre (CIC). They do so by co-ordinating the actions of the CIC team members under their charge. Besides ensuring optimal settings for weapons and sensors employment, they also supervise operators to ensure that directions from the PWO are executed correctly and promptly. In so doing, the Warfare Supervisor frees up bandwidth for the PWO, and allows him or her to "level-up" to focus on the larger picture. The Warfare Supervisor is also groomed as the subject-matter expert in his or her particular domain.

Never Looking Back We'll Always Grow



CHAPTER 3

WITH OUR COMRADES IN ARMS

READY FOR AN EXPANDING
SPECTRUM OF OPERATIONS

***THE WORD GOES OUT;** diplomacy has failed. Singapore has no choice but to defend itself. The ships of the Navy are already out at sea, ready for the task ahead of them. Their mission – to search out and destroy the adversary. Together with the Maritime Patrol Aircraft (MPA), Unmanned Aerial Vehicles (UAV) and other sensors from the SAF, a comprehensive picture of vast swathes of seas is being built up...*

MPAs are sent out, ahead of the task force. Their speed and superior detection capabilities allow them to comb the area of operation for the adversary. UAVs also patrol the skies, flitting from ship to ship, providing visual confirmation of their identity. All this information is fed to all the ships in the force via datalink, sometimes across hundreds of miles. This ability to share a common tactical picture between every unit in the group is one facet of the SAF's Integrated Knowledge-Based Command and Control (IKC2) system that enables our commanders to make decisions with the best available information. Critically, IKC2 enables the three services – Navy, Army and Air Force – to fight as one system, synergised and effective.

The tension mounts as one by one, the enemy warships are localised. Time to move in for the kill. With targeting information provided by the MPA and UAVs,

air strikes are called on the enemy warships. Meanwhile, the Navy's ships ready their Harpoon missiles for launch. As fighter aircraft from the Republic of Singapore Air Force (RSAF) streak towards their targets, salvos of missiles are released by the Navy's warships towards their targets over the horizon. The missiles travel many kilometres, skimming just above the surface of the sea to avoid detection. At the last moment, they pop up, find the enemy ships with their radar seekers, just as the weapons released from the RSAF fighters approach their targets.

Although the adversary has lost the first round, he is not giving up without a fight. Adversary aircraft are rapidly converging on the Navy's warships and hostile submarines lurk in ambush. However, the Formidable-class frigates are prepared. Their long-range radars scan the skies many miles away in anticipation of incoming

adversary aircraft. Suddenly, fast-moving air contacts are picked up at the edge of the radar's detection range, their profiles suspicious. Seconds later, more information on the suspicious air contacts is obtained through other shipboard sensors. The suspicious air contacts are confirmed as enemy aircraft; they are now closing in on the ships at high speeds. The aircraft locations are transmitted instantly to other ships in the force and within seconds, the frigates launch their Aster Surface-to-Air Missiles (SAMs). Travelling at several times the speed of sound, these SAMs streak towards the inbound aircraft. Impact! Air threat neutralised.

The adversary's submarines are a little more challenging to localise, as they operate deep underwater. Nevertheless, the RSN's naval helicopters detect the hostile submarines in time, before the submarines' torpedoes are within striking range of their intended

targets. Torpedoes are launched from the helicopters, even as the Navy's missile corvettes and frigates cordon off the submarines' possible escape routes. The submarines eventually succumb to the relentless attacks. Mission accomplished. Threat eliminated.

While this represents a fictitious exercise scenario, it illustrates just what could happen to those who threaten Singapore's sovereignty and survival. With her comrades in arms from the land and the air, the RSN stands ready to defend Singapore 24/7. This is the ultimate *raison d'être* for the Navy's existence – to safeguard Singapore's sovereignty and to secure a swift and decisive victory should diplomacy and deterrence fail.

In order to fight and win decisively, the RSN devotes a significant portion of its resources and time to realistic training ashore and at sea.





◀ **Strong Fundamentals for War-Fighting.** The Ship-Handling Simulator hones navigation and ship-handling skills, which are vital foundations for every RSN ship.

OPERATIONAL TRAINING TO WIN WARS

Training Ashore

Simulators are used extensively to support training ashore. It is not uncommon to have several such exercises taking place on any given work day. The Missile Corvette (MCV) and the Patrol Vessel (PV) Combat Simulation Centres focus on honing the skill-sets of individual operators and the warfare proficiency of command teams. They provide operators and command teams with a realistic feel of combat pressures at sea. Through injected scenarios ranging from the effects of enemy action to equipment failure and damage, ship command teams are systematically trained to handle a wide variety of scenarios.

Beyond warfare training that focuses on team level proficiency, the Tactical Training Centre (TTC) provides the commander and his team with Task Group (TG) and Task Force (TF) level training. Focused on tactical procedures and decision making, the TTC allows different classes of ships and aircraft to train together in realistic scenarios. For added dynamism and realism, two-sided exercises are often carried out at TTC, pitting two different groups against each other. TTC exercises enable the RSN to draw lessons as well as uncover operational challenges before units sail out to sea.

◀ **As Real as It Gets!** The MCV and the PV Combat Simulation Centres provide command teams and operators with a realistic feel of combat pressures at sea.

EVERY DAY IS WAR AT THE RSN'S COMBAT SIMULATION CENTRE

... Suddenly, the Action Information System operator picks up two radar contacts approaching the ship at blistering speed. Immediately, he raises the alarm: "FLASH! Missiles inbound bearing two-two-five!"

The ship's self-defence systems are quickly brought to bear on the missiles. Weapon Control Specialists activate the Barak Anti-Missile Missile (AMM) system using well-rehearsed procedures. The ship's Barak missiles are fired in quick succession, racing to intercept the inbound threats. On the sonar consoles, the operator picks up a possible enemy submarine lurking in the vicinity. Classification and identification procedures are promptly ordered, just as the countdown to the missile impact is broadcast over the Intercom system. The Commanding Officer keeps his cool, knowing that he still has to deal with two enemy ships that were last detected miles away to the east.

This is not a script out of an action movie, but a daily occurrence at the MCV Combat Simulation Centre. Every working day, battles are hard fought by ships undergoing training in this realistic simulator. Training is ruthlessly tough and the instructors brutal in their assessment. Nevertheless, the ships' command teams approach the training eagerly, because out at sea, "Game Over" is not an option.



▲ **Green Deck! Clear to Land:** Years of training together have enabled RSN-RSAF operations to run almost like clockwork – safe and effective. A Super Puma being signaled to land on board the Landing Ship Tank (LST).



Training At Sea

With its operational plans tested and refined at TTC, the diverse combat skills needed for modern naval warfare are then put to the test in exercises at sea, many of which are joint in nature. In fact, hardly a fortnight goes by without an exercise at sea involving the RSN's sister services. This ensures that the many disparate systems and equipment from the different services can mesh together into an effective whole. Then Chief of Army (now Chief of Defence Force), MG Desmond Kuek observed, "Regular training has enabled the Army and Navy to move beyond mere inter-operability. Today, operations involving the Army and the Navy are seamless and integrated. I can say that the Army works very much hand in hand and shoulder to shoulder with the RSN."

Integrated Operations with the Army and the Air Force:

Regular training with the Army and Air Force over the years has reaped enormous benefits for the SAF in joint operations. A Ramp Powered Launch (RPL) disembarks an armoured vehicle (opposite page) while Fast Craft Equipment and Personnel (FCEPs) facilitate the movement of troops from sea to shore (below and right).



MG Kuek's sentiments were echoed by Chief of Air Force, BG Ng Chee Khern, who also pointed out that the level of integration between the RSN and the RSAF has come a long way. He remarked, "Honed through years of training together and enabled by Command and Control systems that can 'talk to one another', RSAF-RSN operations now run almost like clockwork."

The RSN also regularly pits its skills against friendly navies in exercises to ensure that its war-fighting skills remain top-notch.

One example is the series of encounter exercises pitting RSAF aircraft, RSN ships and submarines against a USN Carrier Battle Group. Such high-end exercises stretch the operational skills of RSN Task Groups at sea. ADM(Ret) Vernon Clark, the former US Navy Chief of Naval Operations (2000–2005) had this to say about the RSN after one such exercise: "The RSN is, in a word,

superb... Your people are well-trained. We have much to learn from you, just as there are some things that you could learn from us."

Like most military forces, the RSN maintains its readiness to meet any hostilities, should they arise. As the ancient Chinese saying goes, "养兵千日, 用在一时" or "raise an army for a thousand days, use it for a moment". Training for war is serious business. War is unlike computer games where one can press the "restart" button if things go terribly wrong. In war, there is often only one chance to get it right. That is why the RSN places so much emphasis on robust and realistic operational training. Minister of State for Education, RADM(NS) Lui Tuck Yew, summed it up very well when as Chief of Navy (2000–2003), he emphasised that "the RSN needs to ensure that it is always a Navy with Superior Readiness, Superior People, and Superior Organisation".





Iron Sharpens Iron – Honing War-Fighting Skills Together:
The RSN exercises regularly with foreign navies under realistic and challenging operational scenarios (above and below).



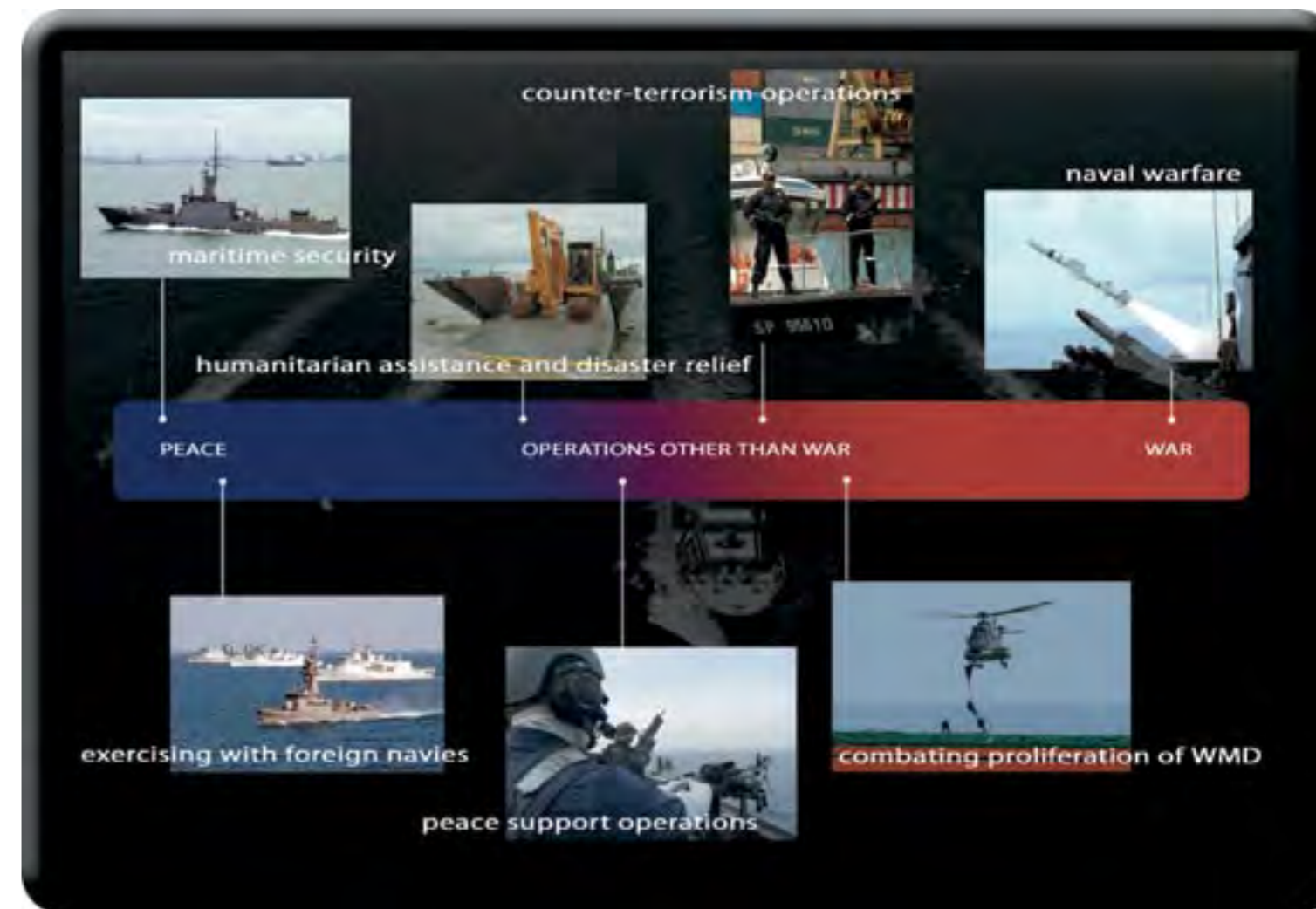
FACING OFF AT SEA!

In 2002, one lone submarine, *RSS Chieftain*, pitted herself against the entire *USS Carl Vinson* Carrier Strike Group (CVSG), as part of a series of regular USN-RSN Passage Exercises (PASSEXs). *RSS Chieftain* was put to the test, and was only given a brief intelligence update before she sailed. The submarine had to employ all her wit and cunning to try and steal past the frigates, destroyers and helicopters in the ASW screen, in order to get a shot at the carrier. Coming away from the exercise, *RSS Chieftain's* crew expressed great satisfaction and a sense of achievement after having participated in such a challenging encounter. While training with the USN has been ongoing for a long time, these high-intensity encounters known as USN-RSN PASSEXs were started in 2001. The PASSEXs have brought immense benefit to exercise participants from both navies.

NAVY'S OPERATIONS IN PEACETIME

Militaries have always been an instrument of last resort, to be used when diplomacy and other instruments of state have failed. However, the RSN has never just concentrated on training for its wartime missions. Since its very inception 40 years ago, the Navy has had to undertake peacetime operations, such as seaward security duties, that are no less important. This is most apparent in the daily patrols mounted by the RSN in the Singapore Strait.

In recent years, the missions that the RSN has been called upon to perform have grown in scope and in scale. The diagram below shows the expansion in the RSN's spectrum of operations. It now includes Counter-Terrorism, Counter-Proliferation, Humanitarian and Disaster Relief, Peace Support, and many other types of operations. In today's fast-evolving security landscape, militaries and the RSN can no longer afford to operate on a binary mode of peace or war.







◀ **New Skills for New Threats:** The RSN has developed capabilities in boarding operations to counter threats at sea.

EXPANDING SPECTRUM OF OPERATIONS IN A CHANGING WORLD

Forces of Globalisation

Driven by the forces of globalisation and powered by advances in information technology, the world is changing at a rapid pace. The world today has grown increasingly inter-connected. Countries such as Singapore have benefited greatly from this, as they plug into this growing network of cities and nations to participate in the global marketplace and economy.

On the flip side, globalisation has its attendant set of risks. Globalisation has made borders more porous, making countries more vulnerable, and allowing small perturbations to propagate quickly from one country to another. The Asian Financial Crisis and the Severe Acute Respiratory Syndrome (SARS) outbreak are telling examples of how events unfolding in one part of the world can have global repercussions.

9-11 and the Rise of Transnational Terrorism

Unlike a traditional military opponent, the terrorist of today is an amorphous and faceless foe, relying on the cover of the masses to conceal his identity. Using the technological know-how of this information age,

they co-ordinate their activities on a global scale, unconstrained by border controls and checkpoints. 9-11 is a case in point.

Terror threats are not confined to the land and the air. Maritime terrorism poses a very real threat. The attacks on the USS *Cole* in 2000 and the MV *Limburg* in 2002 are reminders of the damage that small bands of terrorists can wreak.

MARITIME TERRORISM – A CLEAR AND PRESENT DANGER

On 12 October 2000, Al-Qaeda carried out an attack on the US Navy destroyer, USS *Cole*, while it was anchored in Aden Harbour in Yemen for a routine refuelling. Shortly before noon, two suicide bombers approached the USS *Cole* in an explosive-laden speed boat and detonated it alongside the vessel. The blast tore open the *Cole's* steel hull and killed 17 members of the crew. Thirty-nine others were injured in this terrorist attack.

Two years later, a French oil tanker MV *Limburg* was the target of maritime terrorism. The super-tanker was attacked in the Gulf of Aden as it approached Yemen's Ash Shihr oil terminal. Again, a small boat was used which exploded as it approached the vessel, causing substantial damage to the side of the *Limburg*.

MARITIME SECURITY

The RSN has invested significantly to ensure that it has the resources and capabilities to deter and respond to transnational terrorist threats at sea.

Maritime Security Operations in the Singapore Strait Today

Under the charge of COSCOM, the PVs of the Navy continue to conduct daily patrols, but with a greatly expanded role, to tackle the suite of maritime challenges and contingencies that has evolved in recent times. These include more routine operations like escort of merchant ships carrying high-value cargo, and force protection duties in the Singapore Strait. The PVs are also called upon to respond to contingency operations ranging from search and rescue to incidents like hijacking at sea.

SHEPHERDING SHIPS THROUGH THE SINGAPORE STRAIT

More than a thousand ships use the Singapore Strait every day. The security of these ships during the transit is a prime concern for the RSN. Ships such as passenger liners and large oil tankers can be lucrative targets for terrorist or piracy attacks, and therefore, the RSN conducts escort operations for selected vessels. In so doing, the RSN enhances the security of international shipping in Singapore's waters.

▼ **Shepherding Ships:** The PVs are now increasingly called upon to conduct a diverse range of maritime security operations. These include escort of merchant ships passing through the Singapore Strait.





▲ **Safe in My Wake:** The MCMVs ensure that Singapore's port and waters remain mine-free.

The Mine Countermeasure Vessels (MCMVs) also play an important role in maritime security. Mining is a serious threat to Singapore's economy. It is estimated that closure of Singapore's ports would result in direct trade losses amounting to more than \$1.2 billion a day. The MCMVs ensure that the Singapore Strait and the sea lanes surrounding Singapore remain mine-free, so that commerce, which remains the lifeblood of Singapore's economy, can flow unabated.

The PVs and MCMVs play a vital role in protecting Singapore's seaward security. They are ready to respond at a moment's notice at all times.

A LEAF FROM COSCOM'S HISTORY

Since its inauguration, COSCOM has seen action in some notable real-life operations that have tested the capabilities of this Formation.

On 31 January 1991, the Coastal Patrol Craft (CPCs) RSS *Swift Knight* and RSS *Swift Cavalier* responded to a distress call by a sinking general cargo vessel MV *Jenson*, southwest of Horsburgh Lighthouse. Battling limited visibility at night, the crew on board the CPCs rescued all 15 members of the vessel's crew. The vessel sank not long after the rescue mission.

The crash of SilkAir Flight MI 185 on 19 December 1997 in the Musi River near Palembang, Indonesia was a national tragedy. Together with the RSN's divers who combed the Musi River in search of debris and aircraft parts, the MCMVs RSS *Kallang*, RSS *Punggol* and RSS *Bedok* were deployed to assist the Indonesian authorities in their Search and Recovery operations. The ships' sonar systems scanned the riverbed for metal debris. Though no survivors were found, the efforts of the RSN contributed to this important operation.

180 SQN – VIGILANT IN SHIPPING CONTROL

Known as the Shipping Control Squadron, 180 Squadron has two primary functions. It collects and analyses shipping data, and boards merchant ships in Singapore waters to ensure their security.

With increased maritime threats following 9-11, demands on the squadron have risen significantly, even in peacetime.

LTC Lee Khai Leong, previously Commanding Officer of 180 Squadron, reveals some of the training his men in 180 Squadron underwent to operate well in this work environment: "We need a good knowledge of shipping practices and operations to better understand shipping trends. Many of my men have attended commercial maritime classes like tanker familiarisation courses and dangerous cargo handling courses. As shipping operations are complex and involve multiple agencies like the Maritime and Port Authority, the Police Coast Guard and the Immigration and Checkpoints Authority, the squadron also needs good rapport and links with them."



▲ **Keeping a Watchful Eye 24/7:** Shipping traffic is scrutinised for signs of threats.

Rising to the Maritime Security Challenge

Working with the Maritime and Port Authority's Network of Shore Radars

Tracking the 1000-plus vessels that ply the narrow and congested Singapore Strait daily is no mean feat. To overcome this challenge, the Navy works closely with the Maritime and Port Authority's network of shore radars to achieve pervasive awareness in the Singapore Strait. In addition, analysis of shipping data obtained from the port authority to enable timely detection of anomalies and suspicious vessels is the job of COSCOM's 180 Squadron.



Accompanying Sea Security Teams

Another new capability that the Navy has developed to tackle maritime terrorism is the Accompanying Sea Security Teams, or ASSETs for short. Like the air marshals on commercial airplanes, ASSETs consist of highly trained Navy and Police Coast Guard personnel deployed on board key vessels entering and leaving Singapore's ports to ensure their safe and secure passage. Well-versed in weapons handling, boarding procedures and the layouts of commercial gas and chemical tankers, ASSETs are prepared to handle any eventuality.

Even though the ASSETs were only recently set up, their presence has already become a source of assurance to the commercial shipping community. A manager of a shipping company explains, "Knowing that there is a dedicated force looking out for the ships puts the hearts and minds of many a seafarer at ease."



ASSET in Action: Highly trained Navy and Police Coast Guard personnel deployed on board merchant vessels to ensure their safe passage through Singapore waters.



Whole-of-Government Approach

Information, another vital resource needed to tackle the maritime security problem, also does not reside in any one agency. The RSN works closely with other government agencies and the shipping community to thwart maritime terrorism and crime today.

Fortunately, the RSN did not need to start from scratch. It already had close operating ties with the Police Coast Guard (PCG) that were painstakingly built up over the years. Today, the RSN and the PCG co-ordinate their daily operations and enjoy a high degree of inter-operability.

The Maritime Security Task Force (MSTF) was set up in 2004 to provide a framework for co-operation between Ministries and other private agencies. This has helped bring inter-agency co-ordination for maritime security to a higher plane. Mr Chiang Chie Foo, Permanent Secretary (Defence), who is also the Chairman of the MSTF, credits the Navy for "playing a key role in co-ordinating the implementation of maritime security measures and helping to build inter-operability between the agencies."



EXERCISE APEX – A PRIME EXAMPLE OF INTER-AGENCY CO-OPERATION

Since 1993, the Navy has been instrumental in co-ordinating and organising a large-scale inter-agency maritime security exercise, codenamed APEX. This exercise involves the Navy, Air Force, Army, Police Coast Guard, Maritime and Port Authority and the Immigration and Checkpoints Authority. In its largest-ever exercise in 2006, 1,600 personnel, ships and aircraft from the participating agencies executed a co-ordinated mission to guard against potential attacks along the Singapore Strait, and to secure the safe passage of vessels carrying vital cargo through them. Conducting such exercises regularly enables the Navy and its partners to build inter-operability and practise contingency plans. Such exercises also demonstrate the capability and commitment of Singapore's national agencies to foil maritime threats in its waters.

At the APEX of Maritime Security: Co-ordination among various inter-ministerial agencies were honed in drills such as ship-boarding (above and left) during Exercise APEX.



◀ **Moving from Strength to Strength – 15 Years of Indonesia-Singapore Maritime Security Co-operation:** Chief of Staff, Indonesian Navy, ADM Slamet Soebijanto, and Chief of Navy, RSN, RADM Ronnie Tay, launching Project *SURPIC*, under which both Navies could share a common real-time sea situation picture. Since 1992, the RSN and TNI-AL have been conducting co-ordinated patrols in the Singapore Strait.

WORKING TOGETHER TO PROTECT THE SINGAPORE STRAIT – FROM ISCP TO PROJECT *SURPIC*

The Indonesia-Singapore Co-ordinated Patrol (ISCP) was established in June 1992. Beginning with a simple radio communications link between the two navies for co-ordinating operations in the Singapore Strait and Phillip Channel, co-operation progressed to the conduct of co-ordinated patrols against sea robbery. Since its inception, sea robberies in the ISCP area of operations have plummeted from over 100 cases a year, to zero in most years.

Today, the two navies are highly inter-operable and the ships from the two navies frequently share operational experiences with the aim of further increasing the effectiveness of the co-ordinated patrols.

In May 2005, the Indonesian and Singaporean Navies marked yet another milestone in their excellent ties of friendship and co-operation with the launch of Project

SURPIC. This is a bilateral information sharing initiative to boost common situational awareness in the Singapore Strait. Project *SURPIC* will enable both navies to better monitor the busy waterway, exchange information and deploy their patrolling ships in the area more effectively.

*“By operating closely together for so many years, our Navies have learnt a lot from each other and we have become very inter-operable. In the process, we have greatly deepened our understanding and trust of each other. Truly, it is this friendship, respect and bond we have both built together that has enabled us to make Project *SURPIC* a reality, allowing us to take another stride forward in our fight against maritime security threats.”*

– RADM Ronnie Tay, Chief of Navy,
at the launch of Project *SURPIC* at Batam Naval Base.

Regional Maritime Security Co-operation

Maritime security is a multi-faceted and complex problem that cannot be addressed by any one navy or country alone. Like maritime trade, maritime threats may originate and end in the waters of different nations, crossing numerous boundaries in the process.

Regionally, close inter-navy ties have been a great boon for maritime security co-operation. Underpinned by years of bilateral exercises and other exchanges, the navies of Indonesia, Malaysia and Singapore are working closely together on a series of maritime security initiatives.

It started with the Indonesia-Singapore Co-ordinated Patrols or ISCP in short. Under the auspices of ISCP, the RSN and the Indonesian Navy (TNI-AL) undertook co-ordinated patrols in the Singapore Strait and the Phillip Channel. Since 1992, there has been virtually no sea robbery reported within the ISCP area of operation in the Singapore Strait. A new initiative, Project *SURPIC*, now allows the RSN and the Indonesian Navy to share a real-time recognised sea situation picture to enhance operational co-ordination.



Malacca Strait Patrols (MSP): Naval forces from the RMN, TNI-AL and the RSN now conduct co-ordinated patrols in the Malacca Strait to enhance maritime security. Since its inception, instances of piracy and sea robbery in the Malacca Strait have been reduced. Defence and Navy Chiefs from Singapore, Malaysia and Indonesia (above) are seen here reviewing ships deployed for MSP at the launching ceremony (below).





“EYES IN THE SKY”

A major initiative to enhance the security of the Malacca and Singapore Straits and the passage of ships along the sea lines of communications was launched by the three littoral states – Malaysia, Singapore and Indonesia. It is called “Eyes in the Sky”, with each of the littoral states contributing aircraft to conduct patrolling of the Malacca Strait from the air.

Launching the initiative at the Subang Air Base in Kuala Lumpur was Malaysian Deputy Prime Minister and Defence Minister, Najib Tun Razak, who had first proposed the idea of multinational maritime air patrols, or “Eyes in the Sky” at the Singapore Shangri-La Dialogue in June 2005.

Also at the event to launch the inaugural flight were Singapore’s Defence Minister Teo Chee Hean and senior defence officials. He said: “This is an excellent example of how a scheme can be put in place which is practical, useful and serves the needs of security in the Malacca Strait.”

– S Ramesh, Channel NewsAsia, 13 September 2005, covering the launch of the “Eyes in the Sky” initiative.

◀ **Eyes in the Sky (EIS):** Launched in September 2005, the EIS initiative calls for each littoral state to provide aircraft and crew to conduct patrols of the Malacca Strait from the air.

▼ **Enhancing Maritime Security:** Maritime Patrol Aircraft conducting combined maritime air patrols over the Malacca Strait.

Regional maritime security co-operation between Indonesia, Malaysia and Singapore was given an added boost with the formation of the Malacca Strait Patrols or MSP in short. MSP brings together the Malacca Strait Co-ordinated Patrols and the “Eyes in the Sky” aerial surveillance flights over the Malacca Strait. This close co-operation demonstrates the three littoral states’ commitment to strengthening maritime security in the Malacca Strait.



International Maritime Security Co-operation

Beyond regional maritime security co-operation, the RSN also leverages on its ties with other navies and Singapore’s strategic location to play a role in catalysing regional maritime security co-operation efforts. Mr Chiang Chie Foo noted that “with maritime security emerging as an area of growing concern to many countries, the RSN is uniquely poised to contribute to strengthening regional maritime security by working with friends and partners.”

A good example is the WPNS Multilateral Sea Exercise (WMSX) that the RSN hosted in 2005 as part of the 9th Western Pacific Naval Symposium (WPNS). Bringing together ships, observers and participants from 14 nations, the exercise created opportunities for navies from countries such as France, Brunei, India and China to co-operate and build inter-operability in maritime security. In the same light, the Navy organised the Maritime Security Information Exchange Seminar in August 2006 to share and discuss threats and operational measures. RADM William Burke, Commander Logistics



▲ **WPNS Multilateral Sea Exercise (WMSX):** The WMSX in 2005, hosted by the RSN, brought together ships, observers and participants from 14 countries in the Asia-Pacific region in a combined maritime security exercise at sea.

Group Western Pacific, USN, puts the value of such collaboration in this way: “Every second, minute or hour saved by being able to operate well together has the potential to save lives.”

Recognising the importance of information sharing, the RSN initiated the Regional Maritime Information Exchange, or ReMIX in short. This initiative allows ReMIX member navies to share information so as to collectively expand maritime situational awareness and enhance co-ordination among navies.



▲ **Looking Ahead Together:** The WPNS is an important forum for navies to come together to address common maritime security concerns.



Counter Proliferation — Proliferation Security Initiative

As a small state, Singapore is particularly vulnerable to the threat posed by Weapons of Mass Destruction (WMD). At the same time, as a major transshipment hub, Singapore is in a good position to play an important role in countering WMD proliferation. Singapore has therefore joined the international effort to stop worldwide shipments of WMD, their delivery systems, and related materials, known as the Proliferation Security Initiative, or PSI in short. Contributing to Singapore's overall efforts in the PSI, the RSN organised a large-scale PSI exercise codenamed Exercise *DEEP SABRE* in 2005, which focused on the tracking and interdiction of ships carrying WMD on the high seas.



Combating Proliferation of WMD: The RSN organised Exercise *DEEP SABRE* in 2005. This exercise saw 2,000 personnel from 13 countries coming together to hone skills needed to stop worldwide shipments of WMD (above and right).



► **Nothing's Going to Stop Us:** Interdiction of rogue vessels through aerial insertion.



COUNTERING THE PROLIFERATION OF WMD

"PSI provides the international community with a useful means of plugging the gaps in the existing counter-proliferation system... PSI creates an effective mechanism for states to work together to interdict WMD-related cargoes that are already in transit by sea, air or land."

– RADM(Ret) Teo Chee Hean,
Minister for Defence,
at the Opening Ceremony of Exercise *DEEP SABRE*, 2005

What happens when a rogue merchant ship carrying an illegal shipment of chemicals that could be used for the manufacture of weapons of mass destruction (WMD) is detected near the shores of Singapore?

That was the scenario faced by participants of Exercise *DEEP SABRE*, a multinational maritime interdiction exercise under the Proliferation Security Initiative (PSI) from 15–19 August 2005. Hosted by the RSN, it was the first PSI exercise held in Southeast Asia.

One of the largest PSI exercises to date, it included some 2,000 military, Coast Guard and Customs personnel from 13 countries with a total of ten ships, six maritime patrol aircraft, nine boarding teams and numerous experts and observers. The RSN fielded 400 personnel, three ships and two MPAs for the exercise. Besides Singapore, other participating PSI nations included Australia, Canada, France, Germany, Greece,

Italy, Japan, the Netherlands, New Zealand, Russia, the United Kingdom and the United States of America. There were also observers from countries like Brunei, Malaysia, Pakistan and Vietnam.

Participants of the exercise engaged in an intensive series of activities, including shore-based table-top discussions and harbour training. The sea phase of the exercise began with intelligence collection on the rogue ship. Operating from a Combined Co-ordination Centre in Changi Naval Base, participants deliberated their options for searching and interdicting the vessel suspected of carrying WMD-related material. During the sea phase, participants deployed their maritime and air assets to detect and trail the rogue ship in the South China Sea. When the ship rejected the request for a voluntary search, the ship was interdicted and diverted to Singapore.

A team from the RSN's Naval Diving Unit then boarded and secured the vessel. Follow-on forces from the SAF's Chemical, Biological, Radiological and Explosive (CBRE) Defence Group, the Japan Coast Guard and Australian Customs Service subsequently boarded the vessel for a preliminary search and investigation. When indications of a suspicious cargo were found, the ship was escorted back to Pasir Panjang Port for a more extensive search by domestic law enforcement agencies.



OPERATIONS OTHER THAN WAR (OOTW)

Besides maritime security, it is also important for the SAF and the RSN to contribute, within its capacity and means, to Operations Other Than War (OOTW). By so doing, the Navy does its part to preserve a stable, healthy global security environment within which Singapore can thrive as a responsible global citizen, secure and safe. The Navy is well suited to contribute in the arena of OOTW, due to its attributes such as versatility, lift capacity and sustained reach. Since the early 1990s, the tempo of OOTW undertaken by the RSN has increased, ranging from Humanitarian Assistance and Disaster Relief (HADR) to Peace Support Operations (PSO).

Peace Support Operations

On 18 September 1999, RSS *Excellence* departed Singapore for Darwin to participate in the International Force for East Timor or INTERFET for short. Shortly after, RSS *Intrepid* joined the deployment. RSS *Endurance* and RSS *Intrepid* spent about two months in and out of Darwin during which they were tasked to transport



INTERFET personnel, equipment and vehicles between Darwin, Australia and Dili, East Timor. The ships received media attention for the proficiency that the crew demonstrated during the mission, prompting the Royal Australian Navy (RAN) to write in its Navy News (November 1999 issue), "The Navy of the Republic of Singapore has demonstrated it is no slouch in carrying out its allocated tasks." General (Ret) Peter Cosgrove, who was the Commander of INTERFET also appreciated the support of the Singapore LSTs for the entire operation. He said that "the presence of the LSTs added enormously to the logistic viability of the force ashore. The fact that RSS *Excellence* was only given 48 hours' notice to sail for the 2½ month deployment bears further testimony to the readiness of the RSN's sailors."

Since 2004, the RSN has despatched an LST Task Group to the Northern Arabian Gulf on three separate deployments, codenamed Operation *BLUE ORCHID* or OBO in short, to assist in Iraq's post-war reconstruction efforts. In each deployment, the Navy's LST formed part of a coalition force protecting the Al Basrah and Khawr Al Amaya Oil Terminals in the Northern Arabian Gulf (NAG), which account for some 90% of Iraq's oil exports and 80% of its GDP. The RSN's LSTs performed numerous roles including taking charge of coalition warships as the Surface Action Commander, providing logistics support and medical assistance, acting as an afloat forward staging base, as well as helping to train members of the Iraqi Navy.

◀ **County-Class LSTs Doing the Darwin-Dili "Milk Run":** Although more than 50 years old, the *County*-class LSTs were instrumental in the transportation of INTERFET personnel, equipment and vehicles between Darwin, Australia and Dili, East Timor in 1999.

Missions such as OBO have their fair share of risks. On 25 April 2004, barely three months after RSS *Endurance* left its area of operations, insurgents attempted to attack the oil platforms using explosive-laden fishing boats. MAJ Derrick Chan recalls his participation in Operation *BLUE ORCHID III* as the Executive Officer of RSS *Endeavour*. "We were briefed on the threats facing us in the area of operation. I remember being constantly on the lookout, even when I was not on watch. The ship had to be operationally ready at all times to respond to any threat."



▲ **Peace Support Operations in the Northern Arabian Gulf:** The LSTs were deployed as part of a coalition force to aid in the reconstruction of post-war Iraq. During the deployment, the LSTs performed numerous roles such as protecting offshore oil terminals in the Northern Arabian Gulf, taking charge of coalition warships as the Surface Action Commander, and providing medical and logistic aid.





PROJECTING RELIEF ASHORE DURING OPERATION *FLYING EAGLE*

The hard work of transporting much-needed supplies from the heavily-laden LSTs to shore was undertaken by a small fleet of landing craft. These Fast Craft Utility (FCUs) and Fast Craft Equipment and Personnel (FCEPs) can operate in waters less than half a metre deep. The FCUs transported larger vehicles and equipment, while the FCEPs carried personnel and smaller pieces of equipment and supplies. In order to transport the large amount of material that was required ashore, the men of the landing craft routinely worked 14- to 18-hour days during the operation.

Humanitarian Assistance and Disaster Relief – Operation *FLYING EAGLE* (OFE)

When massive tsunami waves crashed onto the coasts of Indonesia and Thailand on Boxing Day 2004, they swept away critical infrastructure such as roads and airfields. With no viable road links and landing sites, access to significant parts of the affected regions such

as Meulaboh in Aceh was effectively severed, choking off any possible flow of humanitarian aid from the land or air. The main town of Meulaboh, with some 120,000 people, had been destroyed. Casualties were in the tens of thousands.

Lending a Helping Hand: When the tsunami struck on 24 December 2004, the SAF sprang quickly into action. *RSS Endurance* left Singapore for Meulaboh just 72 hours after the tsunami struck. Together with the Army and the Air Force, as well as Non-Governmental Organisations (NGOs), the Navy worked tirelessly to bring relief to the people of Meulaboh.



- ▶ **Largest SAF Humanitarian Assistance and Disaster Relief Effort:** *RSS Endurance*, *RSS Persistence* and *RSS Endeavour* and their fast craft off the coast of Meulaboh.
- ▼ **Making a Difference From the Sea:** With roads and infrastructure like airfields destroyed, aid and heavy equipment needed to be transported to affected areas like Meulaboh from the sea.

It was in such a scenario that the Navy's capabilities proved invaluable. The logisticians and sailors of the RSN sprang quickly into action, co-ordinating seamlessly with their counterparts from the Air Force and Army to prepare the Navy's ships for the mission. Working round the clock, they quickly loaded the Navy's LSTs with vehicles, medical equipment and stores. The first LST left Singapore for Meulaboh, just over 72 hours after the incident, and arrived on-station within five days of the catastrophe. Two other LSTs were similarly deployed in the weeks that followed.

The presence of the Navy's LSTs was clearly felt. Bachtiar Chamsyah, Indonesia's Social Services Minister remarked, "When I got word that [*RSS Endurance*] was anchored off the shores of Meulaboh, I informed Cabinet Secretary Sudi Silalahi, who in turn informed President Susilo Bambang Yudhoyono. The President was delighted." Over the next few weeks, personnel from the SAF and other Non-Governmental Organisations (NGOs) worked tirelessly in Meulaboh to bring aid to its people, using the Navy's LSTs as their base of operations. Said Mr Eddie Langton, a member of the Singapore Red Cross Team sent to Meulaboh, "I spent three days with the

Navy and they have done an incredible job. You have got to be here to see just what they have done."

The RSN's was not the largest contingent in the humanitarian assistance operation. But, similar to its approach in other OOTW missions, what the RSN brought to the table was a combination of well-trained, committed people and focused objectives. Barry Wain from the *Wall Street Journal* put it this way: "Singapore's performance shows that even when a huge natural disaster requires a massive and costly response, pinpointed doses of aid can yield disproportionate benefits."

READY FOR AN EXPANDING SPECTRUM OF OPERATIONS

The RSN has the capability to operate effectively across a range of missions. Not only is the RSN ready to deal with conventional threats, it has also proven to be versatile in maritime security and OOTW. The RSN will continue to hone and sharpen its capabilities to stay relevant in a dynamically changing security environment.





CHAPTER 4

ALL PLAY A PART TO PROTECT OUR SEAS

WORKING WITH OTHER NAVIES

EXERCISES WITH OTHER NAVIES feature prominently in the RSN's calendar of activities. Each year, the RSN participates in an average of more than 40 exercises with navies from around the world. Exercises allow navies to learn from one another, increase mutual trust and understanding, as well as deepen their ability to operate with one another. Over the years, these exercises have increased in both breadth and depth.



◀ **Replenishment at Sea:** The MGB conducting replenishment at sea during an early foreign exercise.

EARLY YEARS

In the early years, the RSN was a “Beginner Navy”. It was through engagements with more developed navies that the RSN managed to jump-start its own development. Midshipmen were sent overseas for training and sailors attached to foreign warships to gain firsthand experience. At the same time, the RSN engaged the Royal New Zealand Navy (RNZN) to train the RSN’s officers and WOSRs in Singapore. In this way, a capable corps of officers and WOSRs was rapidly built up.

Building up its shipboard competencies and war-fighting skills was a challenge in those early years as the Navy had to start from ground zero. At the same time, it had to focus its energies on ensuring the security of the waters around Singapore. SWO Roger Seow, staff officer in Naval Personnel Department, recalls the first Exercise *STARFISH*, which was a maritime Five Power Defence Arrangement (FPDA) exercise with Malaysia, Australia, New Zealand and the United Kingdom in 1981. “We were like students learning the ropes from more established navies. With only Missile Gunboats (MGBs) and Patrol Craft (PCs), how could we compare with their frigates and destroyers? I remember how we were often assigned the role of visual scouts, positioned ahead of the larger ships.”

The RSN had to improve fast, and that was exactly what it did, growing by leaps and bounds after each exercise. “I’ve participated in lots of exercises: we learn something new every time. We would always come back and adapt what we had learnt,” explains MWO Nirmal Singh, Coxswain, *RSS Intrepid*. He adds, “It was this hard work and dedication to learn from others that helped us build up our professional skills quickly.”

ATTACHMENT ON BOARD HMS EURYALUS

It was one of the most unforgettable experiences of my life. To go straight from Singapore’s small wooden-hull ships to the big and sophisticated frigate of the Royal Navy was certainly mind-boggling. That was in 1970, before the RSN took delivery of all its patrol craft. My attachment brought me around Australia, and after visiting a few ports, we were off to Sydney to attend the Captain Cook Bi-Century Celebration. *HMS Euryalus* then headed north for the Philippines and arrived in Hong Kong. During the voyage, we experienced some bad storms, particularly around the Great Barrier Reef, but I never felt any anxiety about the sea-worthiness of the ship. Before sailing home to Singapore, the ship participated in an exercise around the turquoise waters of Pulau Tioman. It was the biggest assembly of large warships that I had ever seen! The attachment was truly an eye-opener for me.

– SWO(Ret) Hussain on his experiences on board *HMS Euryalus* in 1970.

LEARNING FROM OTHER NAVIES

Foreign exercises allow navies to share ideas and best practices, and leads to the mutual sharpening of capabilities.

In the early years of the Missile Corvettes’ (MCVs’) development, the Royal Australian Navy (RAN) was particularly helpful in the area of Anti-Submarine Warfare (ASW). Seminars were organised to share their knowledge of ASW and related subjects such as the effects of the underwater environment on sonar performance. The RAN also conducted tactical training exercises, imparting ASW basics such as the execution of Co-ordinated Anti-Submarine Exercises (CASEXs).

When the Navy was acquiring a submarine capability, the Swedish Navy provided operational and technical training to the pioneer crews. This contributed significantly to building the proficiency of the RSN’s submarine crew and helped them scale steep learning curves.

The RSN also benefited greatly from the training provided by the RNZN in its fledgling years. Although the RNZN instructors have long left Singapore, the RSN and the RNZN continue to train and exchange best practices with one another. Today, the RNZN shares its expertise in areas such as advanced boarding and helicopter operations with the RSN.

The RSN interacts regularly with navies at the multilateral level as well. Usually, exercises of this magnitude bring together assets from various countries and provide opportunities to hone specialised skill



▲ **FPDA Training Partners:** FPDA training continues to this day. Such exercises have grown in complexity over the years.

▼ **Pioneering the Depths:** The pioneer RSN submarine crew training in Sweden.



sets. Specifically, the frequent participation in FPDA Air Defence Exercises (ADEX) provided RSN officers with excellent exposure to force-level Anti-Air Warfare (AAW) procedures. Some of these officers are now serving on the new *Formidable*-class frigates. Their experience gained from earlier years has put them in good stead to push the boundaries of the frigates’ AAW capabilities. These officers’ AAW skills have been further polished through AAW workshops conducted by the Royal Navy.



▲ **A Rich History of Co-operation:** Fleet Commander, RADM Tan Kai Hoe, takes a tour of the naval dockyard gallery in Visakhapatnam during Exercise *SIMBEX* 06. The Indian Navy and the RSN have conducted bilateral exercises since 1994.

EXPANDING BREADTH AND DEPTH OF EXERCISES

As the Navy rapidly developed, its relationships with its partners began to grow and evolve. With newer ships and better-trained people, the RSN began to increase the breadth, depth and frequency of activities that it conducted with partner navies. This growth is evidenced by the steady rise in the RSN's foreign exercise tempo. Since the 1980s, this has increased from 6 exercises per year to approximately 30 in the 1990s to 45 in 2006.

In the past 40 years, RSN warships have visited a total of 112 ports around the world – no small achievement for a Navy with just over 30 ships. This places the RSN's

warships and personnel among the most prolific of ambassadors for Singapore.

Beyond the diplomatic "show of flag", the substance and complexity of exercises have also increased significantly over the years. Take Exercise *SINGSIAM* for example, which is conducted annually with the Royal Thai Navy. As both navies built up their capabilities and mutual confidence, the exercise grew from navigation and communication serials in the early 1990s, to warfare serials and even a combined Harpoon missile firing in 2002. The same holds true for the RSN's exercises with other navies, such as the Indian Navy, which has grown from strength to strength with each passing year.



▲ **Ties That Bind:** Defence chiefs of the FPDA nations at the opening ceremony of Exercise *BERSAMA PADU* 2006.

▼ **Exercise *BERSAMA PADU* – Five in Unison:** FPDA exercises have expanded in scope and scale over the years to include operational level planning and both conventional warfare and maritime security scenarios.

EXERCISING WITH THE INDIAN NAVY

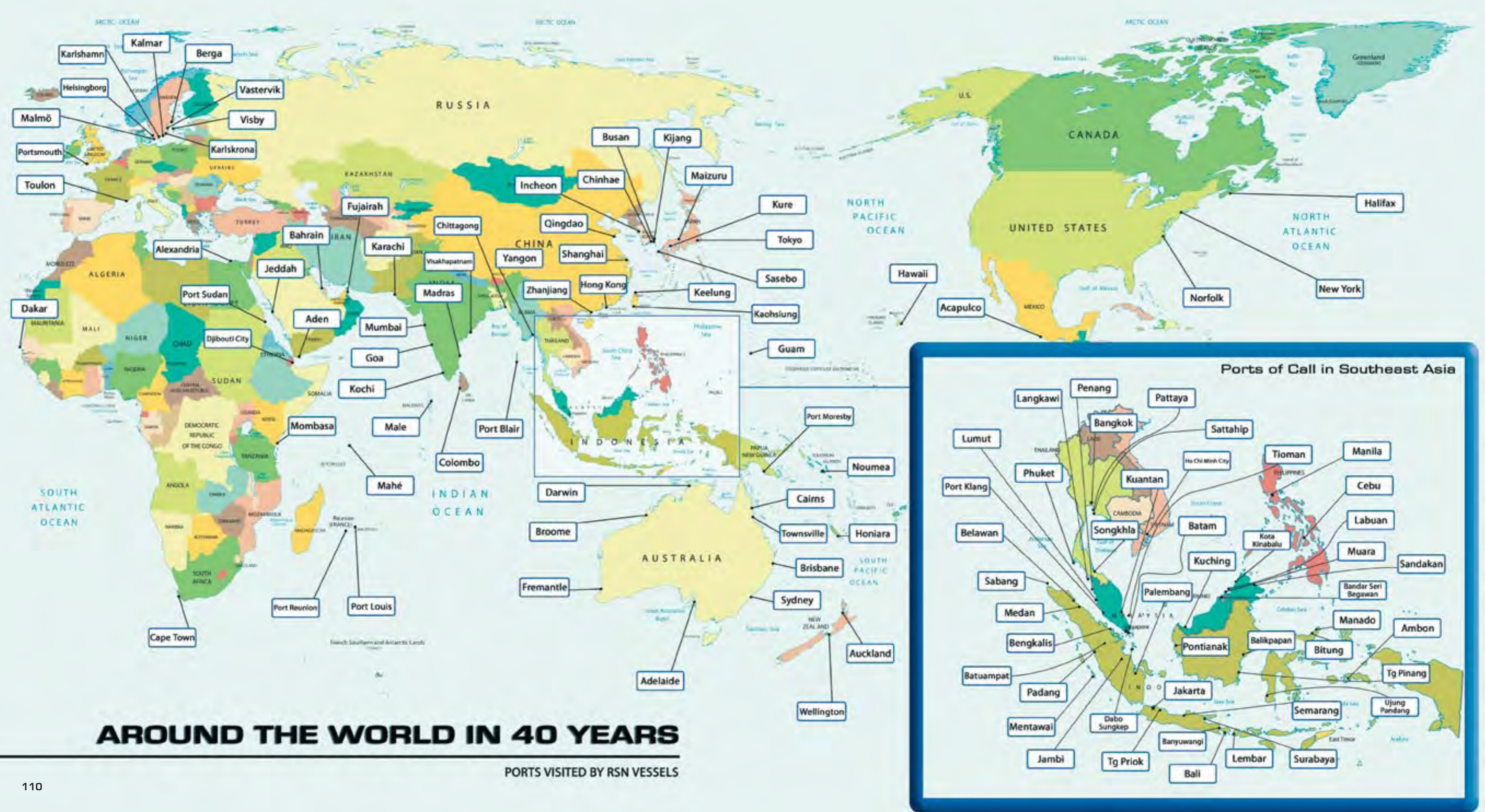
The RSN and the Indian Navy have conducted annual exercises since 1994. These exercises have taken place in the waters off Kochin, Visakhapatnam, Port Blair and in recent years, in the South China Sea. Initially codenamed Exercise *LION KING*, the exercises started off as a predominantly anti-submarine exercise. Over the years, the depth of these exercises has increased. In 2003 and 2004, the RSN even had the opportunity to fire an exercise torpedo against an Indian Navy submarine.

Renamed *SIMBEX* (Singapore-India Maritime Bilateral Exercise) in 2005, the exercises now include multi-

dimensional warfare serials, surface and anti-air firing and maritime patrol aircraft operations. Maritime security and encounter exercises are also carried out.

These exercises helped deepen defence relations between Singapore and India, which were further strengthened after the signing of the Defence Co-operation Agreement in 2004, paving the way for more exercises. In 2004, the Singapore and Indian Air Forces conducted their inaugural exercise. The respective armies followed suit in 2005.







▲ **Leaving No Stone Unturned:** A combined FPDA boarding team in action.

◀ **Ride – Board – Search:** The combined boarding team approaching a “belligerent” vessel during Exercise *BERSAMA LIMA*.

Similarly, FPDA exercises like *BERSAMA PADU* have also expanded in scope and scale. What used to be a purely maritime exercise has evolved into a complex exercise with scenarios that straddle both conventional warfare and maritime security, mirroring today’s complex security threat environment. In 2006, Non-Governmental Organisations (NGOs) were involved for the first time. With over 25 ships, 80 aircraft, a submarine and more than 2,000 participants, FPDA exercises today have advanced significantly from the FPDA exercises of the 1980s. Looking ahead, former Chief of Defence Force LG(NS) Ng Yat Chung expects that “the FPDA will continue to remain an important multilateral arrangement with a strong professional focus, by fostering security dialogues and military exchanges”.



▲ **Sharing Professional Know-how:** USN and RSN personnel interact during Exercise *CARAT*.

The RSN’s interactions with the United States Navy (USN) have also grown from strength to strength. Exercise *CARAT*, for example, now includes submarines, missile firings, and combined exercises with the US Marines and Air Force. The introduction of Command and Control (C2) systems (such as the USN’s CENTRIXS and the RSN’s ACCESS systems) allows ships from both navies to communicate via datalink. Participating units now have a common recognised maritime picture, greatly improving awareness and response times for combined operations.

In recent times, USN Carrier Battle Groups passing through this region often take the opportunity to engage the RSN in high-end mission-oriented exercises, to hone both navies’ littoral war-fighting skills. RADM(NS) Lui Tuck Yew, who pushed for these “short alert” and

“unscripted” mission-oriented exercises when he was Chief of Navy, said, “To achieve superior readiness, we make sure our people and plans are regularly tested, not just at the individual ship level, but also at the system level. Our people must be mentally prepared to execute missions at short notice. My philosophy is this – out at sea, there are no off days, because a bad day on the wrong day, can be our last day.”

The expanding breadth and depth of exercises has allowed both the RSN and its partners to learn from and work with each other, and to sharpen one another’s combat skills, just as “iron sharpens iron”.

The RSN is grateful to its friends in many navies, not all of whom have been mentioned in this book, who have contributed significantly to the RSN’s development.



BUILDING INTER-OPERABILITY

Common operational procedures developed over various exercises have built inter-operability across a wide spectrum of operations. Moreover, the numerous bilateral and multilateral interactions have created an atmosphere conducive for the launching of new initiatives. Together, these form a springboard for greater regional multilateral co-operation.

Exercise EAGLE – Forging Strong Ties with the TNI-AL: RSN ships receiving a warm welcome when they arrived for Exercise EAGLE in the 1970s (above). Although the ships have changed (below), ties with the TNI-AL have grown stronger.



▲ **Working Hand in Glove – Combined Boarding Exercise with the TNI-AL:** Over the years, the scope of Exercise EAGLE has grown in size and complexity, and it now includes Maritime Security exercises. Here, a combined boarding team sweeps the deck of a suspect vessel in Exercise EAGLE.

The RSN's interaction with the Indonesian Navy (TNI-AL) is a good case in point. Beginning in 1974, Exercise EAGLE was the very first exercise that the Indonesian Armed Forces (TNI) and the SAF held. It contributed to the forging of strong defence ties between the two armed forces. RADM(Ret) Teo Chee Hean, who took part in the first Exercise EAGLE as a young officer recalls, "It was [more than] 32 years ago and we were told to take the exercise very seriously because we wanted to build a new relationship – a relationship of trust and confidence, with Indonesia." Since the 1980s, the SAF has also engaged the TNI in air and land exercises.

▶ **"Gotong Royong" with the Indonesian Navy:** Sailors from the RSN seen here doing community work with their Indonesian counterparts during Exercise EAGLE.



► **Providing Strong Support:** RSN and RMN personnel work side-by-side in a damage control exercise during Exercise *MALAPURA*.

▼ **A New Day Dawns:** RSN and RMN ships observe “colours” during Exercise *MALAPURA*.



More recently, the bilateral RSN-TNI-AL Exercise *EAGLE* marked yet another milestone with the inclusion of assets such as the Maritime Patrol Aircraft. This has further developed the professional capabilities of both navies. “We have done many operations together, rescued hostages, looked after security in the Strait, and also humanitarian relief. I think the foundation that has been built over the years, of confidence and trust between the two armed forces, is a very important one and these exercises provided that foundation,” RADM(Ret) Teo adds.

The mutual understanding forged over the past decades has enabled the RSN and the TNI-AL to work closely together in many areas, from co-ordinated patrols in the Singapore Strait to combined clearance efforts of World War II mines in Indonesia. These operations

► **Showing Their Colours:** KD *Musyteri* and RSS *Sea Dragon* display their international callsigns during the co-ordinated patrols in the Malacca Strait undertaken by Malaysia, Singapore and Indonesia.



have helped make the waters around Singapore and Indonesia safer. This ability to work side by side is also clearly evident in contingency operations. During the search and recovery of MI-185 (the Silkair aircraft that crashed into the Musi River in Palembang in 1997) and in the humanitarian relief efforts in Aceh following the 2004 tsunami disaster, the TNI-AL and the RSN toiled alongside each other, shoulder to shoulder.

Likewise, the RSN’s bilateral interactions with the Royal Malaysian Navy (RMN) are marked by the *MALAPURA* series of exercises, the first of which was held in 1984. Over the years, this exercise has expanded in scope and complexity to include both conventional warfare and maritime security serials. Hosted alternately by the RSN and the RMN, Exercise *MALAPURA* has aided in the development of common procedures to deal with

maritime security situations. Personnel from both navies look forward to the exercise as an opportunity to forge new bonds and renew old friendships. The exercises have not only improved inter-operability but also furthered the close ties between the two navies, ties that provide a firm foundation for a co-ordinated approach towards shared security interests.

The mutual respect and confidence developed over engagements and exercises with the RMN and the TNI-AL formed the bedrock upon which many regional initiatives, such as the patrols in the Malacca Strait and the “Eyes in the Sky” initiatives were built. These professional interactions enable regional navies to work effectively together, an attribute that is crucial in ensuring the safety of important waterways like the Malacca Strait.

► **Leading the Pack:** RSS *Persistence* leads a formation of ships during WMSX 05.



▲ **“Dive-rse” Talents:** Divers from participating nations sharing professional knowledge during *DIVEX*.

▼ **A Breath of Fresh Air:** Medical personnel from participating navies simulate the resuscitation of a diver during *DIVEX*.



MULTILATERAL INITIATIVES

Beyond professional inter-operability, exercises and port calls also help to bring navies together. LG(NS) Ng Yat Chung explains: “It is the Navy that usually initiates contact with other countries as the use of port calls is a non-sensitive way to commence military ties, increase understanding and build friendship between armed forces.”

Singapore’s geographical location places it at a confluence of the world’s major navigational routes. This has enabled the RSN to facilitate large-scale interactions between navies, ranging from exercises like *PACIFIC REACH*, a co-operative submarine rescue exercise held in Singapore in 2000, to seminars, dialogues and other interactions that provide focal points of mutual interest. They serve as valuable opportunities for navies from within and outside this region to work together.

For example, the RSN co-hosted the 2nd Western Pacific Mine Countermeasure Exercise (MCMEX) and Diving Exercise (*DIVEX*) in 2004 with the Indonesian Navy. In 2004, the Navy hosted the 9th Western Pacific Naval Symposium (WPNS), and in 2005, it organised the inaugural WPNS Maritime Security Exercise (WMSX),

involving 14 countries. The inaugural ASEAN Regional Forum Maritime Security Shore Exercise in January 2007 hosted by the RSN saw 21 ARF member countries coming together for professional discussions and tactical training exercises. By helping to bring together navies that may otherwise have few opportunities to interact, the RSN plays its small part to promote understanding, trust and friendship that will help build a more conducive environment for security co-operation.



▲ **Reaching Greater Depths of Co-operation:** Exercise *PACIFIC REACH* 2000, hosted by Singapore, brought together experts and practitioners in submarine rescue from many different navies.

▼ **MCMEX – Mine Countermeasure Co-operation across borders:** MCMVs of various nationalities pipe senior commanders embarked on board an RSN LST at the end of an *MCMEX*.

SUBMARINE RESCUE

The inaugural submarine rescue exercise, codenamed *PACIFIC REACH*, was hosted by Singapore in 2000. For the participating nations – United States, South Korea, Japan and Singapore – the two-week exercise was an important opportunity for navies to come together. Besides the participating countries, Australia, Canada, Chile, Indonesia, China, Russia and the United Kingdom also sent observers to this exercise.

Exercise *PACIFIC REACH* has since grown into a major multilateral exercise involving five participating and eight observing countries. Participating navies see this exercise as an avenue to come together to share expertise in submarine rescue and to practise rescuing a disabled submarine jointly.



CHANGI NAVAL BASE – WHERE NAVIES COME TOGETHER

“It’s a great pleasure to be here to witness, and celebrate the arrival of USS Kitty Hawk, USS Vincennes (CG 49) and USS Chancellorsville (CG 62) as the first United States Navy ships to call at Changi Naval Base. This visit by the Kitty Hawk Battle Group is truly different and that is because of this magnificent pier and base facility at Changi.”

– Then US Chief of Naval Operations Admiral Vernon E. Clark in March 2001, marking the first time that a US aircraft carrier had gone alongside a pier in Singapore.

Between 2004 and 2006, CNB hosted a total of 743 foreign warships. Hardly a week passes by without several foreign Navy ships calling at CNB. Beyond providing a port of call, CNB provides modern infrastructure for other navies to come together for collaboration. Officially opened by then Prime Minister Mr Goh Chok Tong in 2004, CNB is equipped with advanced C4 and networking facilities. These facilities will be given an additional boost when the Changi C2 Centre, slated for completion in 2009, is inaugurated. Foreign navies can be invited to use the Centre, which will serve to facilitate the command and control of multinational exercises and operations in this region.

THE WARSHIPS OF IMDEX



▲ **Dressed for IMDEX:** 18 warships from around the world in their finery grace the piers at CNB during IMDEX.

THE HUMAN FACTOR REMAINS PARAMOUNT

Platforms, facilities and initiatives are all important aspects of foreign engagements. However, the human factor remains the most important.

“I remember scoring a try against the New Zealand team when we played rugby during one of our exercises together. We lost but we had only started learning the sport that day. Initially they were amused at us, but at the end you could tell that they respected how we kept trying and didn’t give up, even though they were so much better at the sport. That built up a firm friendship between the two teams,” recalls CPT Auyong Kok Phai, the Anti-Submarine Warfare Officer on RSS *Vengeance*.

Personal friendships formed with servicemen from other navies are often strengthened as they progress in their respective navies. This is very useful in getting work done faster and better because of the underlying rapport and trust. COL Foo Toon Lim, Commander, Institute of Maritime Warfare, shares one such anecdote: “During Exercise *BERSAMA PADU* 2006, the Joint Safety



▶ **Man On!** Exercise participants prove their mettle on the field as well as at sea during Exercise *MALAPURA*.

Cell needed an officer to man the maritime safety post, but no nation had come prepared to provide an officer for that post. During tea break, I approached the representative from the Malaysian Navy, whom I had got to know from previous exercises. He readily responded saying he would try. Shortly afterwards, he told me that the Malaysian Navy would assign someone to take up the post.”

Personal friendships between commanders are also very helpful when navies need to work closely together in operations at sea. Close ties between senior commanders in the RSN and the Indonesian Navy (TNI-AL) were instrumental in the quick resolution of a suspected case of hijacking involving a merchant ship in December 2005 that was fast approaching the Singapore Strait. Although this incident was a false alarm, information that was promptly shared between the RSN and the TNI-AL would have enabled a contingency operation to be quickly mounted, had the hijacking turned out to be real.

The importance of personal ties was once again highlighted in the aftermath of the 2004 Boxing Day



◀ **Transcending International Boundaries:** Sharing lighter moments with our foreign counterparts during a Tactical Training Centre session.

tsunami. The Commanding Officer of one of the TNI-AL ships on-scene was a course-mate of LTC Tan Bian, then CO(designate) of RSS *Endurance*, the first LST deployed to assist in the relief effort. The TNI-AL LST CO was extremely helpful in bringing the RSN personnel up to speed on the situation. He even provided local charts, which considerably enhanced the navigational safety of RSN ships.

Indeed, good personal relationships facilitate mutual co-operation. And certainly, these relationships hold the key to successful interactions. CPT Rinson Chua, Executive Officer of RSS *Valour*, sums it up: "The most important thing I learnt is that we need to connect with our counterparts, regardless of language. Everything else becomes easy after that."

The Navy takes its work with other regional and international navies very seriously. In the face of an increasingly complex operating environment, nurturing good relationships with foreign navies has never been more important. Such engagements enable the RSN to build a network of friends. This provides a strong foundation for enhancing inter-operability and sharpening our collective response against the widening spectrum of threats in today's security landscape.

In so doing, the Navy and its partners can "all play a part to protect our seas".

▼ **Connecting With Our Counterparts:** Foreign exercises are not only an opportunity for building professional knowledge but also relationships between sailors of different navies.



Midnight on the RSS Resolution in the South China Sea. A voice abruptly interrupts the muffled crackle of static over the communications circuit, and a red icon simultaneously flashes onto the ship's Action Information System.

RSS Valiant : "Flash! Hostile 4511 bearing 227, 15 nm, over."

RSS Resolution : "Surface threat level Red. Hopper to engage Hostile 4511 with two missiles. Valiant to cover with two missiles, over."

USS Hopper : "Roger, two missiles away on Hostile 4511. Standing by for damage assessment, over."

RSS Valiant : "Hostile 4511 destroyed, over."

Smiling, the officers on the RSS Resolution take off their headsets. The final serial for Exercise CARAT 2006 had just been completed.

"Great work," the USN officer remarks. "All done for this year."

"That's right," the RSN officer replies with a smile. "See you again next year!"



CHAPTER 5

MIGHTY MEN OF THE SINGAPORE NAVY

OUR PEOPLE

“**NO MATTER** how sophisticated fighting ships in the Navy of the future may become and how highly specialised their training, two factors will remain unchanged – the sailors and the sea.”

– *The Ensign*, journal of the Singapore Naval Volunteer Force, 1968

Almost four decades on, the above quote still rings true. Ultimately, the might of the Navy is the sum of all its people.



◀ **The Way to a Man's Heart is Through His Stomach:** "The chef on board plays a crucial role in bolstering the crew's morale." SSG Wisley Tay, Chief Chef of RSS *Formidable*.

EVERY SAILOR MATTERS

A gunner who bravely mans the 0.5 inch gun can save a ship from a missile, as the Falkland War clearly testifies. An alert electronic warfare operator picking up a radar transmission the moment it appears plays a huge part in determining mission success. A navigation specialist ensures that the ship stays on course and is safe from navigation hazards. The engineering crew keeps the generators powering their ship's combat systems in peak operating condition. None are less important than the others. Without them, even the fastest ships will not sail, the most advanced command systems will not work, and the most lethal weapons will not fire. Like a well-rehearsed orchestra, an effective fighting ship cannot do without any one of its members. And the Navy cannot fight without its sailors, divers and sea soldiers.

Beyond those serving in combat vocations, many others serving in the Navy also contribute significantly to mission success.

Take the chefs for example. Toiling in compact galleys, they balance piping hot pots of food on electric

stove-tops as the ships pitch and roll, preparing home-cooked meals for hungry crew members. Some chefs even exceed expectations by whipping up delicacy after delicacy, creating meals that look and taste like gourmet fare. SSG Wisley Tay, now Chief Chef of RSS *Formidable*, once whipped up a 13-dish lunch for the ship's company during his days on board RSS *Vengeance*. Why the effort? He explains simply: "The chef plays a crucial role in shaping the crew's morale, and so I take pride in making sure that every meal I prepare is something to be looked forward to. Good food helps to bring the team together."

Supporting the Navy's combatants is the naval medical community that administers preventive and curative medicine both at sea and ashore. Doctors and medics sail on board ships during deployments. Medics also ensure that divers are kept in good shape for all missions, and provide medical support for submariners. Crucially, they maintain a Submarine Hyperbaric Chamber Vessel to support submarine operations, and some even sail with the submarines as Independent Duty Corpsmen – highly trained medics empowered to



▶ **Men at Work:** The Navy requires people to undertake a variety of different tasks to ensure its effectiveness.

deal with medical emergencies independently. These medical personnel know that if things go wrong, they literally make the difference between life and death.

Full-time National Servicemen (NSFs) augment the fighting strength of the ships. NSFs live and fight alongside the regulars – there is little distinction in their roles on board. Indeed, some derive so much meaning and satisfaction during their National Service that they serve beyond the call of duty. CPT(NS) Ng Hui Tong, for example, volunteered his service during Operation *FLYING EAGLE*. Upon hearing that the Navy was deploying ships for the relief effort, CPT(NS) Ng reported to RSS *Persistence* the very next day.

Regulars and full-time National Servicemen. Civilian Defence Executive Officers (DXOs). Officers and specialists. Combatants, base technicians and logisticians. Chefs, sea soldiers, divers and combat medics.

Every sailor matters.

▶ **Responding to the Call of Duty:** CPT(NS) Ng Hui Tong (third from right) had no second thoughts when he volunteered for Operation *FLYING EAGLE*.

WHAT DRIVES THE NAVY?

In the same way that a helm determines the direction of a ship, the Navy's sailors steer the RSN forward. This chapter pays tribute to the men and women of the Navy and celebrates their achievements. Through glimpses of life in the Navy, this section examines key qualities in its sailors, exemplified through their daily work. These qualities in turn underpin distinctive organisational hallmarks that make the RSN unique. Ultimately, a strong Navy Family features at the centre of all its endeavours.



The Men and Women Behind The Machine



“Hands clear lower deck to embark rations.”





◀ **So That You Can Sleep Soundly at Night:** SSG Lim's whole-hearted commitment contributes to the operational readiness of the Navy and the security of the country.

PERSONAL QUALITIES

Sailors come from a wide spectrum of Singapore society. They join the Navy for a variety of reasons – some out of a sense of patriotism, some for a career, some to see the world. Regardless of their reasons, it is vital that every sailor's contribution is maximised. And this is only possible if these sailors realise their full potential. This starts from Day One within the schoolhouses where the nurturing process begins with the inculcation of values and the forging of commitment. This emphasis continues throughout a sailor's career.

Whole-hearted Commitment

"Liberty Men, Free Gangway!" wafts through a ship's public address system, ending yet another busy day. However, not everybody will be going home.

The duty watch assembles at the wharf for their pre-duty briefing. Throughout the night, diligent Quartermasters will do their rounds to ensure the safety and security of the ship. They will have company tonight. A defect was reported earlier in the afternoon. Even though that ship was not tasked to sail the next day, dedicated base technicians will be staying back well

past midnight to rectify the defect, so that the ship can be fully operational as soon as possible.

A newly posted crew member remains on board, tasked by his Chief of Department to finish his task book. But he will not be left on his own. His "L", a Leading Seaman, has volunteered to stay back late. Over the next three hours, he will take the time to literally "show the ropes" to his junior.

These may be little things. But they all matter and they all add up. Thankfully, the Navy has sailors with their hearts in the little things. And that's why the Navy can go on to do bigger things.

Nights and weekends, festive seasons and holidays away from home, these are just some of the sacrifices made by the men and women of the Navy. For those in the Patrol Vessel (PV) Squadron who are tasked with daily patrols, this sometimes means eleventh hour activations to sail for operational contingencies. Many sailors have stories of mobile phones vibrating with the message, "You have been activated", in the middle of meals and movies.

One officer enquired of his subordinate why he willingly put up with the tough sailing routine and the interruptions. SSG Lim Kian Thiam, Chief Radar and Navigation Specialist (RNS) of RSS *Brave*, unhesitatingly



▶ **A Successful Team:** SSG Alex Teo's (seated) sense of duty and professionalism is well-regarded and appreciated by his fellow crew members.

answered: "These recalls are a part of being operationally ready. It is my duty – to do my part to keep Singapore safe, so that my friends and family can sleep soundly." It is commitment like this that warms the heart and lifts up the entire organisation. No matter what role they individually play, every sailor is well aware that he or she contributes meaningfully to something bigger.

Utmost Professionalism

The RSN's Mine Countermeasure Vessels (MCMVs) stand ready to localise and remove underwater mines. In May 2006, RSS *Punggol* was activated for an operation in the South China Sea. This came just as the ship was returning from sea after a long sortie and the crew was eagerly looking forward to going back home for a well-deserved rest. Though disappointed, they quickly readied themselves for their mission to locate an underwater object. The crew only had a rough estimate of the location of that object – this meant that they had to comb through a very large search area. The mission was estimated to take a week.

Undaunted, the search began. Every object detected on the seabed was rigorously investigated. To keep spirits up, the off-duty crew volunteered to help out

in the galley to churn out "special makans". The Chief Petty Officers also spent time telling old Navy stories and imparting their life experiences to the younger crew. After three days of search, RSS *Punggol* handed over the mission to RSS *Katong*, which eventually located that object. Reflecting, LTA Alec Ngo, Operations Officer of RSS *Punggol*, said, "Although we were not the ones who found it, we had no regrets because we all gave of our very best. The crew's dedication to duty and professionalism leaves me with a deep sense of pride."

Doing one's duty right and doing it with pride and devotion. That's the essence of professionalism.

Many of the duties in the Navy are carried out in teams, where every individual sailor has unique roles and responsibilities. For the team to be successful, the professionalism of every single sailor matters. During a submarine training sortie, chef SSG Alex Teo Kok Leong of RSS *Centurion* was washing the dishes in the galley when he heard abnormal noises. He decided to check and discovered that the aft "heads" (naval term for toilets) were taking in seawater. Immediately, he proceeded to shut all the necessary valves to stop the flooding and promptly alerted the Officer-on-Watch, who raised the alarm.



◀ **A Journey That Never Ends:** 1SG Wilson Goh (centre) firmly believes in continual learning, and he hopes this journey for him, and the Navy, never ends.

SSG Ng Kah Leong Jason, formerly a Sonar Operator on board RSS *Centurion*, recalls, "If the chef had not executed the correct actions in the nick of time, either because he was not alert to the noises or because he felt that it was someone else's responsibility to resolve the situation, it could have led to serious equipment damage. Thankfully, that was not the case."

Continually Learning

Since the 1980s, new platforms, sometimes with completely new systems, have been introduced into the RSN to renew our force structure. Existing platforms go through mid-life upgrades. Beyond platforms and systems, doctrines, tactics and work processes are periodically updated in response to new technologies and experiences.

To keep abreast with these changes, sailors frequently attend professional courses, inside and outside the Navy, both local and overseas.

1SG Wilson Goh started his career as a Junior Radar and Navigation Specialist (RNS) on board an Anti-Submarine Patrol Vessel (APV). During his Petty Officers' Course, he was "cross-platform trained", and is now the

Chief RNS of RSS *Vigilance*, a Missile Corvette (MCV). When the MCVs were installed with a new Navigation Radar, 1SG Goh was selected to attend the Operators and Maintainers Course for this new radar in Hainault, United Kingdom.

Asked how he felt about his learning journey, 1SG Goh said, "The MCVs and the APVs have different systems. I like learning new systems, as it makes me more deployable. It is actually not that hard to learn new things."

Continual learning is a way of life in the Navy, one that stands at the very heart of any transformation effort. As RADM(NS) Lui puts it, "Organisational transformation can only take place if minds are first transformed."

This culture of learning extends far beyond the individual level.

Take the series of Barak weapon firings for example. Each year, more and more challenging scenarios were tested. In 1997, the Barak was fired against a single incoming missile target. In 1999, the firing was conducted against two missile targets on two Command-Lines-of-Sight (CLOS). In 2002, the two missile targets were taken down using a single CLOS, a significantly more difficult scenario. In 2004, the Navy achieved a world first when

▶ **Learning Knows No Boundaries:** Training to be a CIC Supervisor requires Warrant Officers to embark on continual learning in order to be competent in this new role.



the Barak, designed as an anti-air and anti-missile weapon, was adapted and successfully hit a surface target. In 2006, Barak missiles were successfully fired in a combined anti-air and anti-missile exercise.

Pushing the capability envelop is hard work. It is work that involves the toil and sacrifice of many people. And in the process, the Navy in general, and successive generations of MCV crews in particular, have learnt a lot about the Barak system. The lessons learnt from these firings have been dutifully recorded and tactical guides modified to take into account the lessons learnt.

"As the Navy acquires more sophisticated combat systems, we are also ensuring that the Navy's 'learning system' stays ahead of the game. This is the only way to secure a cutting edge beyond the capital investment," says COL Joseph Leong, Commander First Flotilla and Commanding Officer of 188 Squadron. "So, it is imperative that our operators, specialists, supervisors, commanders – everyone across the ranks – have the capacity to learn and grow, not only as individuals, but also as teams and as an entire organisation."

This is why, at the threshold of transformation, the Navy does not rest on the laurels of past success. Instead, it is even more relentless in capturing and

sharing knowledge, adopting forward-looking learning practices, and investing in generating the experiences that will grow its collective intellectual capital.

Taking the broad view, COL Leong says, "Whether it is individual learning, team learning, or capturing knowledge from highly complex missile-firing scenarios, the goal is the same. We are investing in the knowledge capital that will fully realise the Navy's transformation into a 3rd Generation force."

Active Leadership

Leadership is the most prized of all values, because everything hinges on it. Strong leaders live out their values daily, and inspire others to do the same.

SSG Maurice Lee remembers vividly that his ship had to sail for a surveillance patrol on Christmas Eve several years back. Then COSCOM Commander, COL(NS) Kevin Santa Maria, took time to speak to the crew before the ship sailed. SSG Lee reflected, "I was deeply impressed by this and felt that my commander cared for us. It proved that care for soldiers need not always come in the form of more privileges. Instead, words of encouragement improve spirits in the same way, if not better."



◀ **Inspirational Leadership:** SSG Hazel Quek does not believe in giving up on her charges. She conducts extra training to ensure that they are professionally up to scratch.

ask him to buy two sets of breakfast the next day. “Why two?” he asked. It was for her and her charge.

Gradually, that serviceman improved professionally and spoke with more confidence. MSG Lee reflects, “I was very inspired by the approach she took with her juniors. It was a fine example of leadership.”

Evidently, the best leaders exemplify the right values. They foster commitment, insist on professionalism and encourage learning. They bring out the best in people.

They also inspire confidence. 1SG Chia Meng Koon, Chief RNS of RSS *Gallant*, served under his Commanding Officer, MAJ Dennis Tay. He proudly says, “MAJ Tay leads by example. His realm of knowledge in all aspects of seamanship and engineering would put some of the specialists to shame. If MAJ Tay were to lead me to war, I would gladly follow in a heartbeat.”

This brief account neatly sums up the essence of true leadership. People are willing to put themselves in harm’s way, because they have full confidence in their leaders. To keep the Navy moving forward, leaders at all levels need to continue working at earning the trust and respect of those under them.

In the Navy, active leadership is demanded and honed at all levels.

In 2000, SSG Hazel Quek was the Chief Electronic Specialist of RSS *Daring*. One of her charges was a slow learner who lacked confidence and social skills. SSG Quek was extremely patient with him. Her crew-mate, MSG Lee Choon Hock, vividly remembers her saying, “Don’t give up on anyone; nobody starts as an expert in his or her area of work.”

True to her word, SSG Quek dedicated mornings to hone his skills. To facilitate additional training, she arranged for her charge to perform duty together with her. MSG Lee recalls that one night, SSG Quek called to



▶ **From Boys to Men:** “Deep in the hearts of everyone on board RSS *Endurance*, we know that for the past two years, the Navy has made CPL Yeo (nicknamed “Xiao Xiao”, which means small boy) a stronger and more confident individual.”

CPT Vincent Yeo, then Executive Officer of RSS *Endurance*, on “Xiao Xiao”.

RSN HALLMARKS

Built on a foundation of strong personal qualities, the Navy has evolved a blend of organisational distinctives. These distinctives make the RSN truly unique.

Tenacity

Only the triumph of the human will enables people to succeed against all odds. It is also what gives the men and women of the RSN courage, direction and strength to rise to the occasion, whenever duty calls.

CPL Yeo Wei Kiang was an RNS on board RSS *Endurance* when she sailed to the Northern Arabian Gulf in 2003 for Operation *BLUE ORCHID I*. CPT Vincent Yeo, then Executive Officer of RSS *Endurance*, recalls, “My first impression of CPL Yeo was that he was a timid and homely boy. On board, he soon gained the title ‘Xiao Xiao’ (small boy).” “Xiao Xiao” volunteered to sail for OBO, even though it was not compulsory for an NSF to participate in an operation of such a nature. It was his last sailing before he “ORD-ed” (completed his 2-year National Service), and he chose to go through it together with the rest of his shipmates.

Despite being relatively junior, “Xiao Xiao” showed great independence and initiative in carrying out his daily duties. It was also his turn to show the ropes to sailors more junior than himself. He encouraged them when the ship was experiencing bad sea conditions and chilly winds.

Speaking with much pride, CPT Yeo says, “Deep in the hearts of everyone on board RSS *Endurance*, we know that for the past two years, the Navy has made Xiao Xiao a stronger and more confident individual. I believe he knows it too.”

COL(NS) Sukhvinder Singh Chopra was the Commander Task Group for OBO I. He recalls, “To witness our young people carry such heavy responsibilities on their shoulders right from Day One, and see them rise to the occasion time after time is an extremely gratifying and heartening experience.” He smiles. “I will always look back on OBO with utmost pride and satisfaction.”

It should come as no surprise then, to hear of the tenacity and zeal possessed by sailors of the RSN. This attitude has pulled them through some of the most difficult and trying times, allowing them to come out tougher and stronger than before.



◀ **Overcome or Perish:** LTC David Foo, Commanding Officer of RSS *Centurion*, graduated from the gruelling Submarine Command Course conducted by the Royal Dutch Navy. Nicknamed the “Perisher” Course, almost half of its participants fail to graduate.

In March 2006, a team of NDU divers took part in the Tasmanian Expedition Race, a self-supported 700km expedition race across Tasmania. Suffering sleep deprivation, frigid weather and hunger, they were the only team from Asia to complete the race, clocking a time of 9 days and 14 hours.

“In addition to the icy weather, the journey wasn’t without its fair share of injuries. I was thrown off my bicycle while negotiating a steep and curvy downhill route. Bleeding from a gash on my head and with a numb right torso, I could only limp gingerly. Seeking medical help was fast becoming an attractive option. However, that would also mean immediate disqualification. I wanted to carry on. Thankfully, with lots of tender care and support from the team, I was soon up and running,” says team member LTA Fu Xiang Yu.

LTA Fu’s experience mirrors that of LTC David Foo, Commanding Officer of RSS *Centurion*, who was one of the officers to graduate from the gruelling Submarine Command Course conducted by the Royal Dutch Navy. Nicknamed the “Perisher” Course, almost half of its participants fail to graduate.

The four-month course puts the tactical ability, stamina and leadership of prospective submarine commanders to the toughest tests. Students were

always sleep-deprived. To add to the discomfort, working spaces were deliberately shrunk – trainees had to prepare for their missions standing up! Constantly under extreme pressure, they worked in a high-threat environment, executing submarine operations at short notice.

But as LTC Foo reflects, “I knew I couldn’t give up – deep down inside me, the submariner’s creed kept ringing through my mind. Submariners never give up and submariners ‘never say die.’”

LTC Foo knew that he was well trained for the task. After all, he could count on the thousands of hours and many months of tough training he had undergone in the RSN. But what truly kept him going during those 130 days was “the thought of not letting my fellow submariners down and the high hopes that they had for me. And if there’s someone I can dedicate my achievement to, it would have to be to my fellow submariners, my family and the Navy.”

Over the years, members of the Navy Family have distinguished themselves in SEAL courses, Ironman competitions, and other physical endeavours. They reinforce the point that ultimately it is not technological excellence, but the human spirit that drives people to achieve great things, especially in times of adversity.

“In the darkest period of your recent history, I saw the Navy at your finest.”

LG(NS) Lim Chuan Poh, former Chief of Defence Force (2000–2003)

3 January 2003 was the darkest moment in the RSN’s history. On that tragic night, RSS *Courageous*, while on operational duty patrolling the area around Pedra Branca, collided with the container ship, *ANL Indonesia*. This tragic incident led to the loss of four RSN servicewomen who gave their lives in the service of their nation – 1SG Seah Ai Ling, 1SG Heng Sock Ling, 2SG Chua Bee Lin and 3SG Goh Hui Ling. As we recall how our sailors embarked on the search for survivors, pledging to leave no stone unturned, the memories of our four dear sisters-in-arms will always remain alive in our hearts.

~

The RSN mounted a Search and Rescue (SAR) effort that lasted a week. With each passing minute, the chances of finding the four servicewomen dwindled. “Yet in those trying days, our sailors doing SAR never lost hope – they just kept pressing on, fuelled by an immense sense of purpose to find their colleagues and to return them to their loved ones,” recalled LTC Sebastian Koh.

Ships deployed for the SAR efforts made requests to be rotated back to base. This was not due to fatigue, but because the crew wanted to attend the funeral of their fallen comrades. Beyond the funeral, many colleagues and friends of the four girls remained in touch with the families. As RADM(NS) Lui Tuck Yew observes, “The true spirit of the Navy Family was clearly evident throughout the RSS *Courageous* incident and even well beyond it.”

Indeed, the RSN drew strength from its strong Navy Family spirit and supported one another in its time of crisis.

“It has been more than two years since the RSS Courageous incident. While we have brought closure to that part of our life, in a sense it will never be closed. We will always miss the four servicewomen we lost.” – Chief of Navy, RADM Ronnie Tay, in the 2005/06 RSN Workplan Seminar Speech.



◀ **Age is No Barrier to Learning:** Hitting the books at the age of 31 did not stop MSG Sekar from bagging the Micron Gold Medal Award at Ngee Ann Polytechnic.

A Culture of Excellence

Over the years, the Navy's officers have consistently done well in courses. Midshipmen have achieved first place among international students at the Britannia Royal Naval College and the United States Naval Academy. RSN officers have topped their courses at Command and Staff Colleges around the world.

But this culture of excellence is not limited to the commissioned officers.

MSG Ganasekar is the Chief RNS of RSS *Resilience*. MSG Sekar, as he is more fondly known, always wanted to achieve more for himself. At the age of 31, he signed up for the Joint Poly-SAF Diploma Scheme. Almost a decade older than his fellow Electronics and Telecom Engineering students at Ngee Ann Polytechnic, MSG Sekar proves that age posed no barrier to learning. He received the Micron Gold Medal Award presented to the top graduate in his course. Among numerous other awards, he was also awarded a Silver Certificate of Achievement for his involvement in Co-Curricular Activities, and the Kindness award for rendering academic help to weaker students.

MSG Sekar thanks his former Commanding Officer, COL(NS) Choo Ah Choon for his support during his three years of studies. He said: "COL Choo was very helpful and gave me lots of encouragement. This motivated me to excel."

This culture of excellence extends far beyond course performance.

In the past, base technicians often had problems with the gun barrel cooling system. After much troubleshooting, the technicians narrowed down the cause of the defect to a component that needed replacement. Not satisfied, 2WO Lau Kheng Leong (who passed away in 2004 from an illness) rallied the team to find out the root of the problem. In spite of its structural complexity, the team not only discovered the cause of the defect, but even went a step further to develop and implement a method to assemble the component.

Ssg Ng Wei Siong was a member of that team. In 2002, he was short-listed to be a submarine engineer. He says, "I experienced a lot of difficulties in coping with the training, as I did not have the relevant mechanical or electrical experience. But I was not daunted, as I wanted to excel. Looking back from where I stand now as a qualified submarine engineer, I appreciate the sense of excellence that the late 2WO Lau instilled in me."

Bring together a group of people, each infused with a spirit of excellence, and great achievements will result.

Ensuring that our gunnery weapon systems fire accurately and consistently is not easy and never happens by chance. Everything from logistics, system maintenance, training and shipboard procedures have to be right before a shot can be put on the target. This makes it a good test of readiness at the system level. Because gunnery firings can take place frequently (unlike missile firings), good and consistent firing results are a big confidence booster – that our weapon systems work very well.

EXCELLENCE IN AND OUT OF UNIFORM

- On 7 February 2006, a gunman robbed a Singapore Pools betting outlet in a supermarket. Upon hearing shouts of "Robbery!", a 37-year-old Naval Officer (who wishes to remain anonymous) stepped forward, helped the security officer tackle the gunman, and pried the pistol away from him. His bravery and public-spiritedness was commended by the police.
- In 2004, on his 23rd birthday, CPT (then LTA) He Ruimin graduated with a doctorate in economics from the Massachusetts Institute of Technology. He had completed his bachelor's degree in electrical engineering and PhD in an unprecedented four years.
- The 2006 Mediacorp Subaru WRX Challenge was a test of endurance and will. Contestants are disqualified the moment they lift their palms from their designated vehicles. Beating 319 other contestants, LTA Alex Koh won after 73 hours and 56 minutes of keeping his palm on the car, winning a new S\$90,000 Subaru Impreza Limited Edition car.
- 2WO Alvin Chia Meng Kwan attended the Diver First Class Course conducted in the United States Navy Diving and Salvage Training Centre in 1997. This nine-month course challenges both the spirit and the body. Half the class, comprising experienced US and foreign naval divers, dropped out. 2WO Chia topped the course.



▲ **Flying the Flag High in Overseas Courses:** RSN personnel regularly do well in the overseas courses that they are sent to participate in.

▲ CPT Tan Say Yong won the top foreign graduate prize from the United States Naval Academy in 2004.

▼ MAJ Frederick Chew clinched the Commandant Prize for Overall Academic Achievement at the Australian Defence College in 2005.



During a routine exercise in October 2006, RSS *Vengeance* encountered a gun stoppage. While the stoppage was quickly rectified, the missed firing opportunity left a bitter aftertaste. "At that point, we pledged to do better the next time round," recalls CPT Lim Han Wei, the Operations Officer of RSS *Vengeance*.

And so the ship embarked on numerous gunnery drills for the entire CIC team. The Command team sat down and reviewed lessons learnt. In November 2006, during the annual Fleet Concentration Period exercise, RSS *Vengeance* shot down the towed air target. Their efforts had paid off.

Doing Things Right

One of the biggest challenges of operating a new platform is putting her out to sea for the first time.

RSS *Formidable* was designed and built in Lorient, France. French sailors and technical support engineers sailed the ship back to Singapore. While the sail-back provided a handful of the pioneer Singaporean crew with an opportunity to operate the frigate, they were always under the supervision of the French team. The supervision ended the moment the ship arrived in Changi Naval Base.

Working with draft operating procedures, the crew spent days preparing the deck machinery, running shipboard and emergency drills, and reviewing safety processes again and again. RSS *Formidable* set sail from CNB for sea trials with her pioneer crew on 20 July 2005, just two weeks after arriving back from France.

This might have been a small step towards operationalisation, but it was a significant achievement. As MAJ Lim Yu Chuan, Operations Officer 2 of RSS *Formidable* says, "There can be no short cuts. The right standards can only be set by doing things right from the very start."

For Commanding Officer COL Jackson Chia, setting the right tone was also important. "Once established, it is likely to stay with the ship," COL Chia explains.

Setting the right tone involved demanding competence, proper conduct, and smart appearance on the bridge, engineering and deck watches. Chiefs of Department actively demanded punctuality, forehandedness and smartness. Officers ensured that proper procedures were carried out during operations and training.

Why the effort? COL Chia adds, "A good tone exudes quiet confidence and reflects the professional abilities of the crew. This must start from Day One."



◀ **Doing It Right, Doing It Safe:** Conducting well-dock operation is a challenging and demanding task that requires adherence to correct procedures, an eye for detail and a strong emphasis on safety.

One critical component of doing things right is to do things safely. While the Navy engages in tough training and real operations, it places heavy emphasis on safety. The RSN has a strong safety system and culture in place. And it is constantly strengthening its safety system and culture – because everyone matters.

"Thinking safety" enables people to pay attention to their work environment and build an open reporting culture. 1SG Justin Lee, the Gunnery Yeoman of RSS *Endurance*, knows that everybody plays a part in ensuring safety. To him as a deck petty officer, "Safety is not just about sticking to procedures and rules that have been laid out. From the smallest detail such as ensuring that everyone has his lifejacket, gloves or helmet, to overseeing the entire operation and looking out especially for the less experienced crew, safety is also about common sense and caring for your fellow shipmate."

One life lost is one too many.

His shipmate, 1SG Ong Chun Teck, understands this perfectly well. "Ultimately, nobody wants to see his or her friends getting hurt. It's much better to anticipate an accident and prevent it from happening, than to regret it for the rest of your life because you could have made a difference there and then, but didn't."

AT THE HEART OF IT ALL: A CLOSE-KNIT FAMILY

Beyond the hallmarks, what makes the RSN so special is its close-knit family spirit which allows tight bonds of personal friendship and camaraderie to develop. These bonds are forged through tough training and memorable shared moments (such as the Midshipmen Sea Training Deployment). The shipboard environment promotes cohesion across ranks and vocations. The Navy Biathlon and various sporting competitions at the squadron and formation levels help to build *esprit de corps*. Gradually, these connections between individuals transcend into a Navy-wide web, providing a backbone fabric for the Navy Family.

Sharing the Happy Times...

Nowhere is this sense of family more evident than during long overseas deployments. When RSS *Endurance* was deployed in the Gulf for OBO I in late 2003, crew members could not spend Chinese New Year at home with their loved ones. The ship recreated a home away from home by arranging a Chinese New Year bash on board – in the middle of the Arabian Sea.



◀ **No Shortcuts:** Operationalising a new capability like the *Formidable*-class frigates requires the development of basic shipboard processes like fire-fighting.



Gong Xi Fa Cai 3,000 Miles from Singapore: Heart-warming “Bak Kwa” and mandarin oranges personally delivered by Chief of Navy truly highlights the closely-knit Navy Family.

Recounts CPT Darren Au Yeong, Marine Engineering Officer of RSS *Endurance*, “What we didn’t expect was the arrival of our very own *Cai Shen Ye* (God of Fortune). Armed with mandarin oranges, pineapple tarts and *bak kwa* from home, Chief of Navy visited to see how we were doing. It was really heart warming to know that our hard work was not forgotten nor taken for granted.”

In the midst of all these festivities, CPT Au Yeong and his crew realised that “nowhere in the civilian sector will you find this unique sense of camaraderie that we enjoy on board our ships, and of course, the exceptional experience of sharing a piece of ‘bak kwa’ with your cabin-mate 3,000 miles away from home.”

All who serve on board the Navy’s ships naturally become family over time.

This includes the many NSFs and National Servicemen (NSmen). From the moment they step on board, they are treated like family, so much so that the bonds forged with them last long after they have left the Navy or “ORD-ed”.

“I have learnt a lot from the ship crew, life skills that I never had in the past. The ship crew taught me to be professional in my job. I learnt when to be serious and when to have fun,” says NSF CPL Brandon Su, who served as a Sonar Operator on board RSS *Kallang*. Looking back, CPL Su recalls both the good and the tough times on board, “I think I will miss our monthly ship dinners.”



...As Well as Difficult and Tough Times

While sailors relish the company of their Navy Family during celebrations and other social functions, the resolute presence of the Navy Family during difficult and tough times matters just as much.

* * * * *

In early 2001, 2LT Daryl Loh lost his life in an incident in Changi Naval Base. The news of his death came as a tragic shock to the Navy Family, but it hit home especially hard amongst the members of the 44th Midshipman batch, to which Daryl belonged. Their individual grief was immense. This grief and loss was also shared by all in the Navy Family. Officers and men from different units of the Navy came forward to help and to prepare the military funeral. One of Daryl’s course-mates read the eulogy. The batch shared the weight of bearing the coffin. They went through this period of pain and sorrow together as a family.

* * * * *

“George”¹ is a National Serviceman who has just started work as an account services officer in one of the established banks in Singapore. He is in his final year of his part-time correspondence university studies. What sets George apart from his colleagues at the bank is that

¹ Real name concealed to protect his identity.

he once had a promising career with the Navy, but in a moment of folly, he committed a serious crime and was sent to jail.

As George reflects, “2003 was the toughest and most challenging year as yet. Overnight, I lost everything. Just when the situation seemed bleak or hopeless, people like Alan Goh came along.”

MAJ Alan Goh was George’s Executive Officer when he committed his offence. Throughout George’s 10 months behind bars, MAJ Goh visited him regularly.

The visits meant a lot. George says, “Now as I look back, reflecting on that year, the thing that remains in my memory is not the endless hours staring out of the small barred window, nor is it the countless steps pacing the tiny cell. What remains entrenched is the way people like Foo Suan Yong (Coxswain), Lew Chuen Hong (Division Officer) and especially Alan all came together in extending their helping hand.”

Each time they meet, George thanks MAJ Goh for helping to turn his life around, for not giving up on him, and giving him hope when he was at the very lowest point in his life. Otherwise, it could so easily have gone completely awry.

However, MAJ Goh refuses to take credit for the way things turned out. “I believe many people in my capacity would have done the same. I simply did what was the right thing to do,” he says.



◀ **Stronger by the Numbers.** Strong support from 2WO Chai's wife not only enabled him to concentrate on training, but also saw the birth of his second daughter in Sweden.

THE LARGER NAVY FAMILY

Behind every sailor, there is his/her family...

The Navy Family is not just made up of its sailors, but extends to their friends, family and loved ones. Because sailors spend a long time at sea, the RSN endeavours to help family and loved ones understand the nature of their work. For long deployments, the Navy organises farewells and home-coming ceremonies. Sailors frequently use these opportunities to show off their ships to their families. In addition, visits are also made to families whose loved ones are away at sea for extended periods.

During ship functions, sailors bring their loved ones to meet their shipmates, and during festive occasions, sailors open their homes to their crew-mates. For weddings in particular, the tables of rowdy Navy friends

can always be counted on to make the wedding couple's memories more colourful.

In the autumn of August 1996, 2WO (then SSG) Chai Sin Boon of the pioneer batch of submariners left to train in Sweden. He brought along his wife and their one-year-old daughter. He remembers sharing the excitement with his wife, but also her fears of adapting to such a new environment.

Initially, adapting was tough, especially to the slower pace of life. Good Chinese food was hard to come by: it was at least a half-hour drive away.

On 28 September 1999, 2WO Chai's second daughter was conceived in Sweden. It was a joyous occasion for his family because "we had persevered through this new environment and kept our family close together. Our second daughter is testimony to that." Speaking with gratitude, 2WO Chai is thankful to his wife for her understanding and support that allowed him to move to Sweden.



▶ **Like Father Like Son:** LTC Irvin Lim (right) was inspired to join the Navy by his father, MAJ(Ret) Lim Jit Cheow.

Beyond the Navy Family spirit that binds the men and women of the Navy closely, there are many actual families within the Navy Family. The adventures and stories told by fathers or brothers serving in the Navy have no doubt acted as a spur for their children and younger siblings to join the RSN.

LTC Irvin Lim, Branch Head in Naval Intelligence Department, joined the Navy some eight years after his dad hung up his uniform in 1979. His father, MAJ(Ret) Lim Jit Cheow, was a pioneer member of the Navy who had worked with the Royal New Zealand Navy to set up the RSN's training schools for both Specialists and Officers. MAJ(Ret) Lim also initiated the Midshipman song, "Onwards and Upwards", that eventually became the Navy song.

MAJ(Ret) Lim provided the inspiration that shaped his son's decision to sign on with the Navy. LTC Lim vividly remembers the many occasions that he visited

Navy ships as a young boy, once even taking the helm of a Ramp Powered Launch on a trip to an offshore island for a Family Day in the mid-1970s.

"It was the fascination and sense of adventure through my early childhood contact with the Navy, brought to life by the many nautical stories my dad shared with me, that sparked my curiosity and interest in the Navy."

Would LTC Irvin Lim encourage his own children to join the Navy? He smiles. "My dad's spirit of sharing and learning will surely live on as I pass on my professional naval experiences through stories of my own to my three young children. Keeping it all in the Navy Family, as one might say."

Although the RSN is only in its fourth decade of existence, the tradition of family members from one generation to the next signing up to serve in the Navy is starting to take root. Here are just some examples...

- RADM(Ret) Richard Lim Cherng Yih and his twin sons, CPT David Lim Shi Hao and CPT Jonathan Lim Shi Cao
- LTC(Ret) Hia Chek Phong (father) and LTA Xing Yong Zhi (son)
- MAJ(Ret) Ooi Teik Chai (father) and CPT Ooi Tjin Kai (son)
- MAJ(Ret) Lim Jit Cheow (father) and LTC Irvin Lim Fang Jau (son) and LTA(NS) Kelvin Lim Fang Hui (son)
- SWO Johnny Lim (father) and CPT Jonathan Lim Wei Chung (son)
- DXOs Ms Ng Bee Eng and Ms Susan Ng (sisters)
- RADM Tan Kai Hoe and LTC Tan Kai Cheong (brothers)
- LTC Joseph Neo Hock Chye and MWO Neo Hock Nee (brothers)
- LTC Lim Eng Yew and 1WO Lim Eng Joo (brothers)
- LTC Jason Chong Kwong Yew and MAJ Jerry Chong Kwong Wai (brothers)
- MAJ Tan Hong Teck and 2WO Tan Hong Boon (brothers)
- MAJ Chan Khai Sam and SSG(NS) Chan Kai Weng (brothers)
- CPT Chang Tuck Wah and CPT Chang Tuck Kam (brothers)



- MAJ Chew Chun Chau and MAJ Chew Chun Liang (twin brothers, pictured above)
- CPT Leon Chua Kee Thye and CPT Ian Chua Shian Loong (brothers)
- 1WO Ong Teck Lim and 1WO Ong Chin Bok (brothers)
- 1SG Ong Chun Teck and 1SG Ong Chun Ming (brothers)
- COL Philip Alvar, 2WO Cyril Christopher Alvar, 2SG(NS) Ignatius Alvar and 2SG(NS) Mark George Alvar (all brothers)

This list will doubtless continue to grow. It stands as a living testament to the positive effect that the Navy has on the lives of its men and women, who having seen what the Navy has done for them, will encourage their family members to likewise answer the call to serve.

CONCLUSION

Sailors join the Navy to make a difference. And they do. With hearts in the right place, sharp minds and stout spirits, they touch the lives of those around them, and make Singapore a safer place for all.

But the Navy makes a difference to its sailors too. They lead, and they learn. They become stronger and better people. They make friends, and they find a second family: a family that will be there for them through thick and thin.

Eventually, these sailors will leave the service, but they never really leave the Navy. Because memories last. As do friends. And family. These are for life.





CHAPTER 6

ONWARDS AND UPWARDS

BEING THE BEST THAT WE CAN BE

AMIDST SOOTHING BACKGROUND MUSIC, Chief of Navy (CNV) shared his thoughts with the writers of this book on the progress and priorities of the RSN. He began by reflecting on his days as a young officer in the Fleet.

“Back in the mid-1980s, I served on board the Missile Gunboats (MGBs). That was a busy time in the Fleet. The Navy was being rejuvenated. The Missile Corvettes (MCVs) were being built. Plans were being made to acquire the Maritime Patrol Aircraft (MPAs). The MGBs were being upgraded. In fact, one of the thrilling changes on the MGB was when we switched from the manual and laborious plotting of the tactical picture at sea on tracing paper, contact by contact, to using a simple tracking and display system for the very first time. Up till then, our ship command teams had to try and maintain a tidy and accurate tactical plot under very cramped and ‘rocking’ conditions in the Combat Information Centre (CIC).



Dramatic Change: From the traditional helms and throttle to the Integrated Bridge Consoles of the frigates.



From Hands-On to Almost Hands-Free: The complex button-pressing sequences required to fire missiles on board the MGBs have been replaced by automated processes on board the frigates – the specialist only has to approve the engagement.



“Some twenty years later, I saw on my recent visit to the RSS *Formidable* how the Combat Management System in her CIC was an almost hands-free system, where the numerous contacts detected by the frigate as well as other units in the force were automatically plotted, self-classified based on its coded software, and instantly correlated to give a coherent tactical picture. In just one generation, the capabilities of the RSN and the way it operated had changed dramatically.”

“We have come a long way...”

The Navy has come a long way. Just think – the two wooden ships of the infant Navy barely had a surveillance picture of the Singapore Strait. The MGBs and MCVs that came subsequently each have an area of influence about 50 times the size of Singapore. Today, the *Formidable*-class frigates’ area of coverage is not only far larger, but their zone of influence also spans hundreds of kilometres in the air dimension. And with its balanced force of mine-hunters and submarines, the RSN’s reach extends to the underwater domain as well.

Operations at sea are becoming increasingly joint, leveraging on the sensors and combat power of the Army, Air Force and Navy. Through operating seamlessly with its sister services as a vital part of the 3rd Generation force, the Navy will fight in an integrated system that is well orchestrated for maximum effectiveness.

In addition, the Navy has to work closely with other national agencies, in a Whole-of-Government approach to meeting Singapore’s maritime security challenges. Such inter-agency co-operation allows the RSN and other home agencies to bring different capabilities together as a synergistic whole, to deal with common problems efficiently and effectively, even in daily operations.

Beyond our shores, there is also a need to collaborate with other navies in and out of the region. Today’s security threats are transnational and require a multi-national solution. Hostile and non-state elements can exploit sea-lanes for cover as they cut across jurisdictional zones, traversing territorial and international waters. Navies need to work together to tackle the myriad of amorphous threats effectively, to make the seas and their surroundings safer.

“The Navy plays a vital role in an expanding spectrum of operations”

Keeping the seas safe is critical for a maritime nation like Singapore. Located astride the world’s most important shipping lanes joining the East with the West, the sea is Singapore’s lifeline and fundamental to its prosperity. The RSN’s mission of safeguarding Singapore’s access to the sea and protecting its Sea Lines of Communication (SLOCs) remains as relevant today as it did 40 years ago.

However, the spectrum of operations undertaken by the RSN has expanded. In recent years, with the more volatile security environment, the threat posed by terrorism and the incidence of natural disasters, the RSN has seen a higher tempo of operations. In response, it has strengthened its capabilities to deal with the threat, and conducted increased maritime security operations, such as the force protection missions and surveillance patrols of its Patrol Vessels (PVs) and MPAs. RSN Landing Ships Tank (LSTs) have also been deployed for Humanitarian Assistance and Disaster Relief Operations such as Operation *FLYING EAGLE* (OFE) in Aceh, as well as for Peace Support Operations beyond the region, such as to the Northern Arabian Gulf.

It is not just the RSN, but also other navies in the world, which have had to be more engaged in operations. This is not surprising, since warships are versatile and can carry out a whole range of tasks. As seen during OFE, they can provide access to areas hard to reach by land or air, when infrastructure like airports and roads have been destroyed. They can remain at sea for prolonged periods, and be poised as a deterrent force beyond their show of presence operations. And should the button ever be pressed, naval forces can transit seamlessly from a peace to a war posture. Indeed, a well-trained task force at sea with its long range missiles can mass its fires against opposing forces quickly and decisively.

“Keep our sights trained on three key focus areas...”

As the RSN moves ahead in a sea of rapid change, CNV saw that the Navy will need to “keep our sights trained on three key focus areas.”

Mission Success

“The evolving security environment will always bring with it new operational challenges. The Navy can expect to be called, sometimes at short notice, to undertake operational missions, including some which may be quite unexpected. We must always stand ready to fulfil our mission, and be focused on our key goal of mission success – at the end of the day, everything we do must count towards that.”

Continual Pursuit of Transformation

“While operational duties will always occupy us, we must devote time and energy to developing our Navy of the future. We must continue to build strong capabilities and develop imaginative fighting concepts. While transformational efforts are driven by technology, it will always be the creative energies of our quality people that will unlock the full potential of each transformation cycle. The years ahead will provide ample exciting opportunities for contribution by those who are serving today and those who will be joining the Navy in the future.”

Committed and Competent People

“Our people will always be the key to the Navy’s success. I am happy that they are rigorously trained, skilled and adept at operating in a challenging environment. We depend on our tough war-fighters with their deep warfare competencies to achieve victory for the SAF at sea and beyond. We must ensure the commitment of our people and emphasise the common values which unite and inspire us.”

“Our Navy – Committed, Strong and Ready”

As the interview came to an end, CNV expressed to the writers how proud he was to be serving alongside the fine men and women of the RSN in a profession of high calling. Asked how he would sum up their aspiration for the Navy in one line, CNV said, “We have a sincere aspiration – we will always ensure that *our Navy is committed, strong and ready.*” Indeed, a Navy that we value and a Navy that Singapore can be proud of.

“We will always ensure that our Navy is committed, strong and ready.”

– **RADM Ronnie Tay, Chief of Navy**





EPILOGUE

ASPIRATIONS OF THE YOUNG MEN AND WOMEN OF THE NAVY

THE FUTURE OF ANY ORGANISATION rests with its young. Young men and women with youthful dreams, ideals and energy will be the ones propelling the organisation to which they belong to greater heights of achievement. The Navy is no exception. The Navy is where it is today because of the young men and women who chose to give the best years of their lives to serving the Navy and the nation. As the Navy moves into its next phase of development, it will still be the young men and women in the junior ranks today who will eventually put the plans that are being developed today into reality tomorrow. These young men and women have noble dreams and aspirations. To commemorate the Navy's 40th Anniversary, this section captures the thoughts of 40 of the Navy's young men and women. Their dreams and aspirations are echoed by many others who have also come forward to contribute their aspirations and ideals.

VOICES

"I'm proud to be a sailor in the RSN. The future lies not only in acquiring advanced weaponry, but also in ensuring that our people stay united as *ONE*, to bring our Navy to greater heights."

MID Xie Yuweng

"An RSN where every individual understands his or her role completely, so that they will be able to commit themselves fully to the cause, fulfilling their duties with conviction and single-minded focus."

2LT Ng Shi Yang

"We must retain **our strong edge in war-fighting** because the Navy exists to ensure that should diplomacy and deterrence fail, it is the job of the Navy and the SAF to **defend Singapore and her interests.**"

MID Thomas Chow

"The continuous quest to think out of the box and to plan many steps ahead stands the future of our Navy in good stead."

2SG Eugene Lim

"I hope that our Navy will always develop new operational concepts that will give the Navy an added edge."

2SG Wu Guo Hao

"I hope to see our Navy involved in more peace support as well as other real-time operations. By demonstrating our ability to carry out such operations, Singaporeans and others will have absolute confidence that the Navy can be counted on to defend Singapore."

3SG Tay Wee Meng

"Every sailor lives by the SAF's Core Values. Values determine behaviours and attitudes, and influence mission outcomes. United by **our core values**, we can overcome all our problems together and move **towards our common goal and a brighter future.**"

LTA Tan Huan Chye

"I want the Navy to be a place where all who serve in it treat it as their second home and that the Navy remains a united family where we can all count on one another."

2SG Ng Kim Seng

"The Navy should be an organisation with three World Class 'T's – Technology, Training and Thinking."

MID Ernest Loh

"The RSN must forever be made up of well-trained and dedicated professionals who will always be ready to defend our nation's sovereignty."

2LT James Ong

"Our Navy must continue to be made up of strong and motivated professionals with a clear sense of mission. I want our Navy to be an exemplary force that will never fail Singapore."

2LT Tan You Cai

"I hope to see an RSN made up of creative people who can constantly spawn new ideas to sharpen our capability edge. I envision the Navy becoming a force that is small but power-packed, not just with technology, but also teeming with ideas that others find difficult to copy."

2LT Mo Yao Hua

"The Sea Lines of Communications linking Singapore with the rest of the world are the source of **our nation's economic strength**. I will work hard and play my part to ensure that the Navy remains fully capable of **defending our way of life** which we all cherish."

MID Sim Qian Yuan

"I want the Navy to remain strong, to keep the seas around Singapore safe. By so doing, we would have done our bit to make Singapore a more vibrant society because it assures the world that Singapore will always remain a safe place to work, play and live."

2SG Lee Zhi Qing

"Impassioned sailors working hand in hand, keeping the Navy strong."

2SG Lee Hoi Ying

"I would like to see greater co-operation between the RSN and other navies to deal with common challenges like maritime security."

2SG Jack Ng

"Motivation is the key factor that drives our men and women to perform. We should provide our sailors with a clear understanding of the 'why' behind all the things we do and how they in turn contribute to Singapore's defence."

2SG Gary Eng

"An RSN that will always care for its people. It will be one where people will find encouragement, motivation and inspiration from one another, regardless of rank, to strive together towards greater heights."

2LT Wei Enli Wycliffe

"The Navy should be made up of servicemen and women who are unafraid to change and who always search for ways to do things better, while retaining our rich culture and traditions."

2LT Eunice Chua Limin

"I hope the Navy is a lifestyle choice rather than just a career choice for those who join and serve in the Navy."

MID Jeremiah Tay

“With good people and advanced technology, I hope our Navy will be able to play a bigger role in contributing to regional security in future.”

MID Ian Loo

“Training hard and playing hard must continue to feature in our work in the Navy. Realistic and demanding training is the best welfare. What wins the day in war are sharp war-fighting competencies, which only tough training can hone.”

3SG Neo Xin Han

“An RSN made up of a special breed of people who are dedicated and committed to serving the Navy, the SAF and most importantly, our nation.”

MID Koh Guan How

“Focus on **nurturing** and **training our people** to be the best that they can be. I envisage our Navy turning ordinary people into sailors capable of **extraordinary feats**. Excellent and well-trained people is something that money cannot really buy.”

2LT Kelvin Zhang

“Our Navy needs to be a dynamic and relevant organisation that is ever ready to combat the newest challenges. I hope to be part of this well-oiled defence machinery, steadfast in the defence of our country.”

2LT Ong Chong Yu

“We should preserve our history and honour the contributions of our people, past and present. I hope that the Navy can forge stronger links between different generations of sailors in the Navy, so that those who have left can still share their experiences with their juniors.”

2SG Ho Swee Chung

“Never stop learning, so that our Navy can continue to advance. But let us also not lose sight of our proud traditions and heritage that should be passed down from generation to generation.”

MID Ragavan

“I would like to see the Navy playing a bigger role in peace support as well as other coalition operations as a responsible member of the international community.”

2LT Zheng Ming Kai

“I want to help build greater engineering and logistics excellence in the Navy to ensure that our ships and fighting systems remain in tip-top condition, ready for deployment, even at short notice.”

2LT Chow Linyi

“Tough training must be a feature of life in our Navy. Tough training builds teamwork, tenacity and raw courage, traits that have proven to be vital for victory.”

MID Chong Hong Hao

“I hope the Navy will be a formidable and united force that will be strong and steadfast in values and ethics.”

CPL Joshua Hui

“Never stop learning from others and sharing our knowledge with other navies. By working with other navies, we will be better prepared to meet the challenges that lie ahead of us, and to help make this region that we live in a safer place.”

2LT Desmond Tan

“I hope the Navy will continue to invest in weapon systems that can protect Singapore against any future threats. We must always be a Navy that is ready for the future.”

3SG Goh Huan Yen

“To be a **well-respected Navy** that others want to work with as well as a Navy that we are all **proud to serve in.**”

2SG Edwin Kam

“Build on our rich traditions and high levels of professionalism so that the RSN can truly become a World Class Navy capable not only of defending Singapore, but also contributing to greater security in our region.”

2SG Kelvin Xu

“By focusing on learning, training and knowledge creation, I believe the RSN of the future will be a force to be reckoned with and a force that will make Singapore a safer place to live in.”

MID Neo Han Wei

“Harness technology to enable thrice the work done in one-third the time and by fewer people. Spare capacity created and manpower saved can be re-channelled to building new exciting capabilities for the Navy.”

MID Loke Jun Jie

“Our people are our most important asset, and I hope we will continue to focus on training to bring out the best in our people. Nothing beats tough, realistic training. As a popular saying goes, ‘the harder you train, the less you bleed’.”

MID Liew Sun Woo

“I will do my part to help make the RSN of the future to be a Navy that others want to train and operate with because of our strong reputation for excellence and dependability.”

2LT Marcus Seng Ren Fu

“With better manpower management and active development of home-grown technology, our Navy can even move beyond the 3rd Generation Navy that is being built today.”

2SG Chay Zun You

The kaleidoscope of ideals and dreams articulated by our young men and women resonate well with the thoughts and reflections of the more experienced members of the Navy Family to form the Navy’s collective aspiration. This aspiration is a live statement which will be updated from time to time with new ideas, aspirations and ideals.

THE NAVY'S ASPIRATION

SINGAPORE IS A MARITIME NATION. The sea is Singapore's lifeline and link to the world. Our Navy plays a vital role in ensuring Singapore's seaward defence, protecting its Sea Lines of Communication, and safeguarding its sovereignty. We stand ready to conduct a wide range of missions in peacetime through war, with our comrades in arms from the other services of the SAF, as well as with partners who share our common goals.

We will do our utmost to ensure that our Navy remains a formidable, balanced and flexible force. We will develop new cutting-edge capabilities, devise imaginative operational concepts and transform to meet tomorrow's challenges. Our training, support capabilities and safety standards must always be of the highest levels – to give depth, robustness and sustenance to our fighting capabilities.

We will always be committed to our people and our mission – united and inspired by our shared values. We are courageous, tenacious and forward-looking. We embrace excellence, never settling for second best when we can be the very best in what we do. We aspire to be a Navy that is readily acknowledged to be a professional and dependable force. It is for us to make certain that our Navy remains committed, strong and ready – a Navy that we value and a Navy that Singapore can be proud of.

If a young man or woman wants a
nine-to-five job, that's their business.
This is ours.



ABBREVIATIONS

A

AAW	Anti-Air Warfare
ACTD	Advanced Concept Technology Demonstration
ADEX	Air Defence Exercise
AIS	Action Information System
AMM	Anti-Missile Missile
APV	Anti-Submarine Patrol Vessel
ARF	ASEAN Regional Forum
ASEAN	Association of Southeast Asian Nations
ASRS	Automated Storage and Recovery System
ASSeT	Accompanying Sea Security Team
ASW	Anti-Submarine Warfare

C

C2	Command and Control
C3	Command, Control and Communications
C4	Command, Control, Communications and Computers
CASEX	Co-ordinated Anti-Submarine Warfare Exercise
CBRE	Chemical, Biological, Radiological and Explosive
CG	Guided Missile Cruiser
CIC	Combat Information Centre
CLOS	Command-Line-of-Sight
CMS	Combat Management System
CNB	Changi Naval Base
CNTB	Changi Naval Training Base
CTG	Commander Task Group
CO	Commanding Officer
COSCOM	Coastal Command
CPC	Coastal Patrol Craft
CVSG	Carrier Strike Group

D

DCN	Direction des Constructions Navales
DIVEX	Diving Exercise
DSO	Defence Science Organisation
DSTA	Defence Science and Technology Agency
DXO	Defence Executive Officer

E

EOD	Explosive Ordnance Disposal
EW	Electronic Warfare

F

FCEP	Fast Craft Equipment and Personnel
FCU	Fast Craft Utility
FPDA	Five Power Defence Arrangement
FWWG	Flotilla Warfare Working Group

G

GDP	Gross Domestic Product
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H

HADR	Humanitarian Assistance and Disaster Relief
HPM	High Performance Magazine

I

ICIT	Installation, Check Out, Integration and Testing
IKC2	Integrated Knowledge-Based Command and Control
IMDEX	International Maritime Defence Exhibition
IMW	Institute of Maritime Warfare
INTERFET	International Force for East Timor
ISCP	Indonesia-Singapore Co-ordinated Patrols

K

KC	Knowledge Creation
KM	Knowledge Management

L

LCDR	Lieutenant Commander (equivalent to the SAF rank of MAJ)
LST	Landing Ship Tank

M

MCMEX	Mine Countermeasure Exercise
MCMV	Mine Countermeasure Vessel
MCV	Missile Corvette
MDV	Mine Disposal Vehicle
MFR	Multi-Function Radar

MGB	Missile Gunboat
MINDEF	Ministry of Defence
MPA	Maritime Patrol Aircraft
MRT	Mass Rapid Transit
MSP	Malacca Strait Patrols
MSTF	Maritime Security Task Force
MV	Motorised Vessel

N

NAG	Northern Arabian Gulf
NALCOM	Naval Logistics Command
NDU	Naval Diving Unit
NGO	Non-Governmental Organisation
NMS	Navy Medical Services
NSF	Full-time National Servicemen
NTTS	Naval Technical Training School

O

OBO	Operation <i>BLUE ORCHID</i>
OFE	Operation <i>FLYING EAGLE</i>
ORD	Operationally Ready Date
OOTW	Operations Other Than War
ORBAT	Order of Battle

P

PASSEX	Passage Exercise
PC	Patrol Craft
PCG	Police Coast Guard
PSI	Proliferation Security Initiative
PSO	Peace Support Operation
PWO	Principal Warfare Officer
PV	Patrol Vessel

R

RAN	Royal Australian Navy
ReMIX	Regional Maritime Information Exchange Initiative
Ret	Retired
RHIB	Rigid-Hulled Inflatable Boat
RMN	Royal Malaysian Navy
RN	Royal Navy
RNS	Radar and Navigation Specialist
RNZN	Royal New Zealand Navy
RSAF	Republic of Singapore Air Force

RSN	Republic of Singapore Navy
RSS	Republic of Singapore Ship
RSwN	Royal Swedish Navy

S

SAF	Singapore Armed Forces
SAM	Surface-to-Air Missile
SAR	Search and Rescue
SARS	Severe Acute Respiratory Syndrome
SEAL	Sea Air Land
SIMBEX	Singapore-India Maritime Bilateral Exercise
SLOC	Sea Lines of Communication
SNVF	Singapore Naval Volunteer Force
SSM	Surface-to-Surface Missile
STM	Singapore Technologies Marine

T

TF	Task Force
TG	Task Group
TRACOM	Training Command
TNI	Tentara Nasional Indonesia (Indonesian Armed Forces)
TNI-AL	Tentara Nasional Indonesia Angkatan Laut (Indonesian Navy)
TTC	Tactical Training Centre

U

UAV	Unmanned Aerial Vehicle
USN	United States Navy
USS	United States Ship
USV	Unmanned Surface Vessel
UUV	Unmanned Underwater Vehicle

V

VNA	Very Narrow Aisle
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W

WARCEN	Warfare Centre
WMD	Weapons of Mass Destruction
WOSR	Warrant Officers, Specialists and Ratings
WPNS	Western Pacific Naval Symposium
WMSX	WPNS Multilateral Sea Exercise

ACKNOWLEDGEMENTS

PRODUCING THIS COMMEMORATIVE BOOK has been an exciting journey for the editorial and production team. It has been an incredible and fulfilling learning experience – hearing fascinating recollections of the past and aspirations for the future, from a wide cross-section of the Navy Family. The team would like to put on record our most sincere thanks to all whom we interviewed as well as those who willingly contributed their ideas and suggestions to improve this book. Through hours of interviews, gigabytes of pictures and stacks of historical documents, and not forgetting many cups of coffee, we found ourselves ever more confident and proud of our Navy and the fine men and women who serve in it. We hope that by reading this book, you will too. – The Editorial Team

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