



DREADFUL LADY OVER THE MEKONG DELTA

AN ANALYSIS OF RAAF CANBERRA
OPERATIONS IN THE VIETNAM WAR

WING COMMANDER BOB HOWE, RAAF (RETD)

© Commonwealth of Australia 2016

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced by any process without prior written permission. Inquiries should be made to the publisher.

Disclaimer

This publication is presented by the Department of Defence for the purpose of disseminating information for the benefit of the public. The Department of Defence does not guarantee and accepts no legal liability whatsoever arising from or connected to the accuracy, reliability, currency or completeness of any material contained in this publication.

The content and views expressed in this publication are the author's own, and are not in any way endorsed by or reflect the views of the Department of Defence. The Department of Defence recommends that you exercise your own skill and care with respect to the use of this publication and carefully evaluate the accuracy, currency, completeness and relevance of the content for your own purposes.

This publication is not a substitute for independent professional advice and you should obtain any appropriate professional advice relevant to your particular circumstances.

Release

This document is approved for public release. Portions of this document may be quoted or reproduced without permission, provided a standard source credit is included.

National Library of Australia Cataloguing-in-Publication entry

Creator: Howe, Bob, author.

Title: Dreadful lady over the Mekong Delta : an analysis of RAAF Canberra operations in the Vietnam War/ Bob Howe (Wing Commander, RAAF, Retd).

ISBN: 9781925062199 (paperback)

Notes: Includes bibliographical references and index.

Subjects: Australia. Royal Australian Air Force. Squadron, 2.—History. Canberra (Bombers)—History. Vietnam War, 1961–1975—Aerial operations, Australian. Vietnam War, 1961–1975—Campaigns. Air pilots, Military—Australia—Biography. Flight navigators, Military—Australia—Biography.

Other Creators/Contributors: Australia. Royal Australian Air Force. Air Power Development Centre, issuing body.

Dewey Number: 959.70433494



Published and distributed by:

Air Power Development Centre

Department of Defence

PO Box 7932

CANBERRA BC ACT 2610

AUSTRALIA

Telephone: + 61 2 6128 7051

Facsimile: + 61 2 6128 7053

Email: airpower@defence.gov.au

Website: www.airforce.gov.au/airpower

DEDICATIONS

This book is dedicated to all members of No 2 Squadron, Royal Australian Air Force, who served at Phan Rang, Republic of South Vietnam, from 1967 to 1971.

It is dedicated to those, whose solemn and surreal duty it was, in mid-flight, to unstrap from the security and safety of their Martin Baker ejection seats, to crawl down a narrow passageway beside their pilot, leaving their parachute behind, to lie prone on their stomachs, intent on the enemy target below, as it moved relentlessly beneath and towards the cross-hairs of their bombsights.

It is dedicated to the late Wing Commander A W 'Tony' Powell and the late Group Captain F R 'Frank' Lonie, both of whom were good friends, and both departed on their last missions far too early.

Frank wrote this poem devoted to his beloved Canberra jet bomber. He gave it to me as a personal gift, which I now pass on in his memory:

DREADFUL LADY

*You flew like a beast unchained:
nose down, yet keen as a hunting falcon.
When you turned on a clear morning,
bomb doors closed, gear up,
Then our hearts turned with you,
as they did when we were young,
Now you are gone.
We will see no more your clean beauty against a clear sky,
Nor hear again the awful thunder of your rage.
Some will sleep better for that,
But, I for one,
will never forget you Dreadful Lady*

Finally, this book is also dedicated to my dear wife Diana, whose enduring love, from far away in Australia, sustained me throughout the entire tour of duty in South Vietnam.

Bob Howe
Canberra, Australia
December 2014



This view from the bomb-aimer's position in the nose of a Canberra bomber captures the aircrew's detachment from the battle going on below.

FOREWORD

I was too young to serve in the Vietnam War so when asked by Bob Howe to write the foreword to his book *Dreadful Lady over the Mekong Delta: An Analysis of RAAF Canberra Operations in the Vietnam War*, I was both surprised and delighted. Surprised, because at the time of the Vietnam War, I was only a schoolboy and one who watched the Vietnam War pan out on TV. To me it was a very foreign war and one that I could only imagine. I was delighted, because much of what the Royal Australian Air Force achieved during that conflict has not been recognised or recorded and this book fills one such gap.

This story is about the men of No 2 Squadron and the operations they flew in the Canberra bomber. The aircraft was acquired in the 1950s as the RAAF sought to enter the jet age. Designed to counter the Soviet threat and respond with a nuclear weapon, the Canberra was perhaps the least suited aircraft for low-level jungle and riverine bombing operations. The designers probably never thought of that role, but it was all Australia had at the time.

The order to prepare No 2 Squadron for deployment to Vietnam arrived on the Commanding Officer's desk two days before Christmas in 1966. It came as some surprise. The squadron arrived in country in April 1967 to spend four years there. Bob Howe as a youthful RAAF navigator arrived in 1969, but his time as both Deputy Navigation Leader and Bombing Leader provided him first-hand experience and such is recorded in some detail in this book. Bob flew 260 missions at a time when riverine operations were the norm and recorded the challenges this created.

As a military historian, I have always felt it important to record all aspects of a squadron's operational service, not just the controversial, the spectacular or the most visible. The riverine operations conducted by No 2 Squadron were but a very small part of an allied effort to disrupt the enemy from using the river systems for transport of troops and supplies. It was, according to one commentator: 'a kind of guerrilla warfare conducted in a navy environment'. Beginning in 1967, the tasking for these operations gradually increased to a peak in 1969 before dropping back in 1970 as the war moved on.

I commend *Dreadful Lady over the Mekong Delta* to you as not only does it fill a gap in the recording of the RAAF's bombing operations in Vietnam, but also adds a very personal touch as to how crews overcame the difficulties of operating in a very intense and foreign environment.

Mark Lax

Air Commodore, RAAFAR
Canberra, Australia

PREFACE

My career in the Royal Australian Air Force was enjoyable and rewarding, even though, as with everything in life, it also had its downside. I wanted to become a RAAF pilot and didn't succeed, but at least I was fortunate to qualify as a navigator, and still experience the joys of flying in the RAAF.

I was very lucky to experience three distinctly different flying tours, firstly starting at RAAF Base Garbutt, Townsville, as a maritime navigator, advancing to tactical air coordinator (TACCO), responsible for conducting long distance patrols out over the Pacific Ocean in Lincoln Mk 31 and Neptune P2V-7 (SP-2H) aircraft. We travelled widely and studiously practised Cold War anti-submarine warfare techniques in conjunction with allied air and naval arms, including conventional and nuclear-powered submarines; it was an enthralling occupation.

After undergoing the post-graduate Advanced Navigation Course at the School of Air Navigation at East Sale, Victoria, I then changed trades, firstly starting as a student, to then become an instructor, with No 1 (Bomber) Operational Conversion Unit at Amberley, Queensland, in the process developing dual-qualified—navigator and bomb-aimer—skills suited to the Australian-built Canberra jet bomber.

Having helped to progress a number of Canberra trainee crews through their conversion courses, bound for the Vietnam War, my turn came when I was posted to No 2 Squadron at Phan Rang Air Base, South Vietnam, to fly the aircraft in anger. I was duly appointed as Deputy Navigation Leader and Bombing Leader during the latter half of my yearlong tour of wartime duty and I was awarded a Mention in Despatches for my efforts in ensuring that No 2 Squadron retained and sustained a proud record for our high standard of bombing accuracy against the enemy.

Following my wartime service, I changed over to my third flying trade, learning the basics at Davis-Monthan Air Force Base, Arizona, and qualifying to fly as a weapons systems officer in the back seat of the amazing, mach 2-capable F-4E Phantom jet fighter, leased as an interim measure pending the delayed arrival of the F-111C into RAAF service. My role as Systems Training Officer at Headquarters No 82 Wing involved great flying with Nos 1 and 6 Squadrons, as well as introducing new concepts into practice, such as managing the transition of the first group of air electronics officers to become F-4E weapons systems officers.

This breadth of operational flying gave me a substantial understanding of airborne, combat-related operations, for which, as I said, I was extremely fortunate. I believe it is a pity that many RAAF aircrews today or tomorrow will not experience flying in more than one aircraft type over their entire flying career, as good value can come from wider operational exposure.

In this book, I use my own personal experiences as the basis for describing the unique nature of No 2 Squadron's missions in the Mekong Delta, when bombing operations by the *Magpies* in this region peaked at the same time that I served with the squadron— from 1969 to 1970.

My thesis in this book is that the RAAF's Canberra jet bombers and their crews found their niche as an integral element of the riverine warfare which took place in the Delta.

Up until now, despite the production of excellent histories on the RAAF and the war in Vietnam by other authors more qualified than me, there has been little evidence of a detailed focus on No 2 Squadron's four years of operations in South Vietnam. There has not been an examination of their bombing missions conducted from April 1967 to May 1971, nor how they fitted into the reality of the ongoing war taking place on the surface below.

In particular, rarely has there been any reference in the literature about No 2 Squadron's relevance to the riverine-based guerrilla warfare that raged in the Mekong Delta region. Certainly, there is hardly any mention of it in either daily Unit History Sheets or monthly Commanding Officer's Reports from Vietnam at the time, and thus historians cannot be blamed for this lapse.

In seeking to escape from the 'aerial cocoon' in which aviators can become trapped in wartime, I have tried to rectify this omission by starting off with an overview of this particular operational environment, aiming to illustrate the nature of riverine warfare and the key participants in Mekong Delta operations.

I then discuss, in some detail, the Canberra jet bomber's capabilities and limitations in support of allied troops fighting a guerrilla war in such difficult terrain. Based on published data and my own personal hitherto-unpublished records and memories collected from my 260-mission, yearlong, operational tour of duty, I seek to show, with examples, what No 2 Squadron and its RAAF Canberra jet bombers could do, and did, in these circumstances.

Finally, I attempt to conclude, not very successfully I admit, in view of the complexity involved, to synthesise events into a kind of assessment of the performance of No 2 Squadron RAAF and its Canberra Mk 20 bombers, in supporting riverine warfare operations in Vietnam, focussing on the period that I served with the unit.

Maybe some readers may find lessons, or something of relevance, which may prove to be applicable to future operations. This would please me very much.

I recognise that the book is an incomplete historical document and I make no apologies for it. Rather, I have sought to lay out a baseline which may be useful for others who follow and who may well be able to elicit details better than I have, and discover further facts that I have been unable to unearth. Hopefully, it will challenge them to correct my mistakes, errors and omissions, if they will, in the hope that a genuine, understandable and accurate history of this specific component of Australia's war in South Vietnam will evolve.

I do apologise, however, to those whose help I did not seek, or have time to contact, in order to limit any errors contained in this book.

Bob Howe

CONTENTS

<i>Dedications</i>	iii
<i>Foreword</i>	v
<i>Preface</i>	vii
<i>Abbreviations and Acronyms</i>	x
<i>Units of Measurement</i>	xv
CHAPTER 1 – INTRODUCTION	1
CHAPTER 2 – THE PARTICIPANTS	9
CHAPTER 3 – US-LED RIVERINE OPERATIONS IN THE MEKONG DELTA	45
CHAPTER 4 – TACTICAL AIR SUPPORT TO RIVERINE OPERATIONS	63
CHAPTER 5 – RAAF CANBERRAS AND RIVERINE OPERATIONS	87
CHAPTER 6 – NO 2 SQUADRON’S EFFECTIVENESS IN RIVERINE OPERATIONS	139
CHAPTER 7 – SUMMARY AND CONCLUSIONS	163
NOTES	167
BIBLIOGRAPHY	203
INDEX	209

ABBREVIATIONS AND ACRONYMS

AAP	Australian Air Publication
ACTOV	Accelerated Turnover to Vietnam
AGL	above ground level
AHC	assault helicopter company
ANGLICO	Air Naval Gunfire Liaison Company
AO	area of operations
AOC	air operations centre
APA	attack transport (ship)
APL	auxiliary personnel lighter
ARDU	Aircraft Research and Development Unit (RAAF)
ARG	amphibious ready group
ARVN	Army of the Republic of Vietnam
ASHC	assault support helicopter company
ASOC	air support operations centre
ASPB	assault support patrol boat
ATC	armoured troop carrier
ATF	Australian Task Force
ATSB	advanced tactical support base
AUW	all up weight
AWM	Australian War Memorial
BDA	bomb damage assessment
CAB	combat aviation battalion
CAG	combat aviation group
CAS	close air support
CBU	cluster bomb unit
CCB	command and communications boat
CDFS	Chief of Defence Force Staff (Australia)
CDT	clearance diving team
CENTCOM	Central Command (US)
CEP	circular error probable
CHECO	Contemporary Historical Examination of Current Operations (US)
CIA	Central Intelligence Agency

CINCPACFLT	Commander-in-Chief, Pacific Fleet (US)
COIN	counter-insurgency
COMAFV	Commander, Australian Forces Vietnam
COMNAVFORV	Commander Naval Forces , Vietnam (US)
COMRAAFV	Commander, RAAF Vietnam
COMUSMACV	Commander, US Military Assistance Command Vietnam
CONARC	Continental Army Command
CRC	control and reporting centre
CRP	control and reporting post
CSF	coastal surveillance force
CTZ	corps tactical zone
DASC	direct air support centre
DER	radar picket escort (ship)
DMZ	Demilitarized Zone
EMU	Experimental Military Unit
EOD	explosive ordnance disposal
FAC	forward air controller
frag	fragmentary order
FSB	fire support base
FSH	fixed sight-head
GAF	Government Aircraft Factory
GP	general purpose
GVN	South Vietnam Government
HAHS	high altitude, high speed
HAL	light helicopter squadron (US Navy)
HC	helicopter combat support squadron
HMM	medium Marine helicopter squadron
HMAS	Her Majesty's Australian Ship
HQ PACAF	Headquarters Pacific Air Force (US)
HSSC	heavy SEAL support craft (US Navy)
hooch	slang term for house or structure
IAS	indicated airspeed
JAGOS	Joint Air-Ground Operations Systems
JCS	Joint Chiefs of Staff (US)
JOC	joint operations centre
KBA	killed by air
KIA	killed in action

km	kilometre
LCM	landing craft mechanized
LOH	light observation helicopter
LPD	amphibious transport dock
LPH	amphibious assault ship
LSD	landing ship dock
LSSL	landing ship support large
LSSC	light SEAL support craft
LST	landing ship tank
LVT	landing vehicle tracked
LZ prep	landing zone preparation
MACV	Military Assistance Command Vietnam
MATSB	mobile advanced tactical support base
MDMAF	Mekong Delta Mobile Afloat Force
mm	millimetre
MOE	measure of effectiveness
MR	military region
MRB	mobile riverine base
MRF	mobile riverine force
MSB	minesweeping boat
MST	mobile support team
NAVFORV	Naval Forces Vietnam
NGFS	Naval gunfire support
nm	nautical miles
NOTAM	notice to airmen
NVA	North Vietnam Army
OCU	Operational Conversion Unit (RAAF)
OSU	Operational Support Unit (RAAF)
PACCOM	Pacific Command (US)
PACFLT	Pacific Fleet (US)
PAVN	Peoples' Army of Vietnam
PBR	river patrol boat
PCF	fast patrol craft
PF	Popular Forces
PG	patrol gunboat
QNH	barometric pressure
RAAF	Royal Australian Air Force

RAF	Riverine Assault Force or Royal Air Force
RAG	Reconnaissance Aviation Group or River Assault Group
RAID	River Assault Interdiction Division
RAN	Royal Australian Navy
RANHFV	Royal Australian Navy Helicopter Force Vietnam
RAR	Royal Australian Regiment
RAS	River Assault Squadron
RF	Regional Force
RID	River Interdiction Division
ROK	Republic of Korea
RPC	river patrol craft
RPF	River Patrol Force
RPG	River Patrol Group or rocket propelled grenade
RSSZ	Rung Sat Special Zone
RTEG	River Transport Escort Group
RTG	River Transport Group
RUSI	Royal United Services Institute
SAC	Strategic Air Command
SAM	surface-to-air missile
SCATTOR	small craft assets, training, and turnover of resources
SEAL	sea, air and land team (US Navy)
SEALORDS	South East Asia lake, ocean, river and delta strategy
SEL	suspected enemy location
SLF	special landing force
slick	slang term for low-drag bomb or a troop-carrying Iroquois helicopter
TACAIR	tactical air
TACAN	Tactical Air Navigation
TACC	Tactical Air Control Center (US)
TACP	Tactical Air Control Party
TACS	Tactical Air Control System
TAOR	tactical area of responsibility
TAS	true airspeed
TASS	tactical air support squadron
TBS	tactical bomber squadron
TF	task force
TFS	tactical fighter squadron
TFW	tactical fighter wing

TG	task group
TIC	troops in contact (with enemy)
TIS	Theater Indoctrination School (US)
TOC	tactical operations centre
TSF	Transport Support Flight (RAAF)
UDT	underwater demolition team
UH	utility helicopter
UHF	ultra high frequency
USAF	United States Air Force
USCG	United States Coast Guard
USMC	United States Marine Corps
USS	United States Ship
USSR	Union of Soviet Socialist Republics
UTM	Universal Transverse Mercator
UXB	unexploded bomb
VAL	light attack squadron (US Navy)
VB	Victoria Bitter (beer) or visual bombing
VC	Viet Cong
VHF	very high frequency
VIP	very important person
VNAF	Vietnam Air Force
VNN	Vietnam Navy
VR	visual reconnaissance
VRGB	variable ratio gearbox
VT	variable time
WBGp	water borne guard post
WPB	cutter (US Coast Guard)
Zippo	armoured, troop-carrying vessel with flame-thrower weapon

UNITS OF MEASUREMENT

Units of measurement used throughout this book are those that were in common use at the time of the Vietnam War.

CONVERSIONS

1 inch (in) = 25.4 millimetres (mm)

1 foot (ft) = 30.5 centimetres (cm)

1000 feet (ft) = 304.8 metres (m)

3000 feet (ft) = 914.4 metres (m)

1 yard (yd) = 36 inches = 914.4 millimetres (mm)

1 statute mile (sm) = 1.6 kilometres (km)

1 nautical mile (nm) = 1.85 kilometres (km)

1 knot (kt) = 1 nautical mile per hour (nmph) = 1.85 kilometres per hour (kmph)

1 pound (lb) = 0.45 kilograms (kg)

1 (long) ton = 1016 kilograms (kg) = 2240 pounds (lb)

1 (short) ton = 907.2 kilograms (kg) = 2000 pounds (lb)

1 tonne = 1 metric tonne = 1000 kilograms (kg) = 2204.6 pounds (lb)

Note: In this book, the unit 'ton' refers to a 'short ton'.

CHAPTER 1

INTRODUCTION

In 1969 and 1970, the author flew 260 operational bombing missions with No 2 Squadron, Royal Australian Air Force (RAAF) in South Vietnam. In the latter part of his tour of duty, he was appointed Bombing Leader, with responsibility for ensuring that bombing operations were conducted professionally. Armed with this first-hand experience, the author's aim of this book is to examine, in detail, the part played by No 2 Squadron in riverine operations undertaken in the Mekong Delta region of South Vietnam during the Vietnam War.

With the fall of Saigon on 30 April 1975, the Vietnam War ended. As the last United States and allied forces departed, they left the southern part of the ravaged country to the victorious communist regime, which had swept in from the north and from the west in Cambodia. The new regime forcefully imposed unified rule over a land torn by centuries of past colonial rule—first by China in the 19th century and then France in the 20th.

The conflict's recent origins had grown out of World War II, the end of which saw the defeat of aggressors Germany and Japan, a major redrawing of the global map, the unrestrained spread of communism sponsored by the Soviet Union's Joseph Stalin and China's Mao Tse Tung, and nationalist movements seeking to rid themselves of the colonial yoke, many under the shadow of the expanding communist threat.

When France was overrun by Germany and Indochina fell to the invading Japanese, many Vietnamese pushed for independence. However after the war, the French sought to re-establish pre-war colonial rule over the region, only to be met by increasing resistance from communist insurgents, supported by the Soviet Union and China, both nations now engaged in a global Cold War stand-off with the United States and its allies, including Australia. The prospect of a third world war loomed large as these new global powers flexed their muscles and the communists in Vietnam made best use of their opportunity.

The Vietnamese communist leader, Ho Chi Minh, captured Hanoi in the north, and declared the whole of Vietnam to be independent. Refusing to recognise this declaration, but weakened by its World War II collapse, France was unable to resist a persistent guerrilla warfare campaign, and was finally defeated militarily in 1954, at the Battle of Dien Bien Phu. Ho Chi Minh then forced a peace settlement.

The Geneva Accords of 1954 (Conference Final Declarations, July 21) declared a ceasefire and Vietnam became officially divided by a Demilitarized Zone (DMZ), based on the 17th parallel of latitude, separating the communist-led North Vietnam from South Vietnam with its anti-communist government. A mass movement of people changed locations.

Dreadful Lady over the Mekong Delta

Recognising a very real global threat arising from the spread of communist-inspired national movements, the United States drew a line in the context of Indochina, and chose to support the anti-communists, despite the inherent weaknesses of the Diem Government, which took over South Vietnam in 1955.

The communists formed the National Liberation Front (Viet Cong) to bring down, by force, the South Vietnam Government, which had refused to agree to reunification talks with the North. US President John F Kennedy thereupon sent additional advisors in early 1962 to help train the local Army of the Republic of Vietnam (ARVN) in combating the communist threat, as South Vietnam struggled to establish a viable government. In 1964, Kennedy's successor, President Lyndon B Johnson, significantly raised the US military commitment to Vietnam in the hope of stopping the increasing flow of troops and weapons from the North into the South, via the inland Ho Chi Minh Trail and also by sea.

Being wary of triggering a major global conflict and mindful of the 'domino effect' should one of a row of South-East Asian nations fall under communist control, the US leadership sought to deter the North Vietnamese from continuing to invade the South. However, fearful of stirring up direct confrontation with the Soviet Union and China, the US chose not to destroy the enemy at its source, or cut external supply lines from these nations into North Vietnam. This policy constrained allied military options in North Vietnam, while its communist sponsors continued unfettered to provide and train the North Vietnamese Army (NVA) in using the latest arms technology, such as modern surface-to-air missiles (SAMs) to help counter the American air attacks on military installations.

As part of its plan to generate solidarity in combating the communists, the US called upon allies of the 'Free World Forces' to join in their containment strategy. Australia, amongst other allies, but notably not the United Kingdom, agreed to send forces, starting with Army instructors in 1961-2 (the Australian Army Training Team Vietnam). This was followed by a RAAF C-7 Caribou flight in 1964 and an Army battalion in 1965. When the battalion was replaced by the 1st Australian Task Force (1ATF) in 1966, No 9 Squadron deployed with their RAAF UH-1 Iroquois helicopters to provide support. Finally, Canberra bombers from No 2 Squadron deployed to Vietnam in 1967.

Heavily constrained politically and unable to engage fully with the enemy in all quarters, respective US field commanders did their best with the limited set of cards that they had been dealt. In early 1965, US aircraft began bombing targets in North Vietnam and the first American troops arrived in South Vietnam under the command of General William Westmoreland (Commander US Military Assistance Command, Vietnam [COMUSMACV]), initially winning victories in conventional battles over Viet Cong and NVA forces around Chu Lai and in the Ia Drang Valley.

Licking their wounds, the North Vietnamese resorted to guerrilla tactics, supported by political efforts, which effectively undermined America's will to make war. In January 1968, as Vietnamese traditionally celebrated their New Year (Tet), the communists launched a major

Introduction

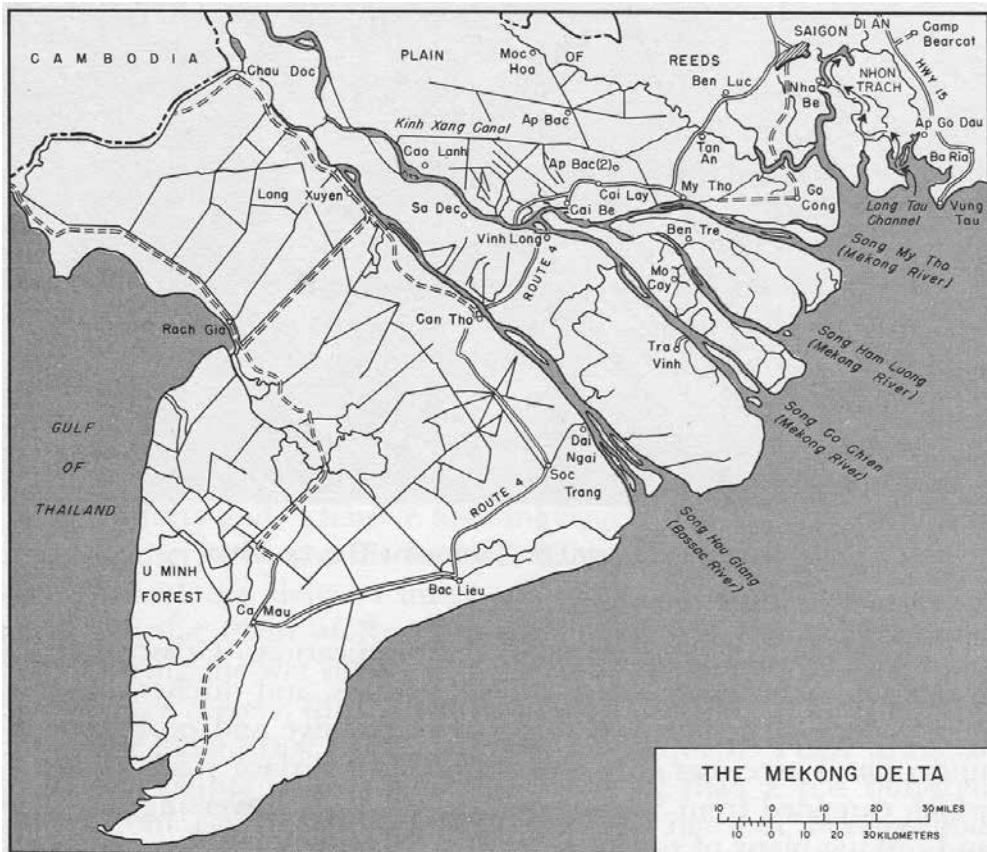
offensive across South Vietnam, starting with a heavy assault on US Marines at Khe Sanh. Extensive use of tactical air power, which included No 2 Squadron Canberras, resulted in a military defeat and heavy casualties for the communist forces. Although the enemy was beaten back in fierce combat, the onslaught achieved its political aims, resulting in the demise of Johnson and the election of Richard Nixon as US President, with a mandate to withdraw from Vietnam and negotiate for a peaceful settlement.

Termed 'Vietnamization', the US adopted a policy of transferring responsibility for combat operations to the South Vietnamese and reducing American forces in country. In January 1973, a peace accord was signed in Paris, theoretically ending the conflict and allowing the withdrawal of the last American forces. The South Vietnamese, relying on leftover US equipment and a few remaining advisors, were left to fight a well-provisioned and determined enemy. Despite agreeing not to resort to further offensive action, the communists spent the next two years building up their forces, while continuing to receive heavy support from USSR and China. In January 1975, communist forces began a major offensive which started in the north and eventually overran the whole of South Vietnam. Saigon, the capital, fell on 30 April.

Undertaking a series of ruthless re-education programs, which saw a huge surge of South Vietnamese refugees fleeing the country, the communists achieved their aim of 'unifying' the nation. In terms of casualties, the decade-long war had cost the lives of almost 60 000 Americans, 230 000 South Vietnamese and over one million North Vietnamese, while Australia lost approximately 500 killed.

In setting out the context, this book starts with a brief look at the environment, follows with a description of the various armed forces involved in the conflict (Chapter 2) and broadly describes US-led riverine operations in the Mekong Delta in Chapter 3. Chapter 4 covers USAF Seventh Air Force operations in the Delta and how and where the RAAF's Canberra jet bomber crews fitted into the scheme of things. Chapter 5 looks at how effective No 2 Squadron operations were in this context, and finally, Chapter 6 concludes with a brief summary.

THE SETTING



Map 1-1: Mekong Delta - IV Corps
(Source: US Army)

As seen by the US military at the time, the Mekong Delta stretched from Saigon, south and west to the Gulf of Siam/Thailand and the border of Cambodia.¹ It comprised the following three distinct geographic regions.

- The first was the Plain of Reeds, located immediately west of Saigon, which was a vast area of reeds and grass, and, during the wet season, lay under two to three metres of water, looking like an immense shallow lake from the air. It had few trees and large grass fires occurred in the dry season. It has been described as 'gloomy and dismal, full of chest-deep canals, standing water, and fetid, nauseating, smelly mud, with small forested patches and villages interspersed among the canals and watery fields.'²
- The second was the lower Mekong Delta, which extended broadly from Saigon, south to the once dense U Minh forests of the Ca Mau Peninsula, and contained three major distributaries of the Mekong River, as well as the Bassac River further south.

Introduction

- The third comprised mangroves and nipa palm swamps, surrounding the main shipping channel along the Long Tau River leading from Vung Tau, on the South China Sea coast, west to Saigon and passing through the Rung Sat Special Zone (RSSZ), so-called by the South Vietnam Government in 1962 to denote its importance. This area comprised many meandering waterways through entangled trees, vines, exposed roots and heavy undergrowth.

In the 1960s, the region's strategic importance was based primarily on its food production capacity, being very rich agriculturally, with significant rice growing and fishing industries. Spread over an area of 40 000 km, the Mekong valley contained eight million people, more than half of the total South Vietnam population of 15 million people. Population density along the waterways was high. The Delta covered 25 per cent of the total South Vietnam land mass and grew 68 per cent of the nation's rice crop.³

The topography inhibited conventional land force operations, and there was only one reasonable road—Highway 4—running from north to south. The Vietnamese had spent centuries creating a massive waterway system, comprising 5000 km of rivers, canals and smaller streams.

As the US Navy put it,

'In South Vietnam, the near-bewildering maze of inland waterways imposes both an extraordinary riverine challenge and an unequalled opportunity for the employment of naval forces. The dense vegetation along many of the waterways limits visibility and provides excellent cover for guerrillas lying in ambush positions along the banks'.⁴

Dreadful Lady over the Mekong Delta



Canal country, Mekong Delta

Located only 10 degrees north of the Equator, the Mekong Delta's climate was very similar, but opposite seasonally, to Darwin's. Its south-west monsoonal wet season generally lasted from June to October, with the dry season (caused by reverse north-east monsoon conditions) extending from November to May, mainly providing sunny weather, although at times hazy conditions could prevail. The transition between monsoons could produce good or bad weather, and as temperatures were constantly warm to hot and humidity was high much of the time, weather conditions could fluctuate considerably.

Introduction



Clouds build up over the Mekong Delta

In the south-eastern part of the Delta where the Gulf of Siam/Thailand met the South China Sea, river currents typically ran at 6 to 8 knots⁵. Not only that, as the Cau Lon, Bo De and Dam Doi rivers (rivers in Vietnamese were called songs, for example, Song Cau Lon) connected with the South China Sea on the eastern side of the Delta, and the Song Cau Lon entered the Gulf of Siam/Thailand to the west, river currents reversed with the tides. Conditions in 'Square Bay' at the western mouth of the Song Cau Lon were especially challenging, as the main channel behaved similarly to that of Broome, Western Australia, peaking at four to five metres at high tide, but turning into vast mud flats at low tide.

Despite the profusion of swamps, marshes and forests in the Mekong Delta, landing zones were plentiful for limited rotary wing operations and the weather seldom inhibited helicopter activity. Nevertheless, a former US Army 9th Division battalion commander, Colonel David H Hackworth, provided a most graphic summary of conditions in the region, when he exclaimed:

'I am convinced that no American soldier has ever suffered more than the infantryman who fought in the Mekong Delta during the Vietnam War, and that includes those at Valley Forge, the Bulge of Christmas '44 and Korea the winter of '50. It was a horrible place. An alluvial plain less than six feet above sea level wherever you were, your feet were always wet, and for a large majority of the time so was the rest of you. At low tide, the rice paddies were a foot deep, at least six inches of which was thick mud; you had little choice but to wade through them, though, because the dikes were generally booby trapped. When the tides were out, the myriads of crisscrossing canals were often mud up to your neck; you couldn't avoid them and you'd emerge exhausted, with leeches clinging to your body.'⁶

CHAPTER 2

THE PARTICIPANTS

FORCE EVOLUTION

During the Vietnam War, the US Military Assistance Command, Vietnam (MACV) adopted the method used by the Army of the Republic of Vietnam (ARVN) of dividing South Vietnam into four military regions, or corps tactical zones (CTZs). I Corps in the north extended from the Demilitarised Zone (DMZ), which separated North and South Vietnam, to Quang Ngai Province. II Corps covered the central highlands and coastal regions, III Corps included Saigon, the northern part of the Plain of Reeds and Phuoc Tuy Province where the 1st Australian Task Force was located, and IV Corps covered the Mekong Delta.⁷



Map 2-1: South Vietnam's four corps tactical zones (CTZs)
(Source: US Army)

Dreadful Lady over the Mekong Delta

Prior to April 1967 when No 2 Squadron arrived in-country, US involvement in IV Corps operations in the Mekong Delta had been confined to supporting, as advisors at all levels, South Vietnamese forces trying to protect their land from communist takeover by the North Vietnamese forces, in conjunction with their locally recruited Viet Cong (VC) units.⁸

Driven by the geography of the Mekong Delta, the only effective way to manoeuvre *en masse* through the region was by water. But riverine warfare was a black art to a US military establishment fully geared for global nuclear warfare with the Soviet Union. Indeed, the Americans had to go far back in history to their own 19th century Civil War and the War of Independence against the British, to find prior in-house riverine experience.⁹

Riverine warfare expertise in Vietnam lay with the French with their long and proud tradition of overseas Foreign Legion expeditions. In combating the Viet Minh, the precursors of the Viet Cong, the French had developed a significant capacity, with river flotillas capable of carrying and landing battalion-size land forces in joint Army-Navy operations in the two major river regions—the northern Red River Delta in Tonkin, and the southern Mekong River Delta in Cochin China.¹⁰

As the French withdrew from Vietnam after the disaster of Dien Bien Phu in 1954, Americans began moving into the Delta to advise the local forces in opposing a communist take-over, emanating from the north. For the next 13 years, however, the onus remained solely on the South Vietnamese to secure the Mekong Delta, which was in effect the backdoor to the capital, Saigon.

Ironically, despite a US Marine colonel (Victor Croizat) having initiated the creation of the Vietnam Marine Corps, a sub-set of the Vietnam Army, and helped them establish the semblance of a riverine doctrine, from late 1966 US Marines forces declined to participate in the IV Corps area of operations, as they were totally pre-occupied with the conflict in North Vietnam and I Corps.¹¹

Colonel David Hackworth, US Army, succinctly summarised the situation when he commented on:

‘... the tactical absurdity of having the 9th Div in the Delta in the first place. The Marine Corps was the Defense Department’s amphibious arm. Yet throughout this period, when the Army was stumbling and splashing like ducks through the waterways of the Mekong Delta, the Marines, configured and trained, and equipped as amphibious shock troops (perfect for Delta combat) were fighting an infantry footslogging war up in I Corps, the most rugged terrain in Vietnam.’¹²

Recognising the need to guarantee food supplies for the rest of the country, MACV leaders knew how important the Mekong Valley was strategically. From a US military perspective, operations in the Delta had to be joint (that is, a combination of Army and Navy) in recognition of the importance of both water and air travel, in lieu of road transport. Thus the US Army’s

The Participants

9th Division and the US Navy's Seventh Fleet were forced to improvise in managing the task of pacifying the region. It was an uneasy joint coalition.

Inter-service rivalry between the US Army and US Navy delayed the development of joint service doctrine. Joint command and control of Mekong Delta riverine forces remained hotly debated issues throughout the war, especially as both US services were starting from scratch, without the benefit of the traditional synergy that the US Navy and the Marine Corps shared in this context.¹³

The US Navy had no equivalent to an Army division, and respective commanders in the field reported up their organisational chains to Commander US Military Assistance Command Vietnam (COMUSMACV).¹⁴ In deference to its on-going advisory role in the south, US Army commanders reported to COMUSMACV through the Vietnam Field Force Commander (a two-star general), while US Navy commanders reported through the Commander Naval Forces Vietnam—COMNAVFORV (initially a two-star US admiral), with the Commander Seventh Fleet running northern operations.¹⁵

Key mission areas of riverine operations were river assault, river patrol, river minesweeping, special operations, fire support and interdiction of enemy supply networks. Operational control in IV Corps was delegated down the line as far as possible to maximise flexibility in joint combat, although, at the working levels, US Army infantry outranked their US Navy brown water counterparts.

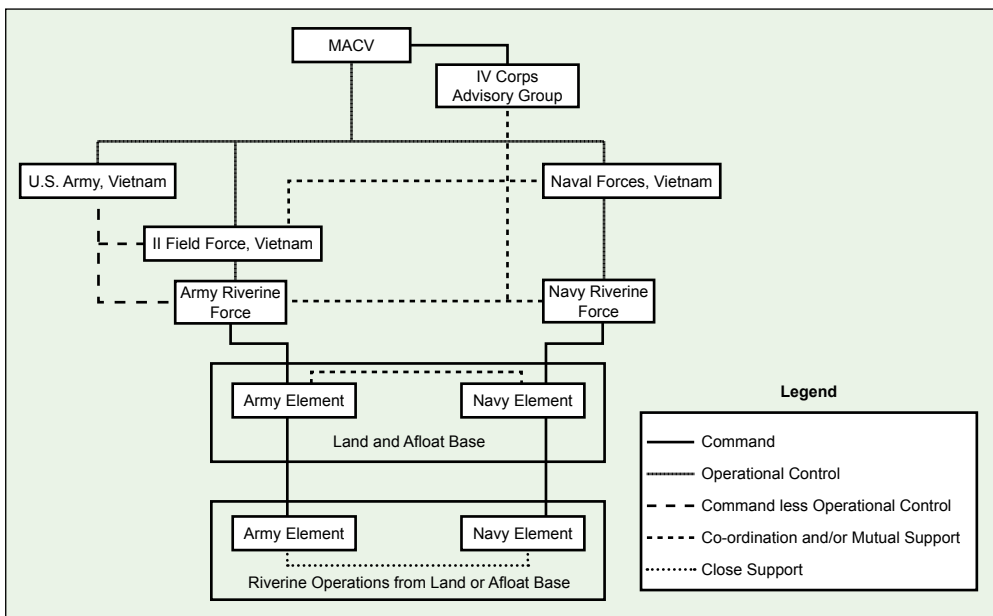


Figure 2–1: Mekong Delta riverine operations command and control
(Source: US Army)

Dreadful Lady over the Mekong Delta

For planning purposes, the one-star US Army brigade commander selected enemy targets and areas of operation (AOs). However, by late 1968 the US Navy asserted greater authority, when it promoted COMNAVFORV, then Rear Admiral Elmo Zumwalt, to Vice Admiral, equivalent in rank to Commander Seventh Fleet, and senior to the US Army's two-star Commander 9th Division.¹⁶

The following provides more detail of the relevant forces involved in IV Corps riverine warfare in the Mekong Delta.

US NAVY

EARLY DAYS

At the outset, the US Navy's involvement in the Vietnam War was the responsibility of the Seventh Fleet, which comprised:

- an attack carrier strike force (TF-77) conducting airborne strike missions into North Vietnam, against the Ho Chi Minh trail and in I Corps, South Vietnam,
- an amphibious task force (TF-76) which supported the landing in I Corps, South Vietnam, of the US Marine Corps' 1st and 3rd Divisions in Operation *Starlite*, and
- a cruiser-destroyer task group (TG70.8) which bombarded enemy targets along the coast of North Vietnam as well as attacking enemy ships under Operation *Sea Dragon*.¹⁷

Operation *Market Time* was initiated by the Seventh Fleet in early 1965 to prevent the enemy from strengthening forces in South Vietnam with seaborne supplies and munitions. The North Vietnam Navy Transportation Group 125 used steel-hulled, 100-ton trawlers and seagoing junks to infiltrate the South, while the locally recruited VC operated smaller junks, sampans, and other craft within South Vietnam's coastal waters.¹⁸

Coastal surveillance under *Market Time* occurred well north of the DMZ, as well as along the entire 1200-mile South Vietnam coastline, from the 17th parallel clockwise around to the Cambodian border, extending 40 miles out to sea. It evolved into patrolling three zonal layers, namely:

- an air surveillance sector farthest out to sea, using land-based US Navy Lockheed P-2 Neptunes, and later P-3 Orion maritime patrol aircraft, as well as carrier-based naval aviation,
- an outer sea barrier patrolled by Seventh Fleet destroyers and minesweeper units, later replaced by radar picket escorts (DERs) of the US Navy (USN) and the Royal Australian Navy (RAN), together with US Coast Guard cutters, and
- an inner shallow-water barrier patrolled by US and Vietnam Navy boats, watercraft and junks.¹⁹

The Participants

During the first half of 1965, five combined US-Vietnam Navy coastal surveillance centres were established along the coastline at Da Nang (I Corps), Qui Nhon and Nha Trang (II Corps), Vung Tau (III Corps) and in IV Corps at An Thoi, on Phu Quoc Island to coordinate these operations.²⁰ Also in 1965, a number of commercially-built patrol craft (Swift boats) arrived from the US for service with US Navy Patrol Division 101, based at An Thoi.

From May 1965 to August 1966, insufficient land-based tactical air support was available in IV Corps. To fill this gap, US Navy aircraft carriers positioned off the South Vietnamese coast (*Dixie Station*) launching Douglas A-1H Skyraiders and A-4 Skyhawks in response to requests for air support in South Vietnam, including the Mekong Delta. They provided forward air control (FAC)–directed close air support (CAS) and interdicted supply routes into South Vietnam, including river-borne and coastal junk and sampan traffic, as well as roads, bridges, and trucks on land. This work was in addition to the carrier's duties located at *Yankee Station* for air operations over North Vietnam.²¹

Seventh Fleet ships (and RAN destroyers) also engaged in off-shore naval gunfire support (NGFS) against enemy positions ashore in the Mekong Delta and actions in the Rung Sat Special Zone (RSSZ), which contained the entry channel for vessels arriving and departing Saigon from the South China Sea. In one incident in April 1966, USS *Morton* (DD-948) responded to an emergency call 20 miles up the Saigon River (Song Sai Gon) and used rapid-firing 5-inch/54-calibre guns against the enemy. In another incident, USS *Princeton* (LPH-5) having conveyed USMC helicopter squadron HMM-362 to Soc Trang, remained on station to support Operation *Jackstay* from 26 March to 6 April 1966.²² This amphibious operation was the first major US naval operation in the river environment of the RSSZ.

US NAVAL FORCES VIETNAM

US Naval Forces Vietnam (NAVFORV) was created in April 1966, initially commanded by Rear Admiral Norvell G Ward, with responsibility for all US naval operations in the Vietnam region, outside I Corps.²³

NAVFORV comprised three task forces:

- TF-115 Coastal Surveillance Force (CSF),
- TF-116 River Patrol Force (RPF), and
- TF-117 Mobile Riverine Force (MRF).



Patrol Craft Fast - Swift Boat
(Source: US Navy)

COASTAL SURVEILLANCE FORCE

The Coastal Surveillance Force, designated as Task Force 115 (TF-115), had been activated in mid-1965, incorporating Patrol Division 101's patrol craft fast (PCF) Swift Boats.²⁴ Eighty four of these 50-foot, 23-knot Swifts had been purchased from the Louisiana-based Stewart Seacraft Company, and were armed with .50-cal machine guns and an 81-mm mortar. They became the mainstay of Navy's Coastal Surveillance Force, employed at bases along the Vietnamese coastline.

RIVER PATROL FORCE

In early 1966, the VC held the Mekong Delta virtually as their exclusive preserve. MACV and the NAVFORV recognised that, in order to deny the Delta to the enemy, it would be necessary to sever enemy supply lines by gaining control of the inland waterways and pro-actively searching out and destroying enemy troops and bases. This meant developing the means to transport and support ground forces of sufficient size to do the job.

The River Patrol Force (RPF), designated as Task Force 116 (TF-116), was thus created under Operation *Game Warden* to accomplish the patrolling task, while the Mobile Riverine Force, including the 2nd Brigade of the US Army's 9th Division, came into being to undertake the waterborne assault mission.²⁵ The RPF was headquartered at Binh Thuy, near Can Tho, on the Bassac River, and employed river patrol boats (PBRs) and well as Swift boats.

The Participants

The PBR was a 32-foot, rigid-hulled fibreglass boat, armed with twin .50-cal machine gun forward, a single .50-cal machine gun aft, a grenade launcher, and an M-60 7.62-mm machine gun plus hand weapons. For waterborne navigation and surveillance, it was fitted with a Raytheon 1900 radar. A water jet propulsion system gave it a top speed of 25 knots, as well as excellent manoeuvrability, and an 18-to-30 inch draft enabled operations in shallow rivers, where normally only flat-bottomed sampans could ply.²⁶ These boats operated with four-man crews from ten *Game Warden* bases, and were used to stop and search river traffic, as well as to insert US Navy Sea, Air, Land (SEAL) teams. TF-116 reached a peak strength of about 250 PBRs, before many of these boats were turned over to the Vietnam Navy in 1968, as the Vietnamese began assuming more river patrol responsibilities.



River patrol boat (PBR)

(Source: Cecil Martin)

TF-116 PBR efforts in working 24-hours-a-day seven-days-a-week in all weather conditions exceeded the US Army's extant support capability. US Army gunships were not equipped for, nor were their pilots skilled in, all-weather helicopter flying, particularly in both day and night operations, from a floating deck. Navy helicopter pilots, on the other hand, were trained for these conditions and were seen to cope better.

HELICOPTER ATTACK SQUADRON (LIGHT) THREE

Unable to acquire new UH-1H Iroquois helicopters, due to high demand from the rapidly evolving air mobile US Army, the US Navy had to be satisfied with second-hand UH-1B gunships. Equipped with these aircraft, the Helicopter Attack Squadron (Light) Three (HAL-3), callsign *Sea Wolf*, was formed in April 1967, following trials from mid-1966 with several detachments from California-based Helicopter Combat Support Squadron One (HC-1).²⁷ These gunships, commonly called 'Hueys', were fitted with four M-60 machine guns and two 2.75-inch, 7-shot rocket pods.

The employment of the 'Huey' gunships in direct naval air support of the PBRs solved a number of command, control and availability problems. During Operations *Market Time* (TF-115) and *Game Warden* (TF-116) it was a common sight for these gunship helicopters

Dreadful Lady over the Mekong Delta

to be seen operating from the decks of a landing ship, with several Navy PCF Swift boats tied-up alongside.



HAL-3 Sea Wolf UH-1 on USS Washoe County (LST-1165)
(Source: US Navy)

In September 1968, HAL-3, with a total of 16 UH-1s, had detachments at Nha Be, Bin Thuy, Dong Tam, Rach Gia and Vinh Long in the Mekong Delta.

MOBILE RIVERINE FORCE

The Mobile Riverine Force (MRF) was essentially a joint US Army-US Navy body tasked with conducting search-and-destroy operations against the Viet Cong in the Mekong Delta region.

Designated by the US Navy as Task Force 117 (TF-117), the MRF grew out of the Pacific Fleet's two river assault flotillas, formed at Coronado, California in September 1966. Recognising the restrictions imposed on land troop transport in the Mekong Delta and the absence of any substantive US Marine presence in the region, the US Navy assembled a force of 11 ships of the Mekong Delta 'Green Fleet' and 186 assault craft. This force was tasked to provide river-borne assault transport, primarily for specially trained, riverine-warfare capable troops of the US Army's 9th Infantry Division, but also for Vietnam Army, Marine, Regional Force and Popular Force soldiers.²⁸

The Participants



**USS *Vernon County* (LST-1161) supporting MRF with armoured
troop carriers and 'Monitors' alongside**
(Source: US Navy)

MRF ships, such as 4000-ton (fully loaded) barracks ships (APBs) USS *Colleton* and *Benevah*, served as floating support vessels known as mobile riverine bases (MRBs), moving up and down the major rivers of the Delta depending on the operational situation. They provided accommodation for deployed US Army battalions, Navy boat crews and joint staff and support personnel. A variety of US Navy river assault craft moored beside them for replenishment before launching operations from them.

The MRF's core watercraft was the US Navy's armoured troop carrier (ATC), a conventional LCM-6 landing craft, specially armoured to shield against the heavy fire of close-in combat and fitted with .30-calibre, .50-calibre and 20-mm machine guns. These vessels could traverse virtually any waterway with a depth of five feet or more, providing there was room to turn around. Typically, a full platoon of 40 fully-equipped Army infantrymen was carried into battle aboard each of these ATCs, and once the platoon was disembarked, instead of departing the area, the US Navy crews would often manoeuvre their craft to serve as a blocking force to prevent enemy escaping.²⁹

Dreadful Lady over the Mekong Delta



Armoured troop carriers (ATCs) on the Mekong River

(Source: US Navy)

The US Navy also converted other LCM-6 landing craft to support and protect the armoured troop carriers in their primary mission of landing troops at important beachheads. These included armoured ‘Monitors’ serving as the battleships of the riverine fleet, with heavy weapons such as automatic grenade launchers, 81-mm mortars, 40-mm cannon, and even a 105-mm howitzer in a forward turret, with the aim of staying on the scene, and engaging with the enemy once contact was made.³⁰



‘Zippo’ armoured troop carrier

(Source: Olive-Drab)

The Participants

Other modified ATCs, known colloquially as ‘Zippos’ (so-called after the popular cigarette lighter of the time), had flame-throwing weapons installed forward, suited to the fierce, close-quartered fighting in the undergrowth along the streams and canals of the Delta.³¹



Command and communications boat

(Source: US Navy)

Command and communications boats (CCBs), also converted LCM-6s, had a joint Army-Navy command post substituted for the ‘Monitor’s’ mortar pit, giving each Army battalion and Navy river squadron commander a communications centre at their continuous disposal, from which they could direct and coordinate the movement of their respective forces.³²

Some ATCs were modified by the addition of a helicopter pad over the bow, and these ‘micro-aircraft carriers’ were used for quick resupply and speedy evacuation of wounded personnel during combat. Four LCM-6s were also reconfigured as refuelling vessels, carrying fuel for both helicopters and small boats, with one of these also fitted with a helicopter landing pad.

Dreadful Lady over the Mekong Delta



ATC with Helicopter Pad

(Source: US Navy)

TF-117 also used assault support patrol boats (ASPBs), specifically designed and constructed for use in the MRF.³³ Capable of much faster speeds than other assault boats (15 knots versus 8 knots), the ASPB's roles included patrol, minesweeping, and escorting slower troop-laden boats.



Assault support patrol boat

(Source: US Navy)

However, the US Navy's first increment of these riverine assault boats was not due to arrive in Vietnam until March 1967. As the VC increased the tempo of their Tet-'67 (Vietnamese New Year) attacks against US and allied vessels in the Song Long Tau, the main shipping

The Participants

route between Saigon and the South China Sea, a decision was made to press the MRF into immediate service in February 1967, temporarily using boats borrowed from the Vietnam Navy, to conduct search-and-destroy operations in the RSSZ.

MINE CLEARANCE

Mine clearing forces were essential to the security of South Vietnam's waterways, particularly on the rivers giving access to Saigon, the country's most vital port. VC mining of the Song Long Tau, winding its way through the RSSZ, south-east of the capital, could have had a devastating effect on the war effort.

Consequently, on 20 May 1966, the US Navy established Mine Squadron 11, Detachment Alpha (Mine Division 112 after May 1968) at Nha Be, under command of TF-116, until mid-1968.³⁴ Fifty-six-foot wooden-hulled minesweeping boats (MSBs) were reactivated in the US, armed with machine guns and grenade launchers and fitted with a surface radar and minesweeping gear. After shipping to South Vietnam, they were used by Mine Squadron 11 for clearing explosives from the key waterways.

The US Navy also deployed subordinate units, consisting of three MSBs to Da Nang and Cam Ranh Bay, in the northern coastal region of South Vietnam. Detachment Alpha's strength increased in July 1967, when the first of six mechanised landing craft [LCM(M)], specially configured to sweep mines, arrived at Nha Be for RSSZ operations.

RAN clearance divers were also involved in similar work in support of the riverine operations. For more details, see the section on the Royal Australian Navy later in this chapter.

US NAVY SPECIAL WARFARE GROUPS

The following Naval Special Warfare Groups were involved with riverine operations.

UNDERWATER DEMOLITION TEAMS

US Navy frogmen from underwater demolition teams (UDTs) were involved in operations in the Mekong Delta, starting as advisors in 1961. Three UDTs (numbers 11, 12 and 13) served there, usually on six-month rotations. Their duties included beach and hydrographic reconnaissance, using two-man swimmer delivery vehicles (SDVs) and ply-wood landing craft personnel ramps launched from Swift boats, ships (for example USS *Cook*, LPR-130) and submarines (for example, USS *Tunny*, SS-282), as well as blowing up enemy hooches and bunkers.³⁵

SEA, AIR & LAND (SEAL) UNITS

Sea, Air & Land (SEAL) units were an outgrowth of, and an expansion on, World War II commandos and Navy frogmen who undertook beach clearance and underwater ship

Dreadful Lady over the Mekong Delta

protection duties. They were first formed during the Vietnam War when two separate units were created by the US Navy, with SEAL Team One located on the Pacific coast at Coronado, California, and SEAL Team Two on the Atlantic coast at Little Creek, Norfolk, Virginia.³⁶

SEAL platoons were sent to Vietnam in 1962 to undertake unconventional counter-guerilla warfare and to conduct clandestine operations in the maritime sphere of operations. The SEALs (SEAL Team One Detachment Bravo) were initially subsumed into covert US Central Intelligence Agency (CIA) operations, carrying out direct action missions, such as ambushes and raids, for example, to eliminate high value enemy personnel or bring them back for interrogation.



SEALS and their light support craft in the Delta

(Source: US Navy)

The SEALs advised and trained South Vietnam forces in I Corps from Da Nang and SEAL Team One Detachment Golf operated from Nha Be in support of TF-116's campaign in the Rung Sat Special Zone (RSSZ), helping to keep the Long Tau shipping channel open from the South China Sea to Saigon. SEAL Team Two contributed three platoons, two of which were stationed with the *Game Warden* units at Binh Thuy/Can Tho (IV Corps) and these units launched operations in the central Mekong Delta area. In 1969-70, one UDT and three SEAL platoons lived on a mobile support base in the Ca Mau Peninsula, carrying out day and night ambushes, hit and run raids, reconnaissance patrols, salvage dives and special intelligence operations.

Normally operating in six-man squads, the SEALs used landing craft, SEAL team assault boats (STABs), 26-foot armoured trimarans, PBRs, sampans, and helicopters for transportation to and from their target areas. Their landing craft ranged from the heavy SEAL support craft (HSSC), basically a much-modified 56-ft long LCM-6 mechanised landing craft with General Motors 6-71 diesel engines, the medium SEAL support craft (MSSC), a 36-foot aluminium, twin-engine boat, and the light SEAL support craft (LSSC), a 24-ft long, aluminium boat, with a shallow draft of around 18 inches of water when fully loaded. For very stealthy insertions and extractions on canals that were too narrow and shallow for the LSSC, the SEALs purchased sampans from the local Vietnamese.

SEAL deployments peaked at eight platoons, with the last departing Vietnam in 1971, followed by the last SEAL advisor in 1973, well after conventional US forces had withdrawn from the Delta.

The Participants

BEACH JUMPERS

Beach Jumpers were communications and deception experts who performed critical roles during World War II, diverting German troops from countering the D-day invasions. Their Vietnam-based descendants began with the creation of Beach Jumpers Unit One Team Twelve Detachment Delta in June 1966, comprising one officer and four enlisted men, assigned to COMNAVFORV to conduct psychological warfare operations such as propaganda leaflet drops and loudspeaker broadcasts in the Mekong Delta.

They later became Team Thirteen in December 1968, working from river patrol boats (PBRs) and supporting the US Army's 5th Special Forces ('Green Berets') A and B Teams and Navy SEALs. Team Thirteen's *Duffel Bag* teams, based at the mobile riverine base in the Ca Mau Peninsula, planted and monitored vibration and body heat activated sensors in a program later taken over by Operation *SEALORDS*.³⁷

US ARMY

RESTRICTED MOBILITY

In the late 1950s, the US Army adopted a revolutionary airmobile concept, where manoeuvrability in the field was to be greatly enhanced by rotary wing transport. The Vietnam War presented the first opportunity for this policy to be put in practice.³⁸ The concept evolved into dedicated airmobile divisions, such as the 1st Cavalry (Airmobile) and 101st Airborne Divisions, with around 400 organic helicopters in each, while conventional Army divisions were allocated an aviation battalion and an air cavalry troop.

In December 1961, in the full glare of world-wide media/TV publicity, the first two US Army Aviation transportation companies (57th and 8th) arrived in South Vietnam, with unarmed Boeing-Vertol CH-21 Shawnee helicopters, to uplift ARVN infantry troops into combat. Their first operational mission (Operation *Chopper*) was carried out on 23 December 1961 from Tan Son Nhut (Saigon) Airport into an area to the north of the airfield. This mission saw the first American helicopter loss of the Vietnam War, bringing home the need for airborne armed support as well.³⁹ Shortly afterwards, the first Bell UH-1 ('Huey') Iroquois gunship helicopters, fitted with machine guns, arrived to escort the Shawnees.⁴⁰ Ten thousand more 'Hueys' were later used in the conflict. Early success in airmobile operations was hard to come by, and in January 1963, at the Battle of Ap Bac, south of Saigon, the US Army's airmobile force suffered heavy casualties while landing ARVN infantry troops in a full pitched battle.

Dreadful Lady over the Mekong Delta



135th Aviation Helicopter Company/EMU 'Huey' over the Mekong Delta

(Source: Michael Stewart)

As more aviation assets arrived from the US, the US Army's Delta Aviation Battalion was set up at Can Tho, on the Bassac River (Song Hau Giang) in July 1963 to support ARVN forces. It expanded in October 1964 to become the 13th Combat Aviation Battalion, comprising three Aviation Companies—the 62nd and 114th at Vinh Long and 121st at Soc Trang, each flying UH-1B 'Hueys'. By 1971, US Army air assets operating in the Delta region had expanded to three combat air battalions.⁴¹

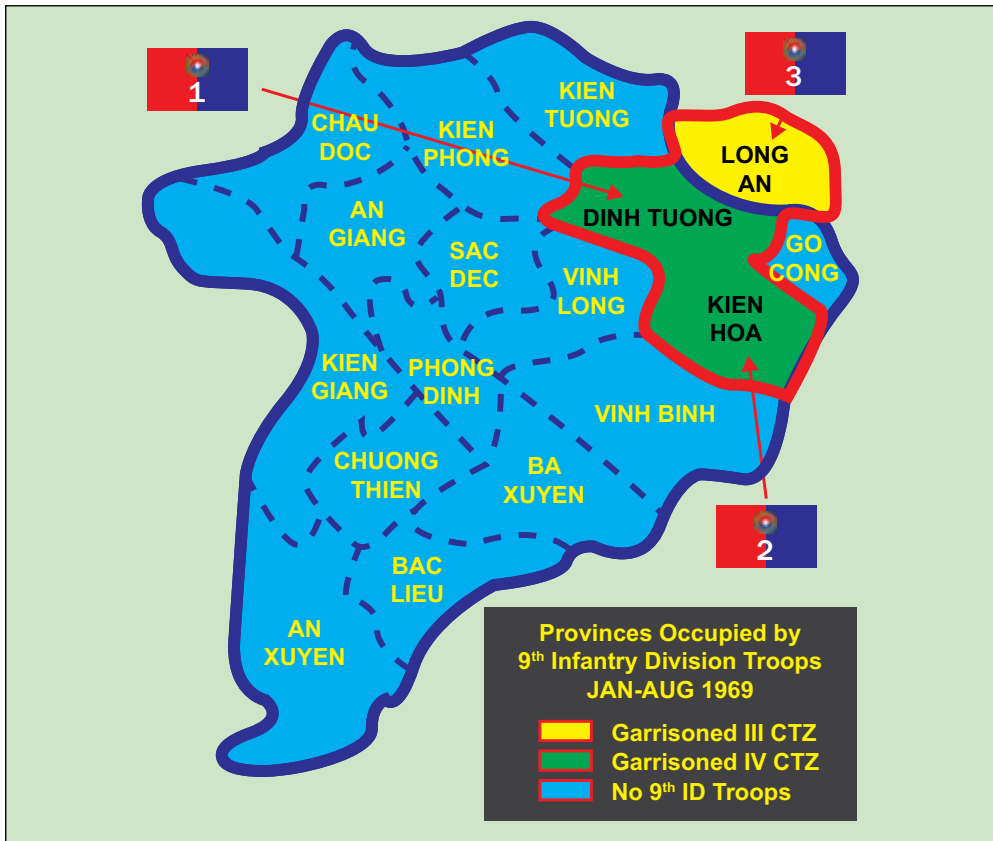
The initial presence was well below a full air mobile division strength, and highlighted the US Army's reluctance in part to commit a large aviation force, let alone a full air mobile division, to IV Corps. This reluctance was due to the triple-canopy jungle and expanses of swampy mangroves being seen as unsuitable for use as landing zones for large-scale conventional air assault operations.⁴²

Strategically, IV Corps was of far less importance than the regions closer to the communist north, even though it was predominantly under enemy control and afforded a dangerous gateway to the South Vietnam capitol of Saigon

However, not only did the US Army lack air mobility in the Mekong Delta, it was even further constrained in applying land power in IV Corps.

NINTH INFANTRY DIVISION

Three battalions of the 1st Infantry Division, US Army, arrived in Vietnam in mid-1965, together with units from the 1st Air Cavalry Division (Airmobile).⁴³ They were distributed mainly throughout the three northern military regions of South Vietnam (I, II and III Corps) and prior to 1967 there was no significant US ground force presence in the Mekong Delta (IV Corps Military Region) at all. Furthermore, not having engaged in internal river-based battles for a long time, the US Army had come unprepared for riverine warfare, despite the fact that the French before them were well versed in operating in this extremely challenging environment.



Map 2-2: US Army 9th Division locations, 1969
(Source: Bob Fischer)

In 1966, a joint riverine concept for a Mekong Delta mobile afloat force (MDMAF) was quickly cobbled together at Coronado, California by US Army and US Navy staffs. The US Joint Chiefs of Staff (JCS) promptly approved it, a doctrine was enunciated and hastily arranged riverine-style exercises were conducted, before any serious land forces headed for the Mekong Delta.⁴⁴

Late that year, at JCS and MACV direction, the 9th Division with 5000 troops in ten manoeuvre battalions, moved from the US to set up at a base camp called Bearcat located 20 miles north-east of Saigon.⁴⁵ It was the first US Army Division since World War II to be organised, equipped and trained specifically for deployment to an overseas combat theatre.

One of its three brigades focussed on III Corps operations, including working with the 1st Australian Task Force (1ATF) in Phuoc Tuy Province, while the other two were responsible for IV Corps, and for conducting riverine operations. However, the basic unit deployed to the Delta was really a battalion, as in reality only three of 9th Division's ten manoeuvre battalions were classified as riverine – the 3rd/47th and 4th/47th of 3rd Brigade and 3rd/60th of 2nd Brigade.

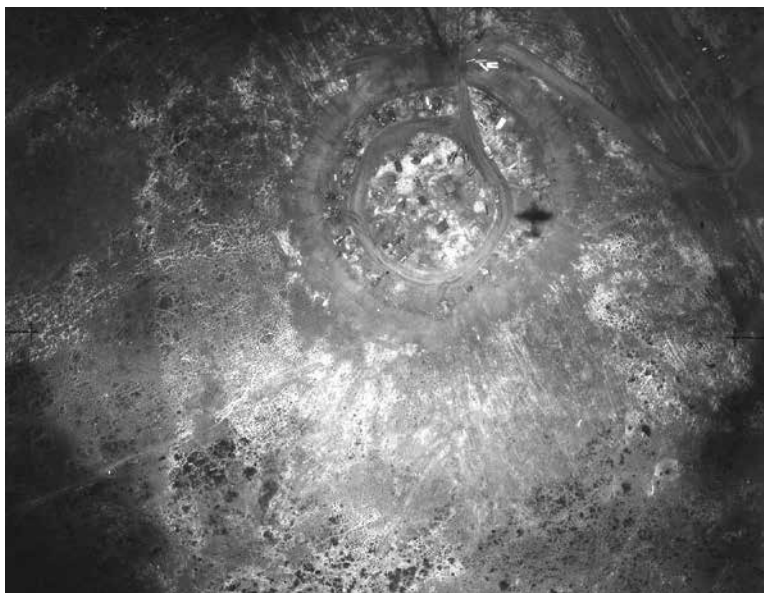
Dreadful Lady over the Mekong Delta

Initial battle hardening for 9th Division took place in III Corps, north of Saigon, with Operation *Colby* in January 1967 and Operation *Palm Beach* from January to May 1967.⁴⁶ The division then became the first and only major American Army outfit to establish a 'permanent' base in the Mekong Delta, when 3rd Brigade moved to a newly created site, built on the banks of the My Tho River 5 miles west of My Tho city. It was named by General Westmoreland, COMUSMACV, '*Dong Tam*', meaning 'united hearts and minds'.

Further operational experience was gained on Operation *Junction City* in III Corps in March 1967, and Operation *Paddington* with the 1ATF in Phuoc Tuy Province in July 1967. Over the next year, an area that received special attention was the Cam Son Secret Zone, as the 9th Division conducted a series of probes into enemy territory under Operation *Coronado*, in conjunction with US Navy TF-117, ARVN Rangers, Vietnam Marines and ARVN Infantry.

From mid-1967, the 2nd Brigade, 9th Division became the US Army's designated contingent of the Mobile Riverine Force (MRF), as troops lived on board the ships of TF-117 and were transported throughout the Mekong Delta on MRF landing craft.⁴⁷

With the counter-insurgency war in South Vietnam being widely dispersed and bereft of either a front line or rear areas, the ground army was unable to use conventional means of combatting an elusive guerrilla enemy. For example, the US Army was forced to use its artillery assets on a fire base concept.⁴⁸ In IV Corps, the US Army's 9th Division was even denied the luxury of dry ground upon which to create fire bases, and so had to resort to being innovative and placing its artillery pieces on the water, or flying them into battle.



**No 2 Squadron Canberra shadow over Fire Support Base Le Loi,
Phuoc Tuy Province, 1970**
(Source: No 2 Squadron Photographic Section)

The Participants

In late January 1968, as the Vietnamese celebrated New Year (Tet '68), the enemy became over-exposed in launching conventional attacks, aimed at convincing the local population to rise up against the South Vietnam Government. A strong reaction by 9th Division and the MRF forced them onto the defensive, from close to Saigon down far into the Delta. Following heavy fighting in the U Minh Forest area, the VC reverted to small unit guerrilla tactics.⁴⁹

Ninth Division conducted Operation *Speedy Express* from December 1968 to May 1969, resulting in large numbers of Vietnamese killed, but with very few weapons captured and minimal US troop casualties. This effort raised questions, at some time after the event, as to how many civilians died, and whether or not they were included in enemy body counts.⁵⁰

Extensive night fighting occurred in 9th Division's northern IV Corps area during 1969, as 'search-and-destroy' missions succeeded in killing many enemy. However, US President Nixon, having begun peace talks with the communists in Paris, ordered US forces to begin withdrawing from Vietnam and the 1st and 2nd Brigades of 9th Division departed in August 1969, while the 3rd Brigade remained on for a further year.

SPECIAL FORCES

Detachments of the 5th Special Forces Group, the US Army's 'Green Berets', served in IV Corps, although headquartered in II Corps at Nha Trang. Much of their time was spent in undertaking covert operations across the Vietnam-Cambodian border aiming to disrupt North Vietnamese Army (NVA) infiltration into the Mekong Delta.

FIXED WING ARMY AVIATION

Eleven flying units of the US Army, with their O-1 Bird Dogs, were spread throughout South Vietnam with the primary purpose of undertaking airborne visual reconnaissance (VR), looking for enemy movement on the ground and providing artillery observation/spotting and adjustment/direction services to both US Army and ARVN artillery.

One of these units, the 220th Reconnaissance Airplane Company (callsign *Catkiller*), located in the northern region of South Vietnam, was officially authorised to direct air strikes, while the others occasionally provided forward air control (FAC) services such as directing Army gunship flights against active enemy targets.⁵¹

The 184th Reconnaissance Airplane Company (callsign *Non-Stop*) supported the 9th Division in the Mekong Delta, including flying counter-mortar watches over Dong Tam, adjusting artillery fire, directing gunships onto targets, as well as supporting ARVN artillery, US Navy SEALs and spotting for US Navy *Sea Wolf* 'Hueys'.⁵²

Dreadful Lady over the Mekong Delta

As organic armed scout helicopters flying in pairs proved capable of locating and engaging targets quite well, the US Army aviation organisation in the Mekong Delta tended to deploy its FACs, in their Cessna Bird Dogs, to more distant regions not being reconnoitred by cavalry troops. These assignments were deconflicted daily between the 9th Division and the 164th Combat (Delta) Aviation Group, while Army air cavalry units were also advised where US Navy aviation units would be operating, with the aim of avoiding duplication of air coverage.

ARMY OF THE REPUBLIC OF VIETNAM

When the French departed Vietnam in 1954 and the country was divided into North and South, the new South Vietnam Government created the Army of the Republic of Vietnam (ARVN) in 1955 from units of the previous Vietnamese National Army. At this time, the Viet Minh/Viet Cong controlled much of the Mekong Delta region, as they supported peasants in taking over fertile regions vacated by fleeing owners. The political involvement of ARVN leaders in destabilising the government, together with the poor showing of the ARVN's 7th Infantry Division in the February 1963 Battle of Ap Bac, gave the Americans cause for concern.⁵³

Four years after US advisors were sent to Vietnam to assist in combating the communists, the US Army finally took the initiative in land fighting around Saigon and to the north. However, the ARVN infantry in the Mekong Delta, partly as a result of Ap Bac '63, were seen to be ambivalent towards confronting the enemy, and were virtually ignored in terms of US material support, leaving them ill-equipped to fight communist guerrillas armed with the latest Russian weapons.⁵⁴

By 1966, the ARVN had 38 000 combat troops in IV Corps, comprising mainly three infantry divisions totalling 31 000. The 7th Division was based at My Tho (south-west of Saigon), the 9th at Sa Dec (south of the Plain of Reeds) and the 21st at Bac Lieu (in the south-east). By 1967, all land operations had become allied and combined with the ARVN units working with the US Army's 9th Division.⁵⁵

The Participants



Map 2-3: ARVN Divisions in IV Corps
(Source: USAF)

Dreadful Lady over the Mekong Delta

It wasn't until the appointment in May 1967 of General Creighton Abrams, as Deputy Commander, US Military Assistance Command Vietnam that the ARVN started to get proper US support, including re-arming with M-16 rifles.⁵⁶ The ARVN passed its first real test in the 1968 Tet Offensive. From then on, the performance of the ARVN improved, even as the US Army drew down its effort. Between 1968 and 1972, South Vietnam armed forces numbers grew by more than 25 per cent to over 1 million in uniform.⁵⁷

Nevertheless, there was still considerable mistrust of the South Vietnam Army amongst the allies, and Australian FACs were concerned about this. RAAF pilot Flying Officer Gary ('Huck') Ennis, who served with US 9th Division in the Ben Tre area in northern IV Corps from June-August 1969, observed the situation first hand. He stated, 'There was a clear lack of commitment on the part of the South Vietnam Army, the ARVN, towards taking the necessary ground action to win the war.'⁵⁸ Hackworth was even more scathing, noting how 'everyone hated the ARVN' as his GIs saw their buddies wounded or killed, while the ARVN 'sat back and let us fight their war'.⁵⁹

Throughout the 1960s, the ARVN was supported by two forms of militia dedicated to local security. Regional Forces (RF) reported to the local province chief, manned regional outposts and defended critical posts such as bridges and ferries, while Popular Forces (PF) (previously called Civil Guard and Self-Defence Forces) served under district chief control, protecting their home villages from VC/NVA attacks. Under General Westmoreland's search-and-destroy strategy, these forces remained separate and apart from the regular ARVN, but when General Abrams took over as COMUSMACV they were incorporated into the ARVN under his clear-and-hold strategy.

Left alone in the Mekong Delta after 1969, the ARVN tried to do its best. By late September 1973, it had driven the 1st Division of the North Vietnam Army (NVA) out of the 'Seven Mountains' redoubt, on the Cambodian border, inflicting such heavy casualties that the enemy division was disbanded with its surviving troops parcelled out to other units.⁶⁰ In early 1974, the ARVN's 7th Division launched a major operation to drive NVA units out their Tri Phap base area further north in the Parrots Beak area, also along the Cambodian border, inflicting heavy casualties. Tri Phap, with hardened defensive positions, had never been penetrated throughout the war, and this humiliating defeat was hidden by communist authorities lest their troops became demoralised.⁶¹

However, by then, as the US radically reduced aid to its South Vietnam ally, while the USSR and China were doing precisely the opposite with North Vietnam, the war was lost. Despite the ARVN 18th Infantry Division's courageous stand at Xuan Loc, and the achievement of its 7th Division troops in defeating an NVA attempt to cut the sole highway connecting the Mekong Delta to Saigon, the flood of troops and munitions from the north was inexorable.⁶²

The Participants

Sir Robert Thompson, a British counter-insurgency expert advising the US Army in South Vietnam, while fully cognisant of ARVN's shortcomings and growth pains, concluded at the time:

'They (RVNAF and the GVN) surmounted national and personal crises which would have crushed most people and in spite of casualties which would have appalled and probably collapsed the United States, they could still maintain over one million men under arms after more than ten years of war. The United Kingdom did just that, proportionately, in 1917 after three years of war but never again. The United States has never done it.'⁶³

VIETNAM NAVY

The Vietnam Navy (VNN) evolved by courtesy of the French, and, with the help of American advisors, grew to one of the world's largest navies by the early 1970s, with 42 000 personnel, 672 amphibious ships and craft, 20 mine warfare vessels, 450 patrol craft, 56 service craft and 242 junks.⁶⁴ For 20 years, from 1955 to 1975, it fought against the communists with considerable resolve, being recognised for its leadership maturity by Vice Admiral Zumwalt in the early 1970s when Operation *Giant Slingshot* was turned over to the Vietnam Navy command.⁶⁵

In 1959, North Vietnam began to insert troops and equipment into the south using small boats that moved through Vietnamese coastal waters. To counter this, the Vietnam Navy organised a coastal junk force of 200 motor-propelled and sail junk boats, manned by Regional Force (RF) personnel and local fishermen, who kept watch along the 1200-mile coastline.⁶⁶

Vietnam Navy units involved in open sea and coastal patrol missions operated in zones corresponding with the Army's I, II, III, and IV Corps military regions, while Coastal Force junks patrolled the offshore waters from 28 bases along the coast, with operations directed from the five coastal surveillance centres described previously in the section on US Navy/Operation *Market Time*.

The Vietnam Navy's River Force, organized into river assault groups (RAGs), based on the French model of *Dinassault* (Naval Assault Divisions), initially served South Vietnam Army divisions closest to its Mekong Delta naval bases at My Tho, Vinh Long, Can Tho and Long Xuyen.⁶⁷ In the early 1960s, the River Transport Escort Group was created to protect vital foodstuffs being convoyed to Saigon, and the River Transport Group was formed to move Army forces throughout the Mekong Delta.

The River Force received from the US a fleet of smaller vessels, including specially converted mechanised landing craft (LCM-6s) that served as monitors, command boats, troop transports, minesweeping boats, patrol vessels, and fuel barges. The US also provided river sailors with 27 American-built river patrol craft (RPC), but these vessels proved to be too noisy, underarmed and easily slowed by river vegetation.⁶⁸

Dreadful Lady over the Mekong Delta

Armed with these resources, the VNN played an increasing role in the fight for South Vietnam. Along with US Navy forces, the Fleet Command and Coastal Force seized or destroyed thousands of junks, sampans, and other craft ferrying enemy munitions and personnel along the coast. The Coastal Force also carried out many amphibious raids, patrols of shallow inlets and river mouths, and troop lifts. These operations played an important part in the allied campaign to deny the enemy easy access to the coastal regions.

In addition to offshore patrol, Fleet Command ships patrolled the larger Mekong Delta rivers and protected merchant ships moving between the sea and the Cambodian capital of Phnom Penh.⁶⁹ They met with some resistance in 1966-7 from enemy river mines, which sank several river craft and mine-sweeping launches, the latter in the RSSZ. Under Vice Admiral Zumwalt's Program ACTOV (name derived from acronym for 'accelerated turnover to Vietnam'), the VNN took sole responsibility for river assault combat operations. The joint US Army-US Navy Mobile Riverine Force lowered its colours in 1969 and transferred 64 riverine assault craft to the VNN.

The VNN Fleet was divided into three task groups.⁷⁰ Comprising patrol gunboats and landing ships (infantry and support), Task Group I (TG-I) patrolled South Vietnam territorial waters to stop enemy infiltration from the north and provided naval gunfire support (NGFS) in combined operations with friendly navies.

Task Group II (TG-II) conducted operations in rivers located in III Corps, IV Corps and the National Capital Special Zone, using landing ships (tank and medium), oil tankers, landing craft, a supply ship, support ships and a repair ship. They provided transportation, amphibious operations, supplies, repair and maintenance services to gunboats, and gunfire support in operational areas. TG-II's roles also included medical assistance, and providing civilian psychological and political warfare programs. The group had two hospital ships equipped with X-ray facilities, dental care units, labs and clinics. These ships serviced villages located along the coast and rivers in the Mekong Delta.

Task Group III (TG-III) with its Tactical Mobile Sea Headquarters, operated its main force of ocean-going destroyers, frigates and escort patrol vessels, patrolling the open sea further out against enemy infiltration. It also participated in combined operations and provided NGFS.

A VNN Amphibious Force was formed in June 1969 to replace the US Navy's Task Force 117. Operating in the Mekong Delta, it comprised command and control boats (CCBs), assault support patrol boats (ASPBs), landing craft monitors and armoured troop carriers (ATCs).

The River Patrol Force was formed in October 1969 and comprised 14 river patrol groups, divided into six river patrol task groups, with a primary role of patrolling, securing the safety of the rivers and preventing VC infiltration through the Task Force's AOs, from the Cambodia-Vietnam border. Each river patrol group was equipped with very high speed and manoeuvrable PBRs able to navigate narrow creeks and shallow waters.

The Vietnam Marines Corps, while ostensibly a Navy organisation was, in fact, part of the Reserve Forces of ARVN General Headquarters.⁷¹

The Participants

The Vietnam Navy's Logistics Command Headquarters, with seven naval support bases at Da Nang (I Corps), Cam Ranh Bay (II Corps), Cat Lo and Nha Be, (III Corps) and An Thoi, Dong Tam and Binh Thuy (IV Corps), supported operational units with shipyard, supply and repair facilities.⁷²

Between 1968 and 1970, the VNN almost doubled in size from 18 000 to 32 000.⁷³ It performed well during the allied push into Cambodia in May 1970 when a combined Vietnamese-American naval task force steamed up the Mekong River under Vietnamese command and secured control of that key waterway from communist forces. The combined flotilla stormed enemy-held Neak Luong, a strategic ferry crossing point on the river, with the Vietnamese contingent of river combatants pushing on to Phnom Penh.

By 1970, as the US Navy drew down operations throughout South Vietnam, the VNN accepted 293 river patrol boats and 224 riverine assault craft from NAVFORV, grouping them into river assault interdiction divisions (RAIDs), river interdiction divisions (RIDs), and river patrol groups (RPGs) with American advisors. In 1970-71 the VNN also took over coastal and high seas surface patrol operations under the US Navy's Program *ACTOV* and the US Coast Guard's *SCATTOR* (name derived from acronym for 'small craft assets, training and turnover of resources') program. Vessels transferred to the VNN included four Coast Guard cutters fitted with 5-inch guns, a radar escort picket ship *USS Camp* (DER-251), a tank landing ship, *USS Garrett County* (LST-786), and various harbour control, mine craft and logistic support vessels.⁷⁴

In the midst of this activity, American and Vietnamese naval forces managed to sink or turn back all but one of eleven North Vietnam ships attempting to infiltrate contraband into South Vietnam during 1971. By August 1972, the VNN had responsibility for the entire coastal patrol effort, when it took possession of the last of 16 American coastal radar installations.

The cease-fire agreement signed on 27 January 1973 in Paris to re-establish peace for Vietnam was promptly violated by the North Vietnam communists by their attacks on ARVN units and VNN vessels. Despite fighting courageously, the VNN was compelled to reduce its overall operations by 50 per cent and river combat and patrol activities by 70 per cent, as the US withdrew support. To conserve scarce ammunition and fuel, the Saigon Government laid up over 600 river and harbour craft and 22 ships. Fortunately, the enemy did not target the waterways during this period, but the respite was short lived.⁷⁵

On 19 January 1974, VNN ships fought a Chinese contingent which tried to occupy the Parcel Islands by force. However by the following year, the North Vietnam Army had seized all of northern and central South Vietnam, bypassing VNN concentrations.⁷⁶ Vietnam Navy's ships and sailors soon joined the hurried exodus of troops and civilians from I and II Corps areas. With the fall of Saigon on 30 April 1975, many of the VNN's ships and craft put to sea and gathered off Con Son Island, southwest of Vung Tau. The flotilla of 26 VNN and other vessels, with 30 000 sailors, their families and other civilians on board, joined the US Seventh Fleet, when it embarked the last of the refugees fleeing South Vietnam and then headed for the Philippines.

OTHER ALLIED PARTICIPANTS

US AIR FORCE

The US Air Force (USAF) is covered in Chapter 4.

US MARINE CORPS

Colonel Victor Croizat of the US Marine Corps (USMC) was the first key US military advisor posted to the Mekong Delta, and in 1954 he persuaded South Vietnam President Diem to establish the Vietnam Marines, in addition to the Navy, which had been created by the French in 1952.⁷⁷

In preparation for later I Corps operations from Da Nang, Marine Helicopter Transport Squadrons 362 (HMM-362) (from April to July 1962) and 163 (HMM-163) (July to September 1962), were temporarily deployed to the Mekong Delta. They flew Sikorsky UH-34 Choctaw unarmed troop-carrying helicopters from Soc Trang, in support of the ARVN's 7th Infantry Division, executing Operation *Lockjaw* in conjunction with the US Army's 57th Aviation Transportation Company's fleet of helicopters based in Saigon, as well as supporting ARVN 9th and 21st Divisions.⁷⁸



USMC UH-34 Choctaw
(Source: USMC)

From March 1965 to October 1966, the US Marine Corps undertook a range of amphibious assaults along the central and northern coast of South Vietnam, pushing the VC and NVA inland after initial success at Chu Lai with Operation *Starlite*.⁷⁹ The USN Amphibious Ready Group and USMC Special Landing Force (ARG/SLF) comprised an amphibious assault ship

The Participants

(LPH), a dock landing ship (LSD), an attack transport (APA) or an amphibious transport dock (LPD) and a tank landing ship (LST). It was supported by the US Navy Seventh Fleet (with carrier air cover, naval gunfire support, logistics supply and medical support) and came under the operational control of the Seventh Fleet's Commander Amphibious Task Force (Commander Task Force 76).

The Marine SLF, with Medium Helicopter Squadron 362 (HMM-362), embarked on the *USS Princeton* (LPH-5) while the other ships carried the ground element—an infantry battalion landing team, reinforced with artillery, armour, engineer and other support units. The force employed a mix of helicopter landings and/or 41 organic Alligator tracked landing vehicles (LVT). Underwater demolition teams, SEALs, beach master, and special communications Beach Jumpers units supported operations on shore.

The first large-scale, coordinated operation involving both Seventh Fleet and Vietnam Navy forces was Operation *Jackstay* (26 March to 7 April 1966) in which the ARG/SLF, with other US and South Vietnamese units, attacked the VC in the Rung Sat Special Zone (RSSZ) swamp surrounding the vital shipping channel to Saigon, but with little success.⁸⁰ From June to September 1966, in a series of *Deckhouse* operations, the ARG/SLF joined Army or Marine amphibious force troops in lengthy multi-battalion combat actions inland. With the exception of Operation *Deckhouse IV*, there was little result from these operations, as the enemy declined to stand and fight.⁸¹

From October 1966, the growing menace of NVA units moving south through the DMZ, drew the ARG/SLF to the northernmost reaches of South Vietnam. Committed fully to I Corps, the USMC then rejected a request by COMUSMACV, General Westmoreland, to provide littoral and riverine warfare forces in the Delta. Whether or not the presence of a major USMC force would have made a significant difference to the outcome of riverine operations in IV Corps can only be a matter for conjecture. Nevertheless, from a tactical air (TACAIR) perspective, the conduct of air operations in the Mekong Delta could well have been problematic, judging by air control problems experienced in the siege of Khe Sanh in Tet '68. Not only were there overlapping USAF, USMC and US Army air control systems, the Marines were possessive of their own organic air power and the US Army was wary of losing its helicopters to the USAF.⁸²

In 1967, 25 amphibious assault operations took place, all in I Corps, except for Operation *Deckhouse V* which was the first and only one in IV Corps. The primary objective of *Deckhouse V* was to secure enemy prisoners. In January 1967, the combined seaborne and heli-borne force of the 1st Battalion, 9th Marines and the Vietnam Marine Brigade Force Bravo (3rd and 4th Battalions) assaulted an area of suspected VC concentrations in the Thanh Phu Secret Zone, on the coast between the Song Co Chien and Song Ham Luong reaches of the Mekong River in Kien Hoa Province. The assault force was supported by HMM-362's now mixed force of UH-34 Choctaw and Boeing-Vertol CH-46 Sea Knight helicopters, operating from the *USS Iwo Jima* (LPH-2). Impeded by low tides ashore, poor joint US Navy and USAF collaboration on the use of air assets and very rough seas, the assault was not considered a

Dreadful Lady over the Mekong Delta

great success, resulting in 21 VC killed in action (KIA), two small arms workshops destroyed, 44 weapons and 42 tons of rice captured, while seven US Marines died.

Throughout the Vietnam War, very small Marine teams provided naval gunfire support (NGFS) spotting services for US Navy and RAN ships firing broadsides from off-shore against land-based enemy targets. Known as ANGLICOs (Air Naval Gunfire Liaison Company), these naval gunfire liaison teams, often only one person, operated in the RSSZ, Can Tho (supporting the Delta Military Assistance Command [DMAC] and US Senior IV Corps advisor), Tra Vinh (supporting ARVN 7th and 9th ARVN Divisions), Bac Lieu, Vi Thanh and Ca Mau (ARVN 21st Division). They also flew on gunfire support missions with a variety of units including US Navy's Light Attack Squadron Four (VAL-4) *Black Ponies*, USAF FACs, US Army Reconnaissance Airplane Companies and the Australian Army's 161 Independent Reconnaissance Flight in Phuoc Tuy Province, III Corps.

US COAST GUARD

The US Coast Guard supported the US Navy from 1965 to 1971, primarily in manning the inner coastal barrier around South Vietnam, undertaking surveillance and stopping NVA infiltration with weapons and supplies by sea.⁸³

In early 1965, COMNAVFORV recognised the need for supplementary Coast Guard units to assist in maintaining surveillance and patrols on the inland and coastal waters of South Vietnam. Seventeen 82-foot patrol boats or cutters (WPBs) were made available and deployed from the US on merchant vessels to Subic Bay, Philippines. US Coast Guard crews joined them and Coast Guard Division 12 departed for Da Nang on 16 July 1965 to cover the east coast of Vietnam. Eight days later, Division 11 sailed for An Thoi, on Phu Quoc Island, in the Gulf of Thailand and became responsible for the south-west coast.

Not long after, Task Force 115 (under Operation *Market Time*) was established on 30 July 1965, with the coastal surveillance centres mentioned above, one in IV Corps alongside the US Navy Swift boat base at An Thoi.⁸⁴ As such, the Coast Guard cutters, covering the inner coastal barrier, reported to US Navy minesweepers or destroyer escorts patrolling the outer barrier. In its first month of operation, Division 11 boarded more than 1100 junks and sampans and inspected over 4000 Vietnamese craft. Nine additional cutters (constituting a new 13th Division) sailed from Subic Bay to Cat Lo on 18 February 1966, to plug a barrier gap in the south-east.⁸⁵

The Participants



USCG Cutter *Point Comfort* inspects junk
(Source: Frank Borzage, US Coast Guard)

Early in 1967, US Navy forces assigned to Operation *Market Time* and other operations were being stretched thin, so the Coast Guard was asked to provide five high-endurance, shallow-draft cutters for duty with the Coastal Surveillance Force. Upon arrival in May 1967, the cutters were assigned to the Gulf of Thailand providing 5-inch naval gunfire support for US forces in a village on the Song Ong Doc and logistic support to USCG WPBs and USN PCF Swift boats on patrol.⁸⁶

For the next three years, until the Vietnamization programs got under way, the USCG provided excellent service to COMNAVFORV. On January 1969, all 26 USCG cutters began transferring to the Vietnam Navy, with the last two handed over by August 1970.⁸⁷

VIETNAM AIR FORCE

The French began training Vietnam Army cooperation pilots in 1952. The Vietnam Air Force (VNAF) was officially created in January 1955, just as the French left Vietnam. By 1974, it had grown into the world's sixth largest air force.⁸⁸ French instructors for both pilots and mechanics remained on until late 1956, when the US then took over. Sixty nine Grumman F-8F Bearcat fighters were transferred from the US to the VNAF, followed later by North American T-28 Trojan piston-engine trainers, which could also carry a small bombload. Sikorsky H-19 Chickasaw helicopters and later H-34 Choctaws were also provided.

Dreadful Lady over the Mekong Delta



VNAF A-1 Skyraider
(Source: VNAF)

A USAF advisory group helped the VNAF expand in 1962 from 5600 men, seven squadrons and 140 aircraft to 13 000 men, 16 squadrons and 393 aircraft in 1965. From 1966 to 1968, an additional 6000 men were added and the number of squadrons grew to 20. A few VNAF pilots were trained briefly in Martin B-57 Canberra bombers in 1965, but this program was quickly discontinued. In October 1965, the VNAF received its first modern UH-1 'Huey' Iroquois turbine-powered helicopters, A-1 Skyraider light attack aircraft and A-37 Dragonfly light jet attack aircraft. In addition, they were equipped with a squadron of Northrop F-5 'Freedom Fighters' which had been developed under a US-Government sponsored export program. By late 1972, the VNAF operated 18 squadrons equipped with 500 new helicopters—one of the largest helicopter fleets in the world.

In IV Corps, following the creation of Binh Thuy air base by the US Army in 1965, four VNAF O-1 Bird Dog FAC and four UH-1 'Huey' helicopter squadrons were housed there. A further two helicopter squadrons were based at Soc Trang—one of CH-47 Chinooks and the other UH-1 Iroquois. Sticking close to the capital Saigon, partly for political reasons, VNAF transport and fighter squadrons regularly flew out of Tan Son Nhut and Bien Hoa airfields.

In 1970, the VNAF manned six fighter/attack squadrons totalling 115 aircraft, comprising one of F-5s at Bien Hoa, three A-37 Dragonfly squadrons (previously equipped with A-1 Skyraiders), one each at Nha Trang, Binh Thuy and Da Nang, and two A-1 Skyraider squadrons at Bien Hoa.

In February 1969, the VNAF possessed 17 per cent of the total number of strike fighter aircraft in South Vietnam and conducted 18 per cent of total sorties. A year later, with 24 per cent of aircraft, they were flying 41 per cent of the sorties.

ROYAL AUSTRALIAN NAVY

It is quite feasible that, without being aware of each other's presence, Royal Australian Navy and No 2 Squadron service personnel were involved in attacking the same enemy targets in IV Corps, at the same time, during their respective tours of duty between 1967 and 1971.

The Participants

FLEET AIR ARM

As the demand for helicopter support in South Vietnam increased, the Australian Government responded to a request from the US Government by creating the Royal Australian Navy Helicopter Flight Vietnam (RANHFV) in July 1967.⁸⁹ Over a four-year period, four contingents of pilots, observers, other aircrew, technical sailors/mechanics and administrative personnel were sent to Vietnam from 723 Squadron, Naval Air Station, Nowra. They were integrated into the US Army's 135th Assault Helicopter Company (135th AHC) in IV Corps—the combined entity being known as the Experimental Military Unit (EMU). It became operational at Vung Tau in October 1967 and was the only fully integrated multi-national helicopter company fighting in South Vietnam. In addition to the RAN personnel serving with EMU, up to eight RAN helicopter pilots served in Vietnam with No 9 Squadron RAAF from 1968 to 1969.

The EMU provided 'Huey' UH-1D and UH-1H troop-carrying helicopters ('slicks', with callsign *Emu*) and UH-1C gunship helicopters (callsign *Taipan*) to support land units working in both III and IV Corps, including the ARVN's 7th Division, the US Army's 9th Division, the US Marine Corps and the 1st Australian Task Force.

The 135th moved from Vung Tau to Blackhorse base camp, south of Xuan Loc, in December 1967, then to Bearcat, 20 miles north-east of Saigon, in November 1968. Although both base camps were in III Corps, most of the unit's tasking was in support of the ARVN, deep in IV Corps, which demanded a one-hour transit and fuel stop at Dong Tam en route. Finally and sensibly, the unit relocated to Dong Tam, in the Mekong Delta, in September 1970, taking up the slack as other US aviation units in IV Corps deactivated. While continuing to support 7th ARVN Division in Kien Hoa Province in the north-east of IV Corps, the EMU was simultaneously tasked to fly in support of the 21st ARVN Division based at Vi Thanh in the south, as well as the 9th ARVN Division based at Sa Dec, further north, again requiring long range travel. The squadron finally moved to Di An, Binh Duong Province, 20 miles north of Saigon, just before the last RAN contingent returned to Australia in June 1971.⁹⁰

By 1969, a typical daily deployment consisted of ten 'slicks', two teams of two gunships and a command and control helicopter (callsign *Charlie Charlie*) departing base at dawn, collecting an infantry unit, conducting a combat assault and returning the unit to their base before dark. Other roles, particularly from 1970 onwards, included dawn-and-dusk assaults and night hunter-killer patrols (which consisted of one 'slick' armed with flares, two gunships and a *Charlie Charlie* armed with a high-powered searchlight and a twin .50 calibre machinegun). They also carried out joint operations with the US Navy SEALs which typically involved locating and capturing senior VC personnel.

The RAN lost four killed and ten seriously injured over four years with the EMU, with three deaths among the first contingent (October 1967 - October 1968).

DESTROYER FORCE

RAN destroyers rotated from Australia in providing naval gunfire support (NGFS), in conjunction with US Seventh Fleet ships and US Marine Corps ANGLICO spotters, mainly in and around the Demilitarised Zone between North and South Vietnam, but also in IV Corps. On her second tour of duty in Vietnam waters, HMAS *Hobart* conducted the first RAN NGFS off the Mekong Delta, supporting 9th ARVN Division for one week in August 1968, while anchored off My Tho, Kien Hoa coast. On 22-23 September 1968, she anchored five miles offshore from Song Hau Giang (Bassac River), to fire against a bunker complex on the Vinh Binh coast.⁹¹ When HMAS *Perth* replaced HMAS *Hobart* on Vietnam duty in November 1968, she provided support for 7th and 9th ARVN Divisions in IV Corps for several short periods, up until the end of 1968.

In April 1969, HMAS *Brisbane* joined Operation *Market Time* activities in the South China Sea, freeing up smaller vessels for Operation *SEALORDS* riverine warfare tasks. In early May, *Brisbane* provided NGFS off Vinh Binh Province, including landing zone preparation work in direct support, for the first time, of 9th ARVN Division troop operations in IV Corps. She also supported the US Special Forces 5th Mobile Strike (*Mike*) Force, ARVN Regional Forces and regulars, off Phu Quoc Island in the Gulf of Thailand on 5 May 1969, using her 5-inch guns as a substitute for the lack of ground artillery in the region.⁹²



Damage to HMAS *Brisbane*'s forward 5-inch gun,
off Vietnam, 22 July 1969
(Source: Rosey Kendall)

The Participants

HMAS *Hobart* on 11 July 1970 anchored off Tan Hoa district, east An Xuyen Province, IV Corps, and supported 9th US Division and 21st ARVN Division with NGFS, against 95th NVA Regiment and local VC units. She then supported 21st ARVN Division, off Kien Giang province, on the other side of the Ca Mau Peninsula. On 19-21 July 1970, *Hobart* guarded a mobile advanced tactical support base (MATSB) (described in Chapter 3 under Operation *Sea Float*) in the Song Ong Doc, firing on VC detected by US Navy SEALs and *Duffel Bag* electronic sensors.⁹³

On 2 December 1970, HMAS *Perth* positioned off An Xuyen Province, provided NGFS against VC positions in the U Minh Forest in a combined operation with land troops of the 21st ARVN Division and helicopter gunships. She was credited with one secondary explosion. On 5 December 1970, *Perth* fired against VC engineering shops and a base camp off Hon Da Bac islet, attacking troop positions and canal targets while supporting 33rd Regiment, 21st ARVN Division. Gunfire from *Perth* accounted for two enemy killed in action (KIA) on 11 December 1970 and an additional enemy KIA on 13 December 1970. HMAS *Perth* also served as a communications link for Army units ashore, before departing Vietnamese waters on 20 December 1970.⁹⁴

Returning to Vietnam from a Hong Kong Christmas stay-over, *Perth* served from 15 January to 2 February 1971 off IV Corps. On 17 January 1971, she was near Tan An, providing NGFS against a VC ambush site. She sailed to Hon Rai Island off Kien Giang Province and provided air-spotted, harassment and interdiction (H&I) NGFS against VC positions in support of 21st ARVN Division.⁹⁵

HMAS *Brisbane* was positioned off IV Corps coast from 8 to 15 April 1971 and after supporting the 1st Australian Task Force in the Long Hai Mountains in Phuoc Tuy Province, conducted NGFS for 33rd Regiment, 21st ARVN Division in the U Minh Forest, in conjunction with a US Coast Guard Operation *Market Time* vessel. Targets in eastern IV Corps included troop concentrations, fuel storage areas and a motorised sampan. *Brisbane* returned to IV Corps from 27 to 30 June 1971 to again support the 21st ARVN Division in the U Minh Forest region.⁹⁶

RAN CLEARANCE DIVING TEAM

Starting in February 1967, Royal Australian Navy Clearance Diving Team 3 (CDT3) personnel served in Vietnam waters with the US Navy's Explosive Ordnance Disposal (EOD) Group. They were very active in the RSSZ and Mekong Delta, including participation in special operations with South Vietnam armed forces from mid-1968 and EOD support for offensive operations with US Navy SEALs from early 1969 along the Cambodian border.

In 1970, they frequently came under enemy fire while destroying bunker complexes, tunnels, trenches, observation posts and log barricades erected by the VC in the rivers and waterways of South Vietnam. RAN divers deployed on MRF vessels such as Swift Boats and Operation *Market Time* vessels, operating along the canals and rivers of III and IV Corps, helping to

Dreadful Lady over the Mekong Delta

clear barricades and removing Soviet BMP-2 limpet mines attached by VC/NVA swimmers to ships' bottoms. They also neutralised improvised explosive devices (IEDs), conducted mine countermeasures, cleared booby traps and recovered stranded junks. The last of eight CDT3 contingents returned to Australia in April 1971.⁹⁷

AUSTRALIAN ARMY

The 600-man 1st Battalion, The Royal Australian Regiment (1 RAR), arrived at Bien Hoa in May 1965—the first large contingent of Australian troops sent to South Vietnam. In August 1965, the battalion was joined by 105 Field Battery (Royal Australian Artillery) and 161 Field Battery (Royal New Zealand Artillery), 3 Field Troop (Royal Australian Engineers) and 161 Independent Reconnaissance Flight (Australian Army Aviation Corps) and the 1st Australian Logistical Support Company. The battalion joined the US Army's 173rd Airborne Brigade which already included two US Army infantry battalions and one artillery battalion.

While fighting mainly in the 'Iron Triangle' to the north-west of Saigon, 1 RAR participated in Operation *Marauder* on the northern fringe of the Plain of Reeds, which extended from III Corps into IV Corps. In late December 1965, the 173rd Airborne was ordered to locate and destroy the 506th VC Local (Province Mobile) Force Battalion, reported by intelligence sources to be near Bao Trai, not far from the Song Vam Co Dong, in the Parrot's Beak area—the junction of the Cambodian Border and the Mekong Delta. The 506th Battalion had been operating with relative impunity in the area for a year or more and, in addition, units of the 267th VC Main Force Battalion were said to be passing through the area.⁹⁸ After a week's heavy fighting, in which over one hundred 267th Main Force VC troops were killed and the headquarters of the 506th Battalion was destroyed, the bulk of the enemy forces retreated further south into the Mekong Delta.

NORTH VIETNAM ARMY/VIET CONG

The invasion of South Vietnam, waged by the communist north and aimed at imposing unity under a communist government, began in earnest when the July 1956 deadline for national elections, agreed by non-Vietnamese participants at Geneva, came and went.⁹⁹

Many core Viet Cong members were southern Viet Minh members who moved to the north after the 1954 Geneva Accords and received military training, returning to the south, along with arms, down the Ho Chi Minh trail. Other communist guerrillas, who had remained behind in the south as 'sleepers', were activated when the population moved *en masse* between the two separated regions, and began sabotaging the southern economy and attacking government officials. The National Liberation Front (NLF) was a synthesis of soldiers, local guerrillas, farmers, villagers and peasants, many of whom lived in tunnels, caves or jungle hideouts. From 1958, they began to be supplied with Chinese and Soviet Union arms, smuggled into the region. Village elders, teachers, doctors and farmers who refused to join the NLF were

The Participants

murdered. President Diem's heartless and indiscriminate reaction generated even further antipathy towards the non-communist South Vietnam Government.¹⁰⁰

The North Vietnamese had two ways of supplying the Viet Cong fighters in the Mekong Delta—the inland route via the Ho Chi Minh trail, with supplies being laboriously man-handled, or down the coast via the South China Sea. Pursuing the latter route in 1963, the North Vietnamese Army's Sea Infiltration Group 759 managed to infiltrate 25 shiploads of weapons and ammunition (including mortars, recoilless rifles and 12.7-mm anti-aircraft guns), totalling 1430 tons, into covert docks and landing sites in the Mekong Delta and the coastal region east of Saigon.¹⁰¹



NVA 100-ton arms infiltration trawler
(Source: US Navy)

By 1964, the relatively small Viet Minh force that fought with, and defeated, the French, had grown to 600 fully equipped VC battalions across South Vietnam.¹⁰² As the US Navy acknowledged, the Mekong Delta 'has sheltered tens of thousands of veteran Viet Cong guerrillas, and has been the scene of 28 years of continuous warfare ...'.¹⁰³ Terror was their key weapon and 'spectacular assassinations' had already taken place in the Mekong Delta region in the late 1950s.

Strategic hamlet re-settlement programs, recommended by Sir Robert Thompson, a British adviser to the Diem Government, based on his Malayan experience, failed within two years, as the VC easily infiltrated them. As of 1965, the NLF had virtually overrun the countryside and had imposed a tax regime on the surviving population of farmers and fishermen.¹⁰⁴ The VC even had a battalion-sized unit permanently operating in, and out of, the Rung Sat Special

Dreadful Lady over the Mekong Delta

Zone, with a special swimmer sapper company, supplemented by members of the NVA's elite 126 Naval Sapper Regiment.¹⁰⁵

The year 1963, in which both Presidents Kennedy and Diem were assassinated, saw the VC extremely active in the My Tho region, when they achieved major victories over troops of the 7th ARVN Division. Perhaps the most significant defeat occurred at Ap Bac in January, when 350 guerrillas from the VC 261st Battalion stood their ground and humbled a modern army which was four times their number and was supported by M-113 armoured personnel carriers (APCs), artillery, a helicopter-borne ARVN aviation battalion and fighter-bombers. The success of this battle gave a huge boost to the confidence of the communist forces. Ho Chi Minh and General Vo Nguyen Giap personally instructed the NLF leaders to unleash waves of similar offensives, known as the 'Ap Bac Emulation Drive'. Spurred on by Diem's death, VC Main Force troops attacked across the entire northern half of the Mekong Delta in 1964.¹⁰⁶

Throughout 1965 and 1966, the VC continued their drive to eliminate any opposition to a communist take-over of South Vietnam, in particular focussing on the Mekong Delta. In the year that 9th Division, US Army, arrived in South Vietnam, VC Local Force battalions, such as the 514th, fought against TF-117, the 2nd Brigade of 9th US Division and ARVN 7th Division, engaging in major battles at Ap Bac (2 May 1967), Cam Son Secret Zone (15 May 1967) and Nhon Trach (7–8 September 1967). Later that year, a combined allied riverine force clashed heavily with the forenamed 267th and 502nd VC Battalions, on the upper Rach Ruong Canal, the 263rd and 514th VC Battalions in the Cam Son area, and soon after, the Ap Bac '63 victors, the 261st VC Battalion, in Dinh Tuong Province.

North Vietnam Army units were also located in IV Corps, and in January 1969, the NVA 528th Heavy Weapons Company, together with up to 300 VC troops, attempted crossings on the Grand (Lagrange) Canal in the north of IV Corps. A year later, enemy activity in the Mekong Delta increased markedly with the influx of the 88th NVA Regiment, infiltrating southwards via the Plain of Reeds. By March 1972, there were significant larger NVA and VC units in the IV Corps Tactical Zone, including the 95th NVA Infantry Regiment in the south, later joined by the 188th NVA Infantry Regiment.¹⁰⁷

Broadly speaking, the Viet Cong comprised permanent, regular units known as Main Forces (MF) and locally recruited, part-time village guerrilla units known as Local Forces (LF). The VC Local Force had formed additional infantry and sapper battalions, while over a 100 companies were scattered throughout the Delta, all under NVA control. Their modus operandi was to trigger an ambush beside a stream, river or canal with a command-detonated mine, follow up with a short period of intense small arms fire and then rapidly disperse into the foliage.

CHAPTER 3

US-LED RIVERINE OPERATIONS IN THE MEKONG DELTA

BEGINNINGS

Responsibility for fighting the counter-insurgency war in South Vietnam depended upon the Commander US Military Assistance Command Vietnam (COMUSMACV), conjointly acting with the Commander Vietnam Armed Forces—not always an effective relationship. MACV was dominated by a land-centric Army which maintained control over air power assets to support counter-insurgency operations inside the borders of South Vietnam.¹⁰⁸

Operation *River Raider I*—the first significant joint Naval Force Vietnam (NAVFORV)—9th Division operation—began in February 1967. The USS *Henrico* (APA-45) served as a mobile base for troops as well as housing the US Navy's portion of the two operations centres running the operation. The other centre, run by the US Army's 9th Division, was located on land, which created an awkward start towards achieving seamless joint command and control.¹⁰⁹



USS *Henrico* (APA-45)
(Source: USS *Henrico*)

Dreadful Lady over the Mekong Delta

The 3rd Battalion of the 34th Artillery Regiment, US Army, mounted 105-mm and self-propelled 155-mm howitzers onto floating barges which were towed around rivers and canals by US Navy landing craft. The battalion moved around the Mekong Delta waterways supporting US and Vietnamese infantry troops.¹¹⁰ Mortar barges were also developed, hosting two 4.2-inch and three 81-mm mortars per barge. The 155-mm guns were fired off solid land sites, if and where they could be found. US Navy River Assault Squadron Nine (RAS-9) transported and supported the battalion in sweeps through the mangrove swamps of the Rung Sat Special Zone (RSSZ).¹¹¹

Modelled on earlier developed French riverine tactics, assault craft provided protection from enemy sniper attacks and ambushes as the force negotiated the rivers and canals. At their destination, troops scrambled ashore under cover of automatic weapon and mortar fire from the assault craft. The boats then took flanking and blocking positions to prevent enemy evasion by water. Throughout the operation, enemy opposition was light, consisting mainly of sporadic sniper fire, but by the end on 19 March 1967, the combined Navy and Army force had killed 40 Viet Cong (VC), destroyed a number of enemy camps, and captured or disposed of large quantities of weapons, ammunition, mines and junks.

By May 1967, 9th Division's 2nd Brigade, in conjunction with 7th Division Army of the Republic of Vietnam (ARVN), had fought its first major battle in IV Corps, at Ap Bac, encircling the enemy as helicopter gunships and fighter bombers attacked. The 514th VC Local Force Battalion was nearly wiped out, losing 195 soldiers confirmed as KIA.¹¹²

In early April 1967, with their own assault boats arriving from the mainland, the US Navy Task Force 117 (TF-117) riverine forces moved from the RSSZ to the Mekong Delta, close to the US Army's 9th Division at Dong Tam, and a month later the five ships that would make up the initial mobile riverine base (MRB) also arrived in the Delta.¹¹³ They included two self-propelled barracks ships, the USS *Benevah* (APB-35) and USS *Colleton* (APB-30); a landing craft repair ship USS *Askari* (ARL-30); an unpowered barracks craft (auxiliary personnel lighter APL-26) and a logistics support transport (LST) assigned on a two-month rotational basis by Commander Seventh Fleet.

These ships provided repair and logistic support, including messing, berthing, and working spaces, for the 1900 embarked troops of the 2nd Brigade and the 1600 Navy men then assigned to TF-117. By mid-June 1967, 68 boats had joined the force, making it possible to conduct six to eight search-and-destroy missions monthly, each of two or three days duration, including some combined US–South Vietnam missions.

Mid-May 1967 saw increased joint and combined force integration in the Cam Son Secret Zone, 20 miles west of Dong Tam, when two battalions of the 3rd Brigade joined with 7th ARVN Division and US Navy river assault teams in a reconnaissance-in-force operation. Military Assistance Command Vietnam (MACV) duly recognised the need for a balanced, joint, mobile strike force capable of navigating Mekong waterways, and in June 1967 formed the Mobile Riverine Force (MRF) by coalescing two battalions of 9th Division's 2nd Brigade

US-Led Riverine Operations in the Mekong Delta

with US Naval TF-117.¹¹⁴ Operating from a fleet of 100 naval vessels, the MRF initiated extensive combat operations in the Mekong marshlands. In their first major contact on 19–22 June 1967, MRF units killed 256 VC fighters at Rach Nui Canal, west of Rach Kien. The MRF also coordinated operations with US Navy SEAL teams, Vietnam Marines, units of the ARVN's 7th Division and Vietnam Navy river assault groups (RAGs).

The newly arrived Royal Australian Navy Helicopter Flight Vietnam (RANHFV), integrated with the 135th US Army Assault Helicopter Company (AHC), flew its first mission on 3 November 1967, conveying 9th Division troops into battle.

A series of Operation *Coronado* activities occurred in the Cam Son Secret Zone and south of Saigon in late 1967 and early 1968. This series concluded with *Coronado XI* ending on 3 March 1968.

1968 TET OFFENSIVE

The 1968 Tet Offensive (Tet '68) lasted from 29 January to 8 February and was vicious and sustained. In IV Corps, civilian refugees were fired upon by the NVA/VC, with many atrocities committed against military prisoners, government officials, women and children throughout the Delta. However, the general uprising of the populace, anticipated by the North Vietnam planners, failed to occur.¹¹⁵

Amazingly, the Tet '68 offensive was a major setback for the North Vietnamese, having drained their supply of reserves all the way from the Gulf of Thailand to Hanoi.¹¹⁶ As the well-known and respected Australian war correspondent Denis Warner, noted: 'it was one of the supreme ironies of the war that at the moment when it came closest to military defeat, Hanoi won its greatest psychological victory'.¹¹⁷

Using water transport mobility to advantage, the MRF shifted its entire force from one threatened theatre to another, with continuous operations during this period, accounting for over 650 NVA/VC killed, capturing large caches of weapons and tons of ammunition and supplies. The MRF's key success in the Mekong Delta at this time was in preventing the NVA/VC from achieving a single important victory.

During this period, the US Army's 9th Division claimed decisive victories at Long Binh, Bien Hoa, Saigon-Cholon, Ben Tre and Xuan Loc in III Corps and My Tho, Vinh Long, Ap Bac, Can Tho and Tan An in IV Corps, with over 1500 enemy killed. Yet no attempt was made by COMUSMACV to take advantage of this situation with a counter-attack, as US President Johnson wouldn't commit to further US troops.

A second wave of enemy attacks heading for Saigon was repulsed by the 9th Division in May 1968 and the VC were pursued through the Plain of Reeds in June. Bolstered by the 5th Vietnam Marine Battalion, in July 1968 the MRF killed over 130 VC and captured over 75 weapons and an arms factory near Vi Thanh, 20 miles south-west of Can Tho.¹¹⁸ Relentless pursuit of the enemy in the once-protective U Minh Forest made the enemy change tactics,

Dreadful Lady over the Mekong Delta

reverting to smaller guerrilla groups which reduced the number of larger contacts for the rest of 1968.

According to Major General William B. Fulton who, as a colonel, was the US Army's architect of the MRF, the action in July-August 1968 was the first major allied ground operation in that area for more than a decade. It was also the first penetration by an American ground force into the U Minh Forest region and it was the deepest penetration by the MRF into the Mekong Delta. The operation was also destined to be the last major strike operation conducted by the MRF.¹¹⁹

NEW COMMANDER NAVAL FORCES VIETNAM

One person determined to go on the offensive was Rear Admiral Elmo Zumwalt, Jr who was appointed Commander Naval Forces Vietnam (COMNAVFORV) in September 1968 and, shortly after, was promoted to Vice Admiral. Operationally, Zumwalt reported to General Creighton Abrams, who had spent a year as Deputy and then replaced General Westmoreland as COMUSMACV on 1 July 1968.



Vice Admiral Elmo Zumwalt
(Source: US Navy)

In his memoirs, Admiral Zumwalt stressed that: 'conducting riverine (brown water) warfare requires ingenuity and improvisation. There is no body of accepted doctrine on the subject; the Naval Academy does not offer courses in it; indeed there is little empirical experience from previous wars to draw upon. You have to make up riverine warfare as you go along.'¹²⁰ And so it transpired under his command.

By October 1968, the Coastal Surveillance Force (TF-115) fleet of Swift boats, while continuing to maintain effective coastal surveillance and naval gunfire support operations, expanded their inshore activities with a series of intelligence probes and raids up the rivers of the Ca Mau Peninsula.¹²¹ In one of these operations, three PCFs suddenly swept seven miles up the Ong Doc River and four miles down a canal into the heart of an enemy base area known locally as 'VC Lake'. Returning to the open sea under cover of naval gunfire provided by a Coast Guard cutter standing off shore, the Swift boats (all-aluminium, 50-foot long,

US-Led Riverine Operations in the Mekong Delta

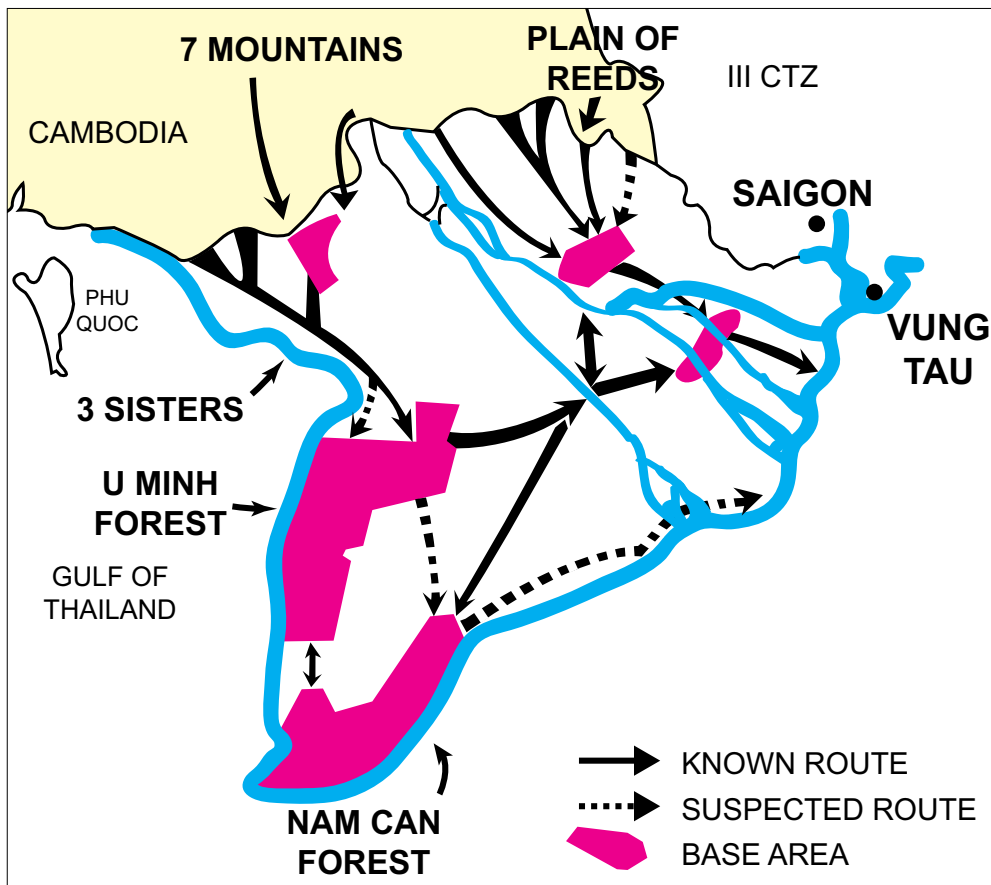
shallow-draft vessels) destroyed more than a hundred buildings and dozens of sampans belonging to the surprised Viet Cong.¹²² The VC used various means of ambush to deter these patrols, including setting Chinese-made, claymore-type, remotely-detonated directional mines in the trees either side of the streams and canals, set to trigger when Swift boats traversed at high tide.



PCF Swift Boats docked with USS *Tutuila* (ARG-4)

(Source: Jim Bandy)

As the River Patrol Force (RPF) increased its strength sufficiently to maintain patrols on all the major rivers of the Mekong Delta, and as MRF operations were expanded, following the arrival of a second task group, coordinated operations of the three task forces—TF-115, TF-116 and TF-117—were now feasible.



Map 3-1: Enemy Infiltration Routes, IV Corps
(Adapted from Eugene Paluso)

SEALORDS STRATEGY

Operation *SEALORDS* (name derived from acronym for ‘South East Asia lake, ocean, river and delta strategy’) was an innovative strategy, initiated by Vice Admiral Zumwalt in late October 1968, for the conduct of combined and joint operations. It involved units of all three previously geographically separate and independent task forces (TF-115, TF-116 and TF-117).¹²³

Striking deep into previously secure enemy strongholds along the network of rivers and canals south of the Bassac River, it was a determined joint and combined effort by the US Navy, the Vietnam Navy, and allied US/Vietnam ground forces, to cut enemy supply lines from Cambodia and to disrupt operations from enemy base areas deep in the Delta. *SEALORDS* involved setting up four major interlocking barriers across the south-west.

US-Led Riverine Operations in the Mekong Delta

By this time, allied naval forces in South Vietnam were at maximum strength. The US Navy's Coastal Surveillance Force (CSF) operated 81 Swift boats, 24 Coast Guard WPBs and 39 other vessels. The River Patrol Force (RPF) deployed 258 patrol and minesweeping boats; the 3700-man Riverine Assault Force (RAF) counted 184 LCM-6 monitors, transports and other armoured craft; and Helicopter Attack Squadron Light (HAL-3) flew 25 UH-1B Iroquois armed helicopters. Complementing the American naval contingent were the Vietnam Navy's 655 ships, assault craft, patrol boats and other vessels.

Non-organic support was provided by Seventh Air Force tactical bombing aircraft (TACAIR), including No 2 Squadron RAAF, aided by forward air controllers (FACs) of 22nd Tactical Air Support Squadron (TASS), headquartered at Binh Thuy. Aircraft such as USAF C-123 Providers and C-7 Caribous (USAF and RAAF), flying from bases further north, provided regular tactical air transport support throughout the Delta.

Into 1968, the allied commanders sought to exploit the communist battlefield losses of the Tet '68 offensive by pushing the enemy's large main force units westwards to Cambodian border areas. By doing this, they extended the South Vietnam Government's presence into VC strongholds and consolidated control over population centres. Naval forces, in particular, spearheaded the drive in the Mekong Delta to isolate and destroy weakened NVA/VC forces.

To focus the allied effort on the *SEALORDS* campaign, COMNAVFORV activated Task Force 194 (TF-194) and appointed his deputy as its operational commander, (who became known, no doubt with tongue-in-cheek reference to the British, as the 'First Sealord').¹²⁴ Although continuing to function, Operation *Game Warden*, Operation *Market Time*, and Riverine Assault Force operations were scaled down, with their personnel and material resources increasingly devoted to *SEALORDS*, and a number of MRF assault support patrol boats (ASPBs) were transferred to TF-194.

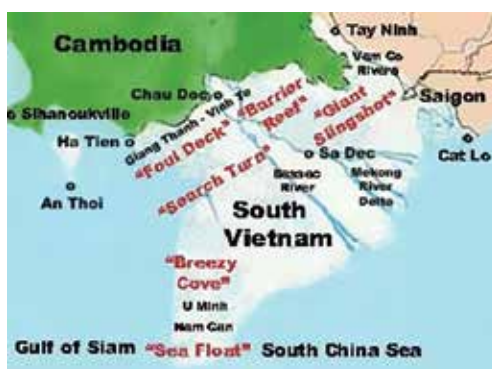
TF-115 Swift Boat PCFs mounted lightning raids into enemy-held coastal waterways and took over patrol responsibility for the Delta's larger rivers. This freed TF-116 PBRs for operations along the previously uncontested smaller rivers and canals. These intrusions into former Viet Cong bastions were possible only with the on-call support of organic naval aircraft (*Sea Wolf* UH-1s and *Black Pony* OV-10s) and the heavily armed armoured troop carrier (ATC) riverine assault craft.

The first phase of the *SEALORDS* campaign saw allied forces establish patrol barriers, often using electronic sensor devices created by SEALs and Beach Jumpers, along the waterways paralleling the Cambodian border. These barriers were laid to:

- interdict enemy lines of communication from the Gulf of Siam/Thailand to the Bassac River,
- open up trans-Delta waterways and pacify adjacent areas,
- clear the Bassac islands and pacify these areas, and
- harass the enemy to keep him off balance.¹²⁵

Dreadful Lady over the Mekong Delta

Primary emphasis was placed on the interdiction aspect, as strike operations cleared enemy fortifications and base camps from the canal systems in the far south. These were followed closely by local Vietnam Army Regional Force (RF) and Popular Force (PF) units, who stepped up operations to hold and pacify these areas and to maintain patrols on the waterways. Obstructions were cleared from the canals, opening them up to commercial traffic, which had previously been either blocked by the Viet Cong and/or heavily taxed.



Map 3-2: SEALORDS Operational Areas
(Source: Robert Shirley)

In early November 1968, Operation *Search Turn* set up the first of four barriers, while PBRs and riverine assault craft (ATCs) opened two canals extending from the Gulf of Siam/Thailand at Rach Gia, inland to the Bassac River at Long Xuyen. At the same time, South Vietnam para-military ground troops helped naval patrol units secure transportation routes.¹²⁶ After this initial success, a number of US Navy river patrol craft continued operating into 1969 from Rach Gia, supporting expanded probes into Viet Cong base areas to the northwest and southeast. Continuing patrols on the Rach Gia-Long Xuyen canal system effectively countered enemy use of this waterway and facilitated civilian resettlement.

Later in November 1968, a second interdiction line—Operation *Foul Deck*—was established close to the Cambodian border when PCF Swift boats, PBRs, riverine assault craft/ATCs and Vietnam Navy vessels initiated the second of the four barriers. They penetrated the Giang Thanh-Vinh Te canal system and established patrols along the waterway north-east from Ha Tien on the Gulf to Chau Doc on the upper Bassac, adjacent to the Cambodian border.¹²⁷ Symbolic of the Vietnam military contribution to the combined effort, and also heralding the turnover of operational responsibilities to the Vietnam Navy, the allied command changed the name of this operation to Operation *Tran Hung Dao I*.

Concurrent with inner Delta strike and pacification efforts, the seaward approaches were secured by a tight surveillance net provided by TF-115 units, using Swift boats, many operating from An Thoi off the coast, on river patrol duties. In addition, units of TF-115 kept the enemy off balance with raids deep into base areas up rivers and canals off the Gulf of Thailand and South China Sea. These waterways were not normally accessible to river

US-Led Riverine Operations in the Mekong Delta

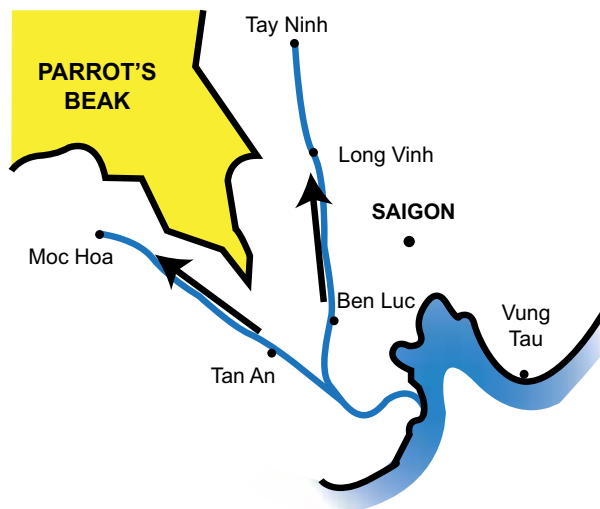
patrol and mobile riverine forces, however, coastal surveillance and mobile riverine forces twice teamed up to strike at enemy concentrations in the southern Ca Mau Peninsula with Operations *Silver Mace I* and *Silver Mace II*.¹²⁸

River patrol craft of TF-116 established tight blockades on the Bassac River at known Viet Cong crossing points, with additional PBRs coming available as TF-115 Swift boats took over PBR stations in the lower portions of the major Delta rivers. At the same time, pacification efforts continued on the largely VC-dominated islands of the lower Bassac.

Under the *SEALORDS* strategy, combined allied and joint forces penetrated into areas where the VC had operated relatively unchallenged for years. Using the unique mobility inherent in riverine forces, the Navy took command of primary lines of communication, the waterways, in these enemy sanctuaries. The combined efforts of TF-115, TF-116 and TF-117 units, along with Vietnam armed forces, provided an important start to the IV Corps Tactical Zone dry season campaign to keep pressure on the enemy. The initial success of this interdiction strategy prompted the expansion of *SEALORDS* in late 1968-early 1969.

OPERATION GIANT SLINGSHOT

In December 1968, COMNAVFORV Zumwalt expanded *SEALORDS* with a third barrier covering the north-west part of the Mekong Delta. He directed TF-194 forces to conduct Operation *Giant Slingshot*, named for the catapult-like configuration of two rivers, the Song Vam Co Dong and Song Vam Co Tay both west of Saigon. The two rivers flowed either side of the Cambodian territory which protruded into South Vietnam and was known as the Parrot's Beak. With its dangerously close proximity to Saigon (50 miles), this region was used extensively by the North Vietnam Army to infiltrate troops and supplies into both the Saigon area and IV Corps.



Map 3-3: Operation *Giant Slingshot*

Dreadful Lady over the Mekong Delta

The left thrust of *Giant Slingshot* began at Tan An, on the western fork of the Song Vam Co Tay, heading upstream to Moc Hoa, through the Plain of Reeds. The right element proceeded along the eastern fork, the Song Vam Co Dong, which wound over 100 km through a flat, primarily rice-producing region, past Ben Luc towards Tay Ninh, in III Corps. Operating from austere tactical support bases and support vessels at six locations along the two rivers, 150 US Navy and Vietnam Navy river patrol and assault craft were used to push up against heavy enemy opposition. They succeeded in cutting infiltration routes from the Parrot's Beak area of Cambodia and severely hampering communist resupply in the region near Saigon and the Plain of Reeds, undoubtedly blunting potential enemy offensives planned for 1969. Many tons of weapons, ammunition, and other supplies were discovered during the operation.



USS *Benewah* (APB-35) mobile riverine base
(Source: US Navy)

With increasing effect through 1969, hundreds of intense battles were fought at close range between small naval boats and heavily armed enemy units attempting to break the barrier. Rapid reaction by US Navy *Sea Wolf* UH-1 helicopters and *Black Pony* OV-10 Broncos, artillery and troops, supplemented by on-call, TACAIR support, cost the VC large numbers of dead and wounded.

The patrol boats also took a heavy toll of the enemy, by lying in wait in night ambush positions at likely crossing points on the rivers. A typical ambush incident took place on the night of 29 March 1969, approximately five miles north-west of Tuyen Nhon on the Vam Co Tay River. The crewmen of two silently-waiting PBRs sighted five VC, with packs and weapons, walking toward them on the dike, along the north bank. When the enemy approached to about 10 yards, the PBR crews opened fire, killing them all. The PBRs then moved 800 yards downstream, to wait in silence once more. A short time later, two VC, trying

US-Led Riverine Operations in the Mekong Delta

to sneak up on the boats with grenades, were fired on and killed 15 yards off. A group of about 20 enemy troops on the south bank then set off flares to illuminate the PBRs, and started firing. Heavy return fire from the boat crews resulted in seven VC confirmed killed and maybe nine others killed or wounded, with no friendly casualties.¹²⁹

OPERATION *BARRIER REEF*

The fourth and the final barrier established under the *SEALORDS* strategy began in early January 1969 with Operation *Barrier Reef*. Extending from Tuyen Nhon, westward to An Long along inland canals, *Barrier Reef* cut enemy southbound supply lines to the Delta, thus giving effect to a virtually continuously patrolled waterway interdiction barrier, lying obliquely from Tay Ninh, northwest of Saigon in III Corps, to the Gulf of Siam/Thailand in the southwest of IV Corps. Units from TF-116 and TF-117 patrolled and swept for mines along the Lagrange, Ong Lon and Dong Tien canals, through the sparsely populated Plain of Reeds. Working closely with local Regional Force and Popular Force troops, *Barrier Reef* forces helped re-establish South Vietnam Government authority along these waterways.

Although the number of arms captured and contacts with the enemy were less than *Giant Slingshot*, this vital link in the interdiction barrier in 1969 turned back several significant enemy infiltration attempts. The Tet '69 enemy offensive never got off the ground in the Delta, due to heavy 9th Division, US Army, resistance. The first half of 1969 saw the 'Old Reliables' (as 9th Division soldiers were known) involved in some of the heaviest fighting of the war, in which more than 10 000 NVA and Viet Cong were killed. Tan An in January, the Plain of Reeds and Ben Tre in February and Cai Be in March saw combat success for the allies.

In May 1969, four companies of 9th Division's 4th Battalion/39th Infantry teamed with helicopter gunships of the 191st Assault Helicopter Company to kill 112 VC in Dinh Tuong Province. Using the highly successful tactic of pre-planned MRF blocking positions to support airmobile insertions, the battalion surprised and surrounded an estimated Main Force VC battalion.¹³⁰ Meanwhile, in the southern Mekong Delta proper, a combined force of Swift boats, PBR river patrol boats, ATC riverine assault craft, SEALs and South Vietnam ground units struck at the Viet Cong in former enemy strongholds, including the Ca Mau Peninsula, the U Minh Forest and the islands of the broad Mekong River system.

OPERATION *SILVER MACE II*

In April 1969, ground, air and naval units from each of the US services, the Vietnam Navy and the Vietnam Marine Corps conducted Operation *Silver Mace II*, a strike operation in the Nam Can mangrove forest on the south-west corner of the Ca Mau Peninsula. The enemy avoided heavy contact with the allied force, but their logistics system was severely disrupted.

After successful raiding and harassing operations like *Silver Mace II*, the allied navies often deployed forces to secure a more permanent South Vietnam Government presence in vital

Dreadful Lady over the Mekong Delta

southern areas. In one case, a Viet Cong heavy weapons company ran into patrol craft twice, while trying to head south for operations west of Sa Dec. A spotter aircraft sighted the enemy force shortly after it had turned back the second time. Air strikes and a group sweep killed almost the entire unit and captured most of its weapons.

The final portion of this interdiction barrier grew out of Swift boat operations on the Rach Gia River and probes into the Vinh Te Canal (along the Cambodian border, joining Ha Tien to Chau Doc) in late 1968, as PBRs were introduced to patrol the Vinh Te Canal, out of Chau Doc.¹³¹

BLACK PONIES ARRIVE

Light Attack Squadron Four (VAL-4) was commissioned on 3 January 1969 at Naval Air Station North Island, San Diego, California and after a short period of intense training, the *Black Ponies* packed up and deployed their 15 OV-10 Broncos (borrowed from the US Marine Corps) to South Vietnam, where they established two in-country detachments in March 1969.¹³² The squadron headquarters and half of its fleet (Detachment Alpha), were based at Binh Thuy on the Bassac River, to support *SEALORDS* operations. The other half (Detachment Bravo) was located at Vung Tau, to support Rung Sat Special Zone (RSSZ) and *Game Warden* units in northern IV Corps and southern III Corps.



VAL-4 *Black Pony* OV-10 Bronco
(Source: VAL-4)

The US Navy OV-10 Broncos were heavily armed, with four M-60 machine guns, two 19-round, 2.75-inch rocket pods, eight 16-round 5-inch Zuni rockets, a Mk IV 20-mm gun pod and a AN/SUU-11 7.62-mm Gatling gun. Even though their primary mission was close air support (CAS), VAL-4 also assumed the mission of airborne forward air controller (FAC) soon after arriving in South Vietnam, directing CAS missions and adjusting naval gunfire and artillery strikes in the Mekong Delta.

OPERATION SEA FLOAT

In June 1969, with a solid set of major counter-infiltration barriers in place, preventing serious enemy activity from Cambodia, the emphasis shifted to internal operations, as naval river forces began patrolling the vital Saigon River (Song Sai Gon), from Phu Cuong to Dau Tieng, in the hotly contested Michelin rubber plantation. This operation, designated Operation *Ready Deck*, tied in with *Giant Slingshot* interdiction efforts to the west.¹³³

More significantly, on 27 June 1969, Vice Admiral Zumwalt activated Operation *Sea Float* (*Tran Hung Dao III* to the Vietnamese) under Phase 2 of *SEALORDS* to create, in the An Xuyen Province of the Ca Mau peninsula, a floating mobile advanced tactical support base (MATSB,) made from eleven 30 feet x 90 feet Ammi pontoon barges coupled together.¹³⁴ It was anchored on the Song Cau Lon, one of the four distributaries extending from the Mekong River, in the southernmost part of South Vietnam's Delta region, and which connected to the Bo De and Dam Doi rivers. Being salt water rivers, any fresh/drinking water used afloat or ashore had to be brought in by ship.

The *Sea Float* area of operations (AO) bordered on the U Minh Forest, a long-time VC stronghold which attracted numerous air strikes by RAAF Canberra bombers. The Song Cau Lon was a tidal river, with a mouth either side of the Ca Mau Peninsula, flowing up to 10 knots in one direction or the other, depending on the tides, with only a few hours of slack water each day. This made boat handling difficult in tight situations, with poor headway against the muddy and turbid currents.



Operation *Sea Float* base, Cau Lon River
(Source: Ed Levebre, Bob Stoner)

The river mouth ran into a square bay on the Gulf of Siam/Thailand that was very shallow and had an unmarked channel. A deeper channel to the South China Sea was located 22 miles up the Song Cau Lon, and down the dangerous Song Bo De, where, near its mouth, stood

Dreadful Lady over the Mekong Delta

the southern town of Tan An (not the *Giant Slingshot* Tan An), a favourite landing place for Chinese junks running the US naval blockade earlier in the 1960s.

At this stage, Vice Admiral Zumwalt began implementing his own Vietnamization program, called *ACTOV*, aiming to help the Commander Vietnam Navy take back control of the Ca Mau peninsular from the communists. The program also aimed to re-establish the Delta's economic productivity, which had lapsed under VC control throughout the 1960s.¹³⁵ In his memoirs, Admiral Zumwalt cited the *ACTOV* program as one of his proudest achievements, even though the US pulled out and left IV Corps to be the last area in South Vietnam 'liberated' by the communist north.¹³⁶ Program *ACTOV*, in his mind, was 'a concerted attempt to obliterate an all too prevalent notion that the Vietnamese were congenitally incapable of operating or maintaining mechanical equipment or mastering military tactics or preserving discipline'. Zumwalt saw that, if the US Navy (together with South Vietnam forces) could gain control of a section of the principal river in the area, it might be possible for a resettlement effort to begin on the river banks, and gradually spread throughout the Mekong Delta. Under *Sea Float*'s protection, South Vietnamese resettlement began: pineapples were re-planted, pottery kilns rebuilt, shrimping and fishing began anew, and more and more inhabitants returned to the area.

The *Sea Float* MATSB was a floating fortress, comprising water borne guard posts (WBGPs) with Swift boats and riverine units, housing various US Navy SEAL teams and underwater demolition teams, while HAL-3 Detachment 1 *Sea Wolf* UH-1 'Hueys' provided air cover. It was constructed in Nha Be, near Saigon, in May-June 1969, towed south by sea to the Song Bo De and then down the Song Cau Lon. LCMs and a combat salvage boat set the anchor buoys, while fighting up to 10-knot tidal flows.



Map 3-4: Major riverine operations – 1969-70
(Source: Bob Stoner)

The *Sea Float* MATSB was protected by a US Navy patrol gunboat, a World War II-vintage Vietnam Navy landing ship support large (LSSL) and by remote sensors that monitored safe zones and detected enemy activities in the canals, streams and forests nearby. Concussion grenades were thrown into the surrounding water from four watch stations every 30 seconds,

US-Led Riverine Operations in the Mekong Delta

24 hours a day (ultimately causing cracks to open up in the pontoons which required pumping out daily). The grenades were to protect the MATSB from enemy swimmer sapper attacks, which were common against the river gunboats that provided night-time gunfire support on the Song Cau Long and Song Bo De.

Sea Float denied the enemy a safe haven, even in this isolated corner of the Delta, and facilitated re-population of the region. At any one time, about 20 PCF Swift boats, one monitor, one Zippo, one heavy SEAL support craft (HSSC), one medium SEAL support craft (MSSC), one light SEAL support craft (LSSC), two to three junks, three SEAL platoons and about 40 US Navy *Sea Float* personnel called it home.

OPERATION *SOLID ANCHOR*

Then came Operation *Solid Anchor*, which provided additional logistics to support *Sea Float* on the riverbank nearby. Constructed by US Navy Seabees in early 1970, Advanced Tactical Support Base (ATSB) *Solid Anchor* housed mobile support teams (MSTs), underwater demolition teams, three SEAL platoons, a tactical operations centre and a Kit Carson Scout camp—the latter being a team of former enemy soldiers who purported to work for the South Vietnam side.

In order to build the base on such soggy ground, the Navy brought in \$6 million worth of sand in barges for the foundations. Even then, interlocking steel pilings had to be sunk into the Song Cau Lon and along canal banks, to limit erosion by the strong tidal currents, which began as soon as the sand was put in place. From there, all sampans and water traffic on the Song Cau Lon and Song Bo De were searched, while existing bunkers and structures of known enemy construction were destroyed.¹³⁷

OPERATION *BREEZY COVE*

The allies further threatened the communist 'rear' area in September 1969, when they set up patrols on the western side of the Ca Mau Peninsula on the Song Ong Doc, bordering the partly dense and isolated U Minh Forest region. Staging from yet another advanced tactical support base (ATSB) at the river's mouth, US and Vietnam Navy PBRs of Operation *Breezy Cove* repeatedly intercepted and destroyed enemy supply parties crossing the waterway, thus extending the allies' offensive presence to the southernmost tip of the Delta.¹³⁸

Dreadful Lady over the Mekong Delta



Operation *Breezy Cove* ATSB at the Song Ong Doc mouth
(Source: Ed Lefebvre)

SEALORDS STRATEGY – ONE YEAR ON

A year after the start of the *SEALORDS* campaign, communist military forces in the Mekong Delta were under heavy pressure. The multi-layered border interdiction barriers delayed and disrupted the enemy's resupply and troop replacement from Cambodia. Allied raiding operations hit vulnerable VC base areas and the *Sea Float* deployment penetrated into what had previously been an enemy sanctuary. Overall, American and Vietnamese forces had captured or destroyed over 500 tons of enemy weapons, ammunition, food, medicines and other supplies. Furthermore, 3000 communist soldiers were killed and 300 were captured, at a cost of 186 allied men killed and 1451 wounded.

By November 1969, the Cambodia-focused logistics logjam caused by *SEALORDS* had created serious problems in North Vietnamese planning for their winter-spring campaign. This was confirmed in January 1970, by a captured NVA soldier, who claimed that 'a 300-man unit which needed weapons and supplies, had been prevented from crossing into the 'Seven Mountains' area for several weeks by naval forces.' Clearly, the *SEALORDS* interdiction forces had cut down infiltration of North Vietnamese supplies, but success depended upon continued inter-service cooperation.¹³⁹

VIETNAMIZATION/PROGRAM ACTOV

COMNAVFORV Zumwalt's trust in the professionalism of the South Vietnamese reflected the full support they were being given by the US Navy in 1969. As already noted, he was instigating his own version of MACV's Vietnamization program, which he called *ACTOV*. Vice Admiral Zumwalt claimed that Commander Tran Van Chon, who commanded the Vietnam Navy, saw the joint force as an international entity, and therefore wanted his people to learn to speak English, rather than have the Americans learn Vietnamese, as the *ACTOV* program cranked

US-Led Riverine Operations in the Mekong Delta

up. Accordingly, Vietnamese sailors studied an elementary English curriculum, sufficient to work side-by-side on boats with their US counterparts.¹⁴⁰

On the other hand, Program *ACTOV* was also seen to be too rushed, with 'insufficient time allowed for corporate knowledge transfer and training in tactics, techniques and procedures acquired by US forces' in the Mekong Delta.¹⁴¹

ALLIES WITHDRAW

'The years that followed the (1968) Tet offensive were good ones for South Vietnam. If the Republic of Vietnam ever had a golden age, this was it'.

Denis Warner in 1977.¹⁴²

Unfortunately for the South Vietnamese, negotiations continued between US and North Vietnam Government authorities, as political pressure at home and abroad mounted on President Johnson, and then Nixon, to withdraw US Forces from Vietnam. After only three years in South Vietnam, the 9th Division US Army withdrew from IV Corps in September 1969.¹⁴³ Several US Army helicopter units, including the 135th and 191st Assault Helicopter Companies, remained behind after the 9th Division left, to support the South Vietnamese in the Mekong Delta.

As the US Navy also began its withdrawal, Swift boats and other riverine craft were handed over to the Vietnamese.¹⁴⁴ *Sea Float* personnel and equipment moved ashore to join *Solid Anchor* in mid-September 1970, and in late January 1971, this base was heavily rocketed and mortared by NVA/VC. It too was formally turned over to the Vietnam Navy on 1 April 1971, although some American advisors remained there until February 1973.¹⁴⁵

The advanced tactical support base at *Breezy Cove*, at the mouth of the Song Ong Doc, was even more exposed to enemy activity than *Sea Float/Solid Anchor*. On the night of 20 October 1970, it was destroyed by mortars and recoilless rifles, in a company-sized ground attack.¹⁴⁶ An action on the Eo Lon canal, 25 miles SSE from Ben Tre Island, on 12 November 1970, saw the last US Navy PCF Swift boat damaged and the last US Navy crewman injured in the Vietnam War.¹⁴⁷

Nonetheless, strike missions in IV Corps by No 2 Squadron RAAF continued increasingly under the control of VNAF FACs, as they assumed responsibility for directing air strikes from the FACs of the USAF's 22nd TASS, as they too withdrew from Binh Thuy. By June 1971, those Australian units which had operated in the Mekong Delta region, namely No 2 Squadron RAAF, RAN Helicopter Flight Vietnam, RAAF FACs and RAN Clearance Diving Team 3, had all returned to Australia, leaving the fighting against the communists largely to the South Vietnam Government forces.

Across South Vietnam, enemy offensive operations dropped significantly, despite a decrease in overall military capabilities, as American troop strength declined. However in IV Corps,

pockets of strong VC influence and control remained, such as in provinces Chuong Thien in the south and Dinh Tuong in the north, although the indigenous VC were no longer seen as a strategic force.¹⁴⁸ Had it not been for massive NVA infiltration and provision of modern Russian and Chinese weaponry through to 1975, reflecting the realities of the global extent of the Cold War, the result may have been quite different.

From a global perspective, the war in Vietnam was seen as a sub-set of the larger Cold War—a war within a war. Lower the horizon and the set of campaigns undertaken from 1967 to 1971 in the Mekong Delta, under leaders such as Vice Admiral Zumwalt, can also be viewed as a war within a war. Some saw NAVFORV's operations and campaigns, such as *Game Warden* and *SEALORDS*, as successful in pacifying the Delta. Professor Dunnavent summarised the result as 'The local population which once travelled in fear on the canals and rivers of South Vietnam could easily transit these waterways and conduct commerce vital to the economy of the Republic of Vietnam.'¹⁴⁹ The significance of this riverine warfare should not be forgotten and will no doubt provide many lessons for future campaigns that might eventuate in similar environments in South-East Asia.

CHAPTER 4

TACTICAL AIR SUPPORT TO RIVERINE OPERATIONS

ORGANISATION

Riverine warfare in South Vietnam has been described as a ‘kind of guerrilla warfare fought in the Navy environment – water – against a full developed Mao Tse Tung type communist guerrilla’.¹⁵⁰ With the exception of a small cadre of FACs, the United States Air Force’s (USAF) participation in such warfare came as a shock, because in the decade before Vietnam the organisation had been fully focussed on strategic nuclear warfare with Warsaw Pact nations. Despite experience in the use of FACs in the Korean War from 1950 to 1953, the USAF had no counter-insurgency doctrine when the Vietnam War started.¹⁵¹

The Commander US Military Assistance Command Vietnam (COMUSMACV) ran the allied war in South Vietnam conjointly with the Commander Vietnam Armed Force. The war was an Army campaign, and tactical air (TACAIR) operations in South Vietnam, including the Mekong Delta, were wholly in support of the Army, as directed by Headquarters US Seventh Air Force, also functioning conjointly with Headquarters Vietnam Air Force.

Military Assistance Command Vietnam (MACV), ‘a counter-insurgency focussed, land-centric, Army dominated organisation’, was a sub-unified command of the US Pacific Command, with Army, Marine Corps and Air Force elements.¹⁵² MACV controlled the war in South Vietnam, while Pacific Command (PACCOM) in Hawaii retained control of the war in North Vietnam, via Pacific Air Forces (PACAF) and Pacific Fleet (PACFLT).

The Seventh Air Force, headquartered in Saigon, was formed in March 1966 when it took over from the 2nd Air Division to direct the air war over Vietnam. It had two responsibilities—a strategic one in prosecuting the air war over North Vietnam and a tactical one in supporting the Army in South Vietnam. Seventh Air Force was under the operational control of MACV for operations in South Vietnam, and the southern part of North Vietnam (known as *Route Pack One*), while North Vietnam operations were controlled by PACAF.¹⁵³

USAF operational wings based in Thailand were under the command of the Philippine-based Thirteenth Air Force, but were operationally controlled by the Seventh Air Force. Aircraft based in South Vietnam were primarily used for missions in South Vietnam (‘in-country’), while Thailand-based squadrons flew mainly into North Vietnam and Laos. USAF’s Strategic Air Command retained control of its B-52 Stratofortress bombers, as well as its tankers and strategic reconnaissance aircraft, which flew missions over both North and South Vietnam.

Dreadful Lady over the Mekong Delta

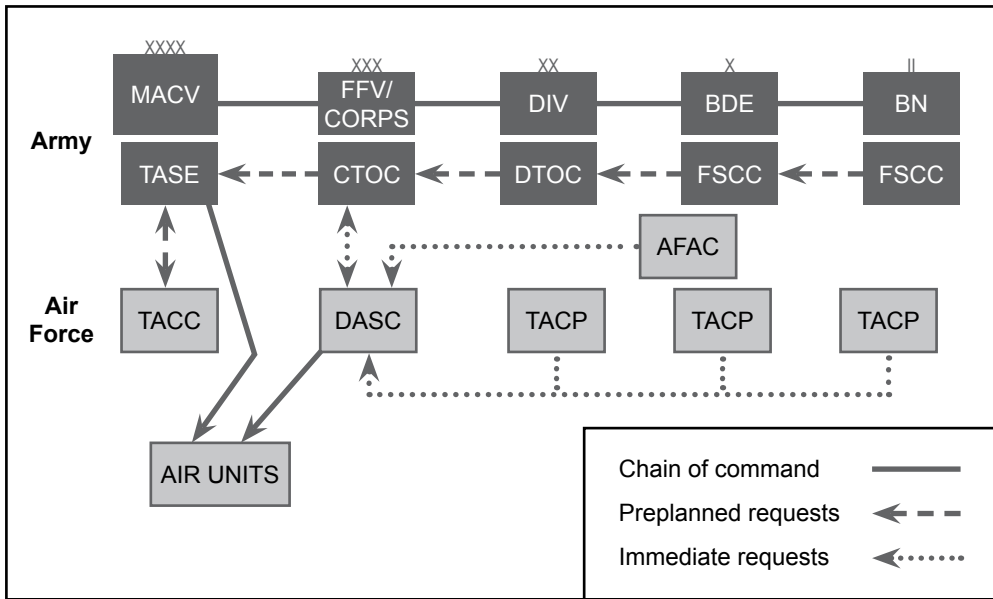
In the late 1960s, within South Vietnam, the USAF operated six tactical fighter wings, comprising 20 squadrons. Ten of these were equipped with F-100 Super Sabres (around 185 aircraft), seven with F-4 Phantoms (about 140 aircraft in all), two with B-57B Canberras (8th and 13th), along with No 2 Squadron RAAF. In addition to these, two squadrons with a total of thirty A-37 Dragonfly aircraft were designated Special Operations Squadrons in South Vietnam.¹⁵⁴

No 2 Squadron flew from Phan Rang Air Base in central South Vietnam, as part of the USAF 35th Tactical Fighter Wing (TFW) under a Memorandum of Understanding between the RAAF and the USAF. The memorandum limited RAAF Canberra operations to within the South Vietnam borders. This wing consisted of between four and six tactical fighter squadrons. It was a small part of the comprehensive TACAIR support system which was deployed to South Vietnam to assist the ground commanders in their aims.¹⁵⁵ No 2 Squadron's fleet of Canberra bombers was Australia's only offensive airborne strike contribution to the war in South Vietnam.¹⁵⁶

The USAF's approach to conducting tactical air warfare in Vietnam had evolved from the Korean War, which was heavily constrained in scope and resources, compared with the global scale of World War II. The Korean War saw the rebirth of forward air control (FAC) aircraft, the joint operations centre (JOC) and both close air support and interdiction operations, all of which had been executed effectively in World War II, especially in the European Theatre. In the Korean campaign, first flying piston-engine P-51 Mustangs, then Gloster Meteor jet fighters, the RAAF's No 77 Squadron distinguished itself in both ground attack and air combat roles.

In Korea, the US Army and a relatively young US Air Force, not yet a decade old after achieving independence from the Army, were required to collaborate in conducting joint tactical air operations in a limited war. However, post-Korea in the mid-1950s, Cold War confrontation became the US's dominant obsession and the importance of tactical air power waned, as top priority was given to building up the USAF's Strategic Air Command, with its focus on global operations using nuclear weapons.

By 1954, Major General James M. Gavin (a top American World War II paratroop commander) was proposing his concepts for helicopter-borne air cavalry and the air mobility of Army troops. This subsequently became accepted US doctrine. In 1957, the USAF's Tactical Air Command and the US Army's Continental Army Command (CONARC) struck an agreement on an air-to-ground system, which, with very little modification, was used throughout the war in Vietnam. Prior to May 1966, the US Army and USAF (then 2nd Air Division, before becoming Seventh Air Force) had separate fire support systems. In May 1966, this changed when the Joint Air-Ground Operations System (JAGOS) officially came into effect. Unlike World War II and Korea, the USAF's tactical air power was now under centralised control, but with decentralised execution.¹⁵⁷



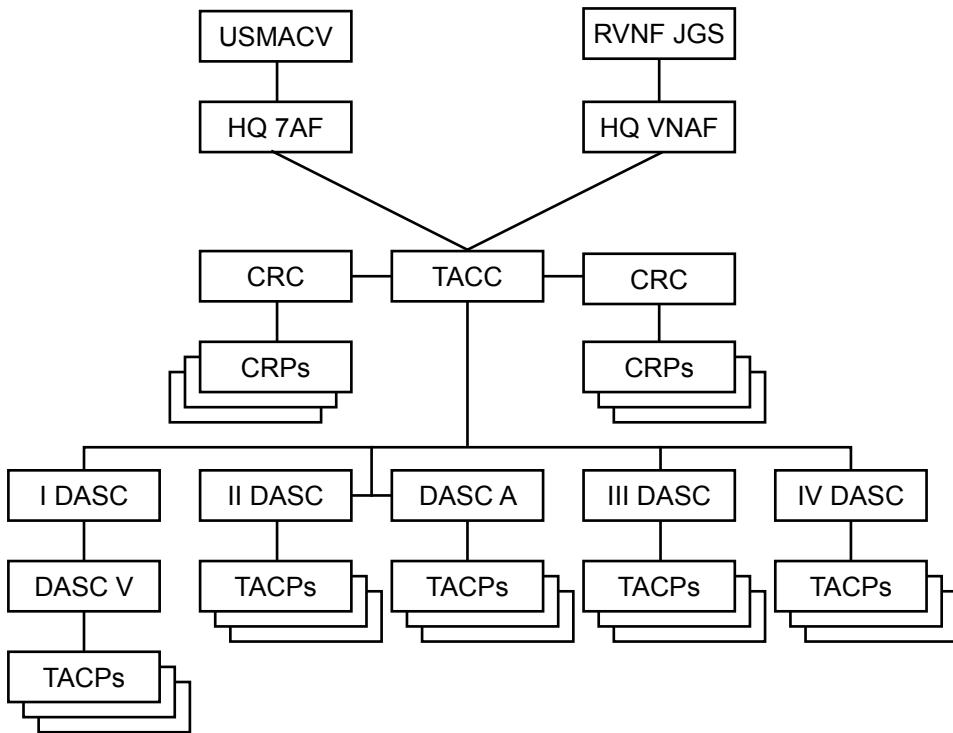
US Army/USAF Joint Air-Ground Operations System (JAGOS),
South Vietnam

(Source: John McGrath, *Fire for Effect*)

The Seventh Air Force’s controlling authority for TACAIR operations in South Vietnam was the Tactical Air Control Center (TACC), located at Tan Son Nhut. Until August 1965, this centre was an air operations centre (AOC). Each of the four corps/military regions had their own direct air support centres (DASCs), initially called air support operations centres (ASOCs), which coordinated tactical air support and air operations in respective areas of operation. For example, the IV DASC was responsible for Mekong Delta operations in IV Corps.¹⁵⁸ The changed nomenclature of the respective centres reflected the USAF’s subservience to the US Army for air operations over South Vietnam.

Commander RAAF Vietnam (COMRAAFV) and his staff officers liaised with Headquarters Seventh Air Force on behalf of No 2 Squadron, although the RAAF erred in not taking up a permanent position within the TACC. This position would have helped avoid confusion within the USAF TACAIR system caused by two different types of Canberra jet bomber operating in South Vietnam—the USAF B-57B and the RAAF’s Mk 20.

Dreadful Lady over the Mekong Delta



USAF/VNAF Tactical Air Control System (TACS), Vietnam

(Source: John McGrath, *Fire for Effect*)

The Vietnam Air Force (VNAF) operated six fighter squadrons (one F-5 Freedom Fighter, three A-37 Dragonfly and two A-1 Skyraider) totalling 115 aircraft, from various locations in South Vietnam. These squadrons were not permitted to fly missions beyond the South Vietnam borders.

To add more complexity, the USAF component of the Tactical Air Control System (TACS) covering strike/bombing missions in support of ground forces in South Vietnam was inaugurated in 1962 in a combined sense (that is, the air forces of two different nations). A VNAF Director and a USAF Deputy Director headed the system, and this combined manning was repeated at DASC level. VNAF squadrons were ‘integrated’ into the TACS in a parallel structure to that of the USAF.

From a tactical aviation perspective, IV Corps corps tactical zone (CTZ) was unique, in that, from the beginning of the conflict, it was primarily a Vietnamese operation.¹⁵⁹ It was not until Operation *Deckhouse V* in January 1967, that US forces were introduced into IV CTZ in other than their advisory roles. Aside from the Mobile Riverine Force (MRF) and small Special Forces units in the Mekong Delta, virtually no US troops had regularly served in the area.

Fighter strike missions were pre-planned a day in advance by each DASC, in response to regional tactical air control party (TACP) requests for strikes, on as many targets as they were

Tactical Air Support to Riverine Operations

allowed to request. IV DASC, based at Can Tho, near Binh Thuy, was an extension of the TACC, providing fast reaction capability to satisfy requests from ground forces for close air, tactical air reconnaissance and tactical airlift support, as well as providing coordination between ground and air elements in IV Corps.



Map 4-1: USAF Seventh Air Force TACAIR bases, South Vietnam

The TACP was headed by an air liaison officer (ALO), a flying FAC himself, who was a key member of the ground commander's staff, and who supervised the FACs under his command. By 1969, the entire IV Corps area, except for the southernmost tip of South Vietnam, was within 15 minutes flying time from the nearest fighter scramble bases at Bien Hoa and Tan Son Nhut.

Uniquely for IV Corps, the ground commander was the only caller of TACAIR and the TACP functioned at brigade level, compared with battalion level, which was the norm in the other three military regions. IV DASC had a vital function of providing close air support for the Mobile Riverine Force operating in the waters of the Delta, and virtually all ground units that came under IV DASC's ambit were ARVN. Even though Can Tho was not too far from the home of the US Army's 9th Division at Dong Tam (less than 50 miles), their requests for tactical air support were directed through III DASC in Saigon. The reason for this was that the 9th Division was part of the US Army's II Field Force Vietnam and was headquartered at Bien Hoa in III CTZ.¹⁶⁰ Adding to the fog of war, until Vietnamization came into effect, the VNAF operated an independent call and response system for its own tactical aircraft.

Dreadful Lady over the Mekong Delta

Once all field requests had been sorted out, the TACC distributed missions as fragments of the overall plan—thus the terms ‘fragmentary order’ (abbreviated to ‘frag order’) and ‘fragged missions’ came into common use. Each frag order detailed the target, time on target, required rendezvous location, flight callsign, aircraft type, weapons loads and assigned rendezvous UHF radio frequency. Daily frag orders for No 2 Squadron were issued by the TACC and came through Headquarters 35th TFW. Daily post-mission (intelligence) reports, which were completed by all aircrew following each bombing sortie, were submitted back up the line in the same manner.

In IV Corps, more than in any other military region, RAAF Canberra (callsign *Magpie*) missions were very much an integral part of both combined and joint air operations. Operations were often conducted in conjunction with VNAF A-1 Skyraiders and A-37 Dragonflies, US Army UH-1 ‘Huey’ and AH-1G Cobra gunships, USAF F-100 Super Sabres, F-4 Phantoms and A-37 Dragonflies. As well, US Navy OV-10 Bronco counter-insurgency aircraft from Binh Thuy, and *Sea Wolf* UH-1 gunships supported riverine operations in the Delta.

Each formation, or group of fighters, would check in with the FAC, who would either give them clearance to descend into the target area for their briefing, or ask them to hold at a safe altitude overhead and wait their turn to deliver their weapons. Providing they had sufficient fuel remaining, the waiting crews had plenty of time to listen in to the FAC directing the strike, observe the target, figure out where the friendly troops were (if any), watch the drift of smoke to determine wind speed and direction on the ground, consider appropriate approach directions and, in general, enjoy (in a professional sense) watching the show. In most situations, holding over the target was no problem for the RAAF Canberra bombers.

As Table 1 shows, up to mid-1969, USAF F-100s had borne the brunt of TACAIR missions into IV Corps, flying more sorties than USAF B-57s and RAAF Canberras combined.¹⁶¹ The FACs, in their ubiquitous O-1 Bird Dogs, well exceeded them all.

	F-100 Super Sabre	F-4 Phantom	A-37 Dragonfly	F-5 Freedom Fighter	Canberra B-57/ Mk 20	O-1 Bird Dog
Service	USAF	USAF	USAF, VNAF	VNAF	USAF, RAAF	USAF, VNAF
1965	8 025	26	0	249	540	9 838
1966	10 851	612	0	858	127	13 599
1967	8 308	1 727	960	442	905	25 298
1968	12 188	1 673	5 094	859	1 899	21 732
Jan-Jun 1969	9 659	1 060	2 759	871	1 225	15 286
TOTALS	49 031	5 098	8 813	3 279	4 696	85 753

Table 4–1: TACAIR sorties flown in IV Corps, 1965 to June 1969

WORKING WITH FORWARD AIR CONTROLLERS

In 1966, the UK Royal United Services Institute (RUSI) heard a lecture by an RAF officer, who had spent three years as the British Air Attaché in Saigon, and who had closely monitored the evolving application of air power to the war in South Vietnam. He stated:

‘If air operations in South Vietnam have demonstrated one thing above all others, it is that the key to achieving discriminate, effective, and close air fire-power, no matter how sophisticated the aircraft, weapons, or sighting systems, is the Forward Air Controller, operating as close as possible to the point of contact, and backed by a first-class tactical air organization . . . it is an exacting and hazardous role, calling at times for great courage and skill.’

Group Captain P W Helmore, RAF ¹⁶²

USAF forward air controllers (FACs) first served in the Mekong Delta as advisors to the Vietnam Air Force in early 1963, training their pilots on Cessna O-1 Bird Dogs. They were based at Can Tho and Rach Gia, in the south-west of the country.¹⁶³ The VNAF developed its own separate FAC force, which worked with ARVN units, communicating in the Vietnamese language. Compared to the US and RAAF FACs who usually flew solo, the VNAF required two crew members in their O-1s—a pilot and an observer.

USAF FACs were also posted as air liaison officers (ALOs) to ARVN 7th, 9th and 21st Divisions in IV Corps. In June 1963, these pilots formed the nucleus of 19th Tactical Air Support Squadron (19th TASS), which commanded all USAF FACs throughout South Vietnam. The squadron was the first FAC squadron in the Seventh Air Force and had its headquarters at Bien Hoa, near Saigon.¹⁶⁴

In IV Corps, a small 19th TASS detachment was initially based at Soc Trang in September 1963 but this was absorbed into 22nd TASS when the new squadron started up in May 1965 at Binh Thuy. The new squadron was created specifically to cover the Mekong Delta, allowing the 19th TASS to limit its operations to the north-western regions of IV Corps.¹⁶⁵ When the US Army’s 9th Division’s 3rd Brigade moved into its new camp at Dong Tam in April 1967, a detachment of 19th TASS FACs (callsign *Tamale*) moved there from Bien Hoa, to support operations in the north of IV Corps and southern parts of III Corps, up to Saigon.

The 22nd TASS functioned until late 1969, providing FAC services from forward operating bases throughout the southern part of IV Corps. Initially flying O-1 Bird Dogs and later Cessna O-2A and O-2B Super Skymaster aircraft, these USAF pilots directed air strikes by VNAF and USAF tactical aircraft, as well as being the major source of controllers for bombing operations by Canberra Mk 20 bombers of No 2 Squadron in IV Corps.

Dreadful Lady over the Mekong Delta



USAF FAC Cessna O-1G Bird Dog
(Source: USAF)

Further north in III Corps, USAF FACs from Bien Hoa, Vung Tau and Base Camp Bearcat supported the US Army 9th Division's 2nd Brigade which covered the Rung Sat Special Zone (RSSZ) bordering on the Delta, as well as the 1st Australian Task Force Tactical Area of Responsibility (TAOR), next door in Phuoc Tuy Province, III Corps.¹⁶⁶

In all, 36 experienced RAAF fighter pilots flew as FACs in South Vietnam as part of the USAF's FAC force. Wing Commander Vance Drummond, RAAF was the first, starting in late 1965 in the Strike Plans Branch at the TACC at Tan Son Nhut, Saigon. He then moved to serve in the III Corps Direct Air Support Center (III DASC) at Bien Hoa, where he checked out on the O-1 Bird Dog and flew some FAC missions. After a short period, he was posted to 19th TASS at Binh Thuy, just before it was subsumed by 22nd TASS. There he served as the ALO for the ARVN 25th Infantry Division, which had moved south from Quang Ngai in 1964 to serve in the Parrot's Beak region on the Vietnam-Cambodia border.

Drummond was succeeded by Wing Commander Tony Powell in December 1966, who had been posted to South Vietnam after serving on the staff at RAAF Academy, Point Cook, where he was the author's commanding officer and friend. He started at the TACC and became Deputy Director at DASC Alpha at Nha Trang, working with the Republic of Korea (ROK) Army's 9th Infantry Division. He moved to 504th Theatre Indoctrination School (504th TIS) at Binh Thuy and finished his tour of duty as ALO, 1st Australian Task Force (with callsign *Jade 01*, thus starting a line of Aussie FACs using the callsign *Jade*).¹⁶⁷



Tony Powell and wife Betty, author's wedding, 11 December 1965

His extensive experience and key contacts gained in-country enabled Wing Commander Powell to facilitate No 2 Squadron's relatively smooth integration into the Seventh Air Force Tactical Air Control System (TACS), which, prior to the arrival of the *Magpies* at Phan Rang, consisted solely of dive-bombing fighter aircraft. While serving at DASC Alpha at Nha Trang, Wing Commander Powell arranged for a joint USAF/US Army trial of the RAAF Canberra Mk 20 bomber in a daytime visual bomb drop under airborne FAC control. This trial was conducted for the Seventh Air Force on 25 June 1967, 30 miles south-west of Tuy Hoa in the central highlands region of II Corps. It was flown by Wing Commander Vin Hill (Executive Officer, No 2 Squadron) with Flight Lieutenant Tom Wright, as navigator bomb-aimer, in

Dreadful Lady over the Mekong Delta

Canberra Mk 20 A84-235. The demonstration was successful in showing that the RAAF Canberra aircraft, using a racetrack, bombing pattern, was suitable for FAC-directed, visual, level, day bombing in South Vietnam.¹⁶⁸

In IV Corps, the FAC operating environment differed from the other three corps areas. Aside from US Army O-1 Bird Dog pilots, who occasionally directed air strikes for their own companies, there were at least three groups whose primary purpose was to serve as FACs in the Mekong Delta region. Firstly, there were the 19th TASS USAF (and RAAF) pilots who supported the US Army's 9th Division out of Dong Tam. Secondly, USAF pilots from 22nd TASS supported ARVN troops. Both sets of FACs flew solo in their O-1 Bird Dogs and directed tactical air strikes by their US and Australian allies, communicating in English language. The third group were FACs from the VNAF, who directed air strikes by their fighter colleagues, speaking in their own language.¹⁶⁹

All three sets of FACs were involved in supporting riverine operations conducted by the allies in IV Corps and yet they functioned virtually independent of each other. This was due to the unique and complex command and control arrangements for tactical air support personnel and organisations. On occasions, one set of US fighters (and/or RAAF Canberras) and their USAF FAC would arrive at a target at the same time as a set of VNAF fighters with their FAC. Both had been directed by the same DASC, but neither side knew what the other had done.¹⁷⁰ This changed by mid-1969, as the Vietnamization program got underway, unifying arrangements as the Americans left the region *en masse*.

Mekong Delta-based USAF FACs were operationally controlled by IV DASC and, officially, the 22nd TASS was a Seventh Air Force unit. However, 22nd TASS FACs actually reported to the US Army's 9th Division Air Liaison Officer (ALO), as well as depending on the US Army for support, supply, transport, facilities, fuel and maintenance.

In the case of urgently required strikes in IV Corps, if a FAC personally detected a large enemy force, he would notify the ground commander, usually starting at battalion level. Should he recommend an air strike, the ground force request then followed parallel channels through the sector or division tactical operations centre (TOC) on the Army's side, and through the sector or division tactical air control party (TACP) on the USAF side. In most cases, the strike also needed clearance from the relevant South Vietnam province chief. If the request was approved at all levels, IV DASC was given the requirement and two options were available, either diverting a strike aircraft *en route* to a pre-planned fragged target or asking the TACC to scramble an aircraft, if available.

When IV DASC was allocated fighters, it advised a USAF control and reporting post (CRP) located at Binh Thuy (callsign *Paddy*), which was equipped with a radar site for identifying and controlling tactical air traffic coming into and out of IV Corps. The same information (rendezvous coordinates, either in Universal Transverse Mercator [UTM] also known as 'grid coordinates', or bearing/distance from a TACAN beacon, and time on target) was sent by IV DASC to the relevant TACP, where it was relayed to the FAC chosen to direct the

Tactical Air Support to Riverine Operations

strike. It was IV DASC's responsibility to make certain that both FAC and strike aircraft were briefed on callsigns, radio operating frequencies (usually UHF), target coordinates and other pertinent information. Once the mission was over, the FAC would provide bomb damage assessment (BDA) and then release the tactical fighters back to *Paddy* CRP, which would provide 'vectors' (bearing and distance) back to home base.



FAC David 42's Mission Brief

Dreadful Lady over the Mekong Delta

The job of a FAC was challenging, as operating a small, bouncing O-1 Bird Dog in a tropical atmosphere, with turbulence building up by the minute, was not conducive to keeping records with a mass of data on targets, friendly troops, etc. Needing to keep their heads up, looking out of the cockpit, rather than use the kneepad typically used by fighter pilots, FACs had a practical way of record-keeping—using chinagraph pencils to write on the side of their cockpit window.

By 1969, most of the 22nd TASS FACs (with callsigns using Christian names, i.e. ‘Alan’, ‘Andy’, ‘Bart’, with by far the majority being ‘David’), controlled No 2 Squadron air strikes, as they patrolled widely in the far south-western parts of the Delta in the ARVN’s 21st Division TAOR. Many *Magpie* crews became familiar with a rendezvous with a *David* FAC over or near the ‘Three Sisters’ during 1969, as repeat missions in this region suggested that the Canberra’s bombing capabilities and good endurance were, at that time, readily appreciated in this interdiction context. Further north, the *Tamale* FACs, headquartered at Dong Tam, undertook FAC work in supporting the US 9th Division while the *Bomber* FACs flew out of IV Corps regions close to the Cambodian border.

Between 1967 and 1969, virtually all southern and central IV Corps bombing missions by No 2 Squadron were directed by USAF FACs of 22nd TASS. An extremely close and unique association developed between aircrew of the two squadrons, to the extent that personnel exchanges were regularly implemented, which enabled each group to better understand the other’s way of doing things. The exchanges also gave the benefit of some social interaction. *Magpie* personnel, including senior executives such as the Commanding Officer, Wing Commander John Whitehead, as well as the author, spent several days visiting Headquarters 22nd TASS at Binh Thuy, experiencing combat from a FAC’s perspective. Likewise, *David* FACs were welcomed at Phan Rang to fly as passengers, sitting on the fold-down ‘jump-seat’ close to the Canberra’s entry/exit door, as well as consuming very popular canned VB beer with the Aussies in the mess after the flight. In June 1970, a reciprocal crew exchange program also began between VNAF FACs and No 2 Squadron along the same lines.¹⁷¹

In order to ensure that a continuous supply of trained FACs could serve in South Vietnam, the USAF set up a ‘FAC University’ where incoming pilots would be taught methodologies applicable to this wartime environment and learn about their FAC aircraft—the 0-1 and later the 0-2 or OV-10.¹⁷² The ‘FAC University’ was actually the 504th Theater Indoctrination School (504th TIS). When this school was transferred from Binh Thuy to Phan Rang in 1968, for a short while it gave No 2 Squadron leaders a good opportunity to introduce new FACs to the vagaries of the Mk 20 Canberra bomber. The school wasn’t there for long however, as it disbanded in late 1969, with the RAAF losing a valuable opportunity to inform new FACs arriving in-country.

COMMUNICATING

Communications between strike crews and FACs were conducted almost universally via Ultra High Frequency (UHF) voice channels, even though FACs and Canberra bombers were also fitted with Very High Frequency (VHF) crystal-controlled radio sets. The FACs generally used VHF frequency modulation (FM) frequencies to talk with the MRF, the Army on the ground or IV DASC.

Magpie crews travelling south from Phan Rang on IV Corps missions would check in with Tan Son Nhut-based control and reporting centre (GRC), callsign *Paris*, with its flight-following radar service. Closer in to the target area, they would change frequency to work with *Paddy* Control and Reporting Post (CRP), where they would receive confirmation of their fragged mission details or be advised of any changes, before being handed over to the FAC's working frequency.

Having two groups of FACs operating on different communications networks in different languages certainly led to some confusion. The problem began in the IV DASC itself, where a combination of poor coordination and communications difficulties could have USAF personnel at the DASC controlling USAF air strikes on a particular target, while VNAF DASC personnel were doing the same with VNAF air strikes, without telling each other. Language problems no doubt contributed.

As all RAAF personnel flying in Vietnam discovered, the Australian accent was difficult to understand for people not familiar with it, including Americans. This was particularly problematic for RAAF FACs serving in South Vietnam, who were required to communicate with Americans on a daily basis in an Americanised communications environment.¹⁷³ It was also a challenge for *Magpie* crews and later became harder when Vietnamese FACs began taking over responsibility for No 2 Squadron strikes in IV Corps.¹⁷⁴

Better understanding between multi-nationals was achieved through use of a 'combat pidgin English' vocabulary, and reflected historical origins. For example, a French word or two crept in to communications, a common one being 'beaucoup' (meaning 'many'), and occasionally featured in bomb damage assessments passed to *Magpie* bombing crews by FACs of both nationalities.



BDA: ‘Beaucoup VC Fish, *Maggie!*’

Because it was impossible for FACs to place every marking rocket on the precise target they wanted bombed, a need developed for communicating distances, generally from the source of the burning smoke marker on the ground. Many FACs developed their own individual styles of describing distance. In III Corps, for instance, where there were lots of trees (and not much else), a FAC may use the top spread of a tree as a reference point, and say ‘one tree equals 10 metres’. In IV Corps, where there were more features on the ground that could be useful guides, canal or river widths featured a lot, and the FAC might say ‘consider that river 100 metres wide’ or ‘bomb two canal widths left of my smoke’.

In 1969, tape recorders and small cassettes were in vogue, and the author took the opportunity of acquiring one from the local base retail store (PX). With assistance from stalwart No 2 Squadron Radio Section personnel, a simple connection was made to enable it to be plugged into a spare intercommunications lead in the Canberra. Thus internal and external communications from the aircraft could be recorded as the mission unfolded. A good cross-section of the missions undertaken by No 2 Squadron in South Vietnam were taped by the author. They were later presented to both the RAAF Museum and the Australian War Memorial where, as at time of writing, they could be heard on the War Memorial’s website.¹⁷⁵



Author and Frank Lonie present *Magpie* Vietnam mission tapes to RAAF Museum¹⁷⁶

VISUAL RENDEZVOUS ICONS

The high intensity of aerial warfare over South Vietnam combined with the limited number of FACs responsible for directing air strikes while simultaneously communicating with troops on the ground, called for constrained voice communications between the respective parties

Dreadful Lady over the Mekong Delta

involved. Once attacking aircraft arrived in their target area, the best way for the FAC to describe the target was to refer to clearly identifiable ground features. In IV Corps this was generally not a problem, although some regions containing lots of small canals that could look the same.

The 'Three Sisters' were located just north of Rach Gia, along the southern coastline bordering the Gulf of Siam/Thailand. Here the tallest hill was only 830' high, but it stood out from the background sea-level lowlands. So did the 'Seven Sisters', or as the VC knew it 'Seven Mountains', which were located on the Cambodian border. Six of these hills were inside South Vietnam in Chau Doc Province, and they rose abruptly from the flat mangrove-covered plain. They served as prominent landmarks for both ground and aerial navigation.



'Seven Sisters', Vietnam-Cambodia border
(Source: Robert L. Moody)

There were also 'Finger Lake', 'VC Lake', 'Mushroom', 'Toilet Plunger', the 'Y Bridge' (crossing the Kinh Doi Canal, south of Saigon), the 'Fishhook' (60 miles north-north-west of Saigon, near Tay Ninh and the Parrot's Beak), the 'Aircraft Carrier' and 'Wagon Wheel' (where six small rivers/canals joined up north Cai Be Province at UTM coordinates WS9855).

Tactical Air Support to Riverine Operations



'Wagon Wheel' Junction

(Source: James Buchanan)

Another was 'Snoopy's Nose', located midway between Dong Tam and Sa Dec, at the confluence of the Mekong River and a number of islands that saw the mighty river split into three distributaries, heading for the South China Sea. Snoopy the dog, who featured in Charles M. Schulz's popular *Peanuts* comic strip at the time, was commandeered by many US units in South Vietnam to become the centrepiece for an unofficial unit badge or emblem.



'Snoopy's Nose', mid-picture

(Source: James Buchanan)

Dreadful Lady over the Mekong Delta

Other more colloquial descriptors included 'the Testicles' (double bend in Song Vam Co Tay, east of Tan An, south of Saigon), 'Gonads' (on the Song Song Be, north of Saigon and south west of Phuoc Vinh) and the 'Prick', not far from Rach Gia in the south west of the Delta.



'The Testicles'

(Source: Michael Stewart)

All were readily visible from the air and saved much communication time when used as rendezvous points, especially as they became well known to aircrews returning to the same location on repeat missions in the area.

TARGET MARKING

The standard method of marking targets for attacking strike aircraft was for the FAC to fire off one of his eight 2.75-inch, white-phosphorous (WP or 'Willie Pete') smoke rockets carried in two tiers under the wings. The O-1 Bird Dog had no gun sight for aiming them and general practice was for the FAC, at least initially, to place a chinagraph pencil mark on the centre of the Bird Dog's front windscreen, and by manoeuvring the aircraft, arrange for the target image to coincide with the windscreen mark. After a few months in action, having moved his head about to get to know the best alignment to achieve the desired effect, aiming at the target to fire smoke rockets became instinctive for the low-flying FAC.¹⁷⁷

Arriving in the target area, the FAC would brief the Canberra crew on the target location and the required run-in direction. With the Canberra flying a racetrack pattern at 3000 feet, the FAC would normally stay above the target at around 1500 feet. When the Canberra called that it was starting to turn onto its final approach to the target, the FAC would do a wingover, dive towards the target and fire off a smoke rocket. Remaining to the side of the incoming bomber's

Tactical Air Support to Riverine Operations

flight path to observe the strike, the FAC then gave a final instruction to the Canberra and cleared it 'hot', meaning the crew were cleared to drop their weapon(s) as briefed. With respective aircrews working very hard during this period, good coordination was needed and as experience built up this sequence became more routine.

One RAAF FAC serving with the 1st Australian Task Force, Flight Lieutenant Dave Robson (*Jade 07*) developed his own special marking technique, initially catering for the RAAF Canberras with their level bombing profile. Instead of firing just one WP rocket, he fired two on the one marking pass. The advantages of this technique, he asserted, were that it gave the Canberra crew a line-up for reference for their attack, and it gave a reference for estimating distances on the ground, as each fighter pilot and FAC probably had different impressions of distance on the ground.¹⁷⁸ He noted that: 'if you wanted to move an aim point say 50 metres beyond the previous bomb, the result might vary widely, and in close situations could mean life or death for the wrong people'. By using two smokes he could use proportional distance consistently for all pilots, for example 'aim two-thirds of the way to the second smoke'.

While this technique may have worked well in Phuoc Tuy Province, it undoubtedly relied on a readily accessible supply of replacement smoke marking rockets, which was often not the case in IV Corps. Further south in the Mekong Delta, FACs often flew long distances from their operating base to respective areas of operation (AO). Flying Officer 'Huck' Ennis (*Tamale 23*) had a 45-minute transit from his base at Binh Thuy to his Ben Tre AO.¹⁷⁹ Indeed, operating in the Mekong Delta region, No 2 Squadron crews were well aware of FACs having to conserve their limited supplies of smoke rockets, especially when a number could smoulder or splutter out upon hitting the water, or when the smoke became diffused in swampy territory.

In IV Corps, it was not unusual for FACs to run out of smoke markers before running out of targets assigned to their missions. While the *Magpies* did experience on a number of occasions having to hold 'high and dry' while the FAC returned to home base to collect a new set of rockets, it was still an inconvenience that was to be avoided if at all possible. If forced to wait for an inordinate period of time before expending their bombs, Canberra crews could always land at the nearest convenient airfield to refuel and then proceed back to Phan Rang. Logbook records show that the author, with Pilot Officer Dick Allchin, did so in Canberra A84-241 on 25 November 1969, after dropping six bombs when conducting a landing zone preparation mission in IV Corps.

The variability of FAC estimates of ground distance was interesting and, aided by post-flight photographic evidence of distance contained in their bombing photos, No 2 Squadron aircrews became quite adept at assessing ground distance from the air. While serving as Bombing Leader at Phan Rang, the author examined No 2 Squadron bombing photos to compare actual distances with recorded FAC advice to the *Magpies*. From 273 photographic images taken on missions during March 1970, it was evident that, on average, FACs were conservative in calling estimated distances by 50 per cent.¹⁸⁰

Dreadful Lady over the Mekong Delta



Canberra bomber's shadow opposite canal bomb strike, IV Corps
(Source: No 2 Squadron Photographic Section)

VIETNAMIZATION OF FACs

By 1969, COMUSMACV General Creighton Abrams' Vietnamization program was underway and in IV Corps, specifically, COMNAVFORV Vice Admiral Elmo Zumwalt's Program ACTOV was running in parallel. In fact, as far back as June 1967, mainly due to a shortage of US specialists, Vietnamization of the Tactical Air Control System in IV Corps had already begun. Because the Delta was primarily a Vietnamese operational area, with the US Army's 9th Division temporarily occupying the northern part from 1967 to 1969, it was the focal point of the program to move VNAF personnel into key positions to eventually take over complete responsibility for air operations. Vietnamization of IV Corps DASC and FACs worked far better than in other military regions, where there were no similar parallel US-Vietnamese ground and air organisations. Until 1967, almost all ground combat troops in IV Corps were ARVN, and all tactical air power based there was VNAF.¹⁸¹

The first step in the Vietnamization of IV Corps was the deployment of VNAF FACs on visual reconnaissance missions but not directing air strikes. By July 1968, VNAF FACs were directing 75 per cent of the VNAF fighter strikes being flown within the ARVN 7th Division's AO in the north-east of IV Corps, prior to US Army's 9th Division arrival. By early 1969, a program had started whereby VNAF FACs would take over controlling all air strikes in the IV Corps region.¹⁸² The methodology adopted was to start with English-speaking VNAF observers, who sat in the rear seat of the O-1 Bird Dog flown by their own countrymen, and then these observers would transfer across to fly with USAF 22nd TASS FACs and conduct air strikes under supervision. After 20 strikes, the VNAF observers would be certified to put in US air strikes.

VNAF FACs flew 505 sorties in January 1969, increasing to 1083 by December 1969. The first VNAF FAC-controlled strike of a USAF tactical fighter occurred on 1 April 1969. By 1 July 1969, VNAF crews were controlling all tactical air strikes (USAF, VNAF and RAAF) for 7th Division ARVN.¹⁸³ Introduction of VNAF FACs met with more resistance from the ARVN than the Americans, mainly due to rank differences.

Some of the 17 English-speaking VNAF FACs who were certified to conduct US air strikes, started in September 1969 to train up other VNAF pilots in the front seat of their Bird Dogs. These pilots, who were of high quality and very experienced—the lowest-time pilot had logged 2300 hours on operations—then flew in the front of USAF O-1s, with the USAF FAC in the rear seat. Finally, VNAF pilots and observers were crewed together to direct all air strikes for ARVN forces in IV Corps. The USAF's 22nd TASS, with which No 2 Squadron had interacted so well over the previous two years, was so successful at training up VNAF FACs, that it had, in effect, put itself out of a job by December 1969.¹⁸⁴

On 7 October 1969, the first *Magpie* mission in IV Corps with a Vietnamese FAC experienced by the author, saw *Eagle 24* directing the air strike on a VC base camp near 'VC Lake', with a USAF FAC (*David 71*) in the back seat of the two-seat O-1 Bird Dog.¹⁸⁵ Four days later, Vietnamese FAC *Eagle 29* directed a strike near Soc Trang.¹⁸⁶ Through November-December

Dreadful Lady over the Mekong Delta

1969, around 50 per cent of No 2 Squadron's daily missions were devoted to the U Minh Forest region in the Mekong Delta. Many of these strikes were controlled by Vietnamese FACs (with callsigns such as *Buffalo, Colorado, Florida, Kansas, Miami, Mexico, Ohio* and *Oregon*). Some of these were without *David* FACs accompanying them, as the US handed over the fighting to the Vietnamese, in preparation for the negotiated withdrawal. Patience was the order of the day, although at times, situations on the ground were very volatile. US fighter pilots were cited for their willingness to talk slowly, make dry runs and help the VNAF FACs as they controlled them in English.¹⁸⁷

It must have been more challenging for VNAF pilots and observers to communicate with faster talking Australians. The US force withdrawal from IV Corps saw an increase in misunderstandings due to Aussie-aircrew communications difficulties with Vietnamese FACs, many of whom had only a basic comprehension of the English language. In April 1970, No 2 Squadron *Unit History Sheet* (Form A51) recorded that due to 'communications difficulties with IV Corps FACs', two missions were diverted into III Corps'.¹⁸⁸ One consequence was the increase in prematurely-discharged smoke rocket markers, from the Vietnamese FACs, presumably eager to show their quick reaction time, and who launched a 'Willie Pete' in response to virtually any *Magpie* radio transmission, frequently before the Canberra crew was in position and ready to drop bombs.¹⁸⁹

Nevertheless, as the 'exchange visit system' between the VNAF and No 2 Squadron developed, respective squadron members got to know each other better and learnt how best to talk to each other in the target area, with good results. By March 1970, VNAF personnel in IV DASC controlled all USAF, Australian and VNAF air strikes in IV Corps, and the VNAF proceeded to man and equip 66 TACPs, co-located with their USAF counterparts.¹⁹⁰

TARGET LEGITIMACY

Many regions of the Mekong Delta were relatively heavily populated and this caused some concern amongst No 2 Squadron bombing crews, as to the legitimacy of some of the targets they were attacking, particularly innocent-looking houses (called 'hooches' in TACAIR jargon) lined up neatly in rows, located along canals and rivers. Targets attacked by Canberra bombers in II and III Corps were frequently exposed or suspected underground bunker networks located very much in open country away from populated villages. In I Corps they were more than likely roads and truck parks, part of the extensive branches of the Ho Chi Minh trail network, mostly hidden under high trees or jungle canopy in mountainous terrain. In the flat wetlands of IV Corps, however, signs of habitation were dispersed regularly throughout the vast waterway systems of the Mekong Delta.

A USAF report, commenting on political clearances, noted: 'the dense population of the area made it more vulnerable to friendly or non-combatant casualties than some other military regions (CTZs)' and concluded that this was a problem in the Delta.¹⁹¹ One tactic of the enemy in the Mekong Delta region was to move in close proximity to either friendly or civilian

Tactical Air Support to Riverine Operations

concentrations, such that any air strike or artillery fire was impossible without causing civilian casualties. A curfew was also widely used, especially on rivers, canals and highways, to keep civilians out of the area, so that any suspicious movement detected was assumed to be by the enemy.¹⁹²

Because of the close relationship generated between the *David* FACs and *Magpie* crews through their informal exchange program, a lot of trust had been built up, such that the Canberra bombing crews felt reassured that their targets were legitimate. This meant that coalition staff, working in respective TACPs, DASCs and the TACC, understood which regions were occupied by the enemy and which were off limits, and that the province chief had indeed given approval for the strike. In addition, the Canberra crews had confidence that the FACs had the integrity not to take short cuts, or run the risks of unnecessary collateral damage—the killing of innocent farmers or fishermen and their families.

In order to provide the high degree of discrimination necessary to avoid injury to civilians and damage to their property, appropriate rules of engagement (ROE) were put in place, and known by all aircrews.¹⁹³ Nevertheless, when targets near clusters of ‘hooches’, located along the narrow canals and rivers of the Delta, were pointed out by FACs directing *Magpie* strike missions in IV Corps, it was natural for some doubts to creep into the minds of the bombing aircrew. As former No 2 Squadron navigator/bomb-aimer Wing Commander ‘Wang’ Miller pondered: ‘... how did the FAC determine which huts had VC in them and which had just ordinary Vietnamese rice farmers/fishermen and their families?’¹⁹⁴

The basic answer to this question was that the FAC had made painstaking efforts to conduct visual reconnaissance of the area, as well as maintaining close contact with, and sometime living with, troops on the ground. It was their responsibility to know their territory intimately, and to be able to detect any changes that suggested enemy activity. FACs spent more of their time on reconnaissance than putting in air strikes.

Where there were any doubts, American and RAAF FACs could be easily questioned in English, and such doubts resolved through normal air-to-air communications. A common response was that the region was a ‘free-fire zone’ and prior bombing clearance had been obtained from the province chief. RAAF FAC ‘Huck’ Ennis noted that free fire zones were established by moving Vietnamese civilians out of villages. After this had been done, any movement or sighting would be assumed to be VC.¹⁹⁵ Bombing crews had no alternative but to trust the FAC not to make mistakes. When it came to the South Vietnamese pilots, there was an increasing degree of uncertainty brought about by language difficulties.

However, mistakes could be made. On a IV Corps mission flown by navigator/bomb-aimer Pilot Officer Peter Murphy in 1970-71, the crew were briefed by the VNAF FAC that there were no friendlies within four kilometres of the target, along the bank of a large river. As the Canberra neared its release point, a sampan with about 25 people on board came around the bend in the river close to the target. Pilot Officer Murphy had the presence of mind to refrain from triggering the bomb release button as the *Magpie* flew over the target area. His pilot

Dreadful Lady over the Mekong Delta

asked the VNAF FAC to confirm who the people were, and they could tell by the tremor in the FAC's voice, that those on board the sampan were indeed friendlies. On that mission, a nasty incident was avoided and innocent people's lives were saved.¹⁹⁶

On the whole, the high degree of interaction and coordination between airborne FACs and their US and Vietnamese ground counterparts made it highly unlikely that targets assigned to *Maggie* crews were anything but enemy locations. During the Vietnam War and in the years since, to the author's knowledge, there has been no evidence to suggest that No 2 Squadron crews bombed anything other than legitimate military targets. The targets were as directed by USAF and VNAF FACs, performing their duties in close collaboration with forces on the ground, observing due process, and engaged in combat with enemy troops. Nevertheless, as many conflicts since then have shown, collateral damage could happen from time to time, especially in guerrilla warfare situations, waged in close proximity to civilian populations. It is not unreasonable to assume that some doubts still persist to this day.

CHAPTER 5

RAAF CANBERRAS AND RIVERINE OPERATIONS

THE CANBERRA'S SUITABILITY

Of the variety of terrains throughout the four corps areas of South Vietnam, No 2 Squadron's Canberra Mk 20 jet bombers were uniquely suited for supporting riverine operations in the Mekong Delta.¹⁹⁷ Advantages included, but were not limited to:

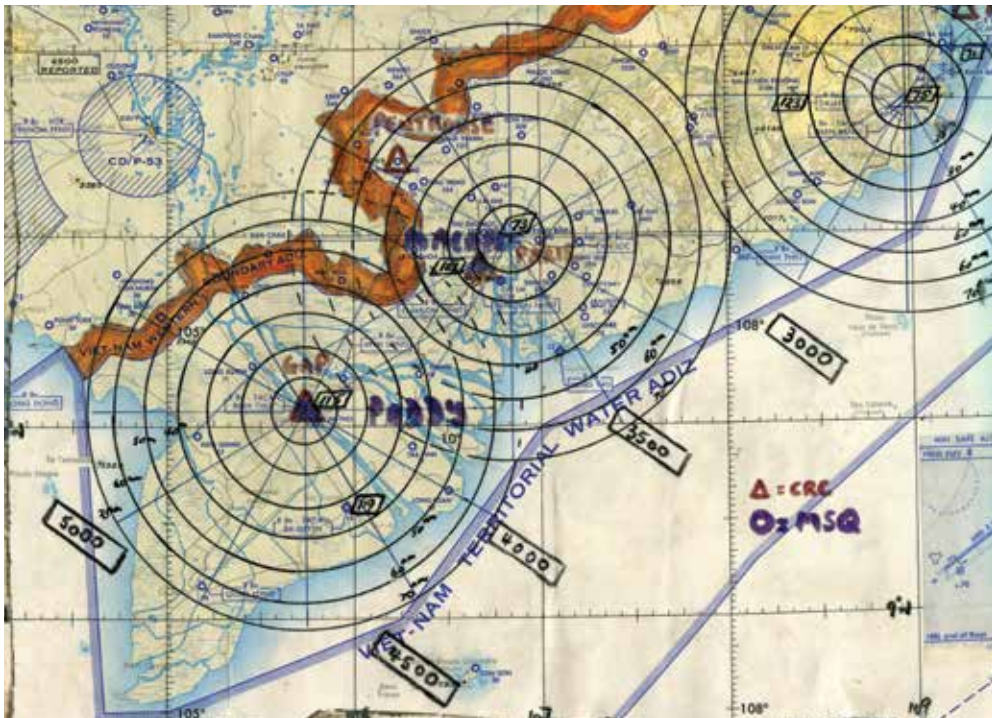
- good range and endurance,
- ability to fly below low cloud bases,
- stable level bombing configuration, and
- inherent bombing accuracy.



No 2 Squadron Mk 20 Canberra A84-228 *en route* to its IV Corps target

RANGE AND ENDURANCE

The Mk 20 version of the Canberra jet bomber, built at the Government Aircraft Factory (GAF) in Melbourne, Victoria, had two Rolls-Royce Avon Mk 109 engines, rated at 7500 lb thrust each. It was fitted with three fuel tanks in the fuselage, one bladder-type tank in each wing and could carry one tank on each wingtip.¹⁹⁸ Total fuel capacity, using wingtip fuel tanks, was 21 600 lb, which reduced to 17 600 lb in the configuration used in South Vietnam where bombs were carried on the wingtips in lieu of tanks.



Map 5-1: Author's TACAN-based navigation map

Even with a full load of high explosive bombs and fully fuelled up, the Canberra had over three hours of endurance. The distance from Phan Rang, located in II Corps in central South Vietnam, to the furthest south-west corner of the Mekong Delta, was 320 nautical miles, which took 45–50 minutes of flight time each way. This gave *Magpie* crews well over an hour of loiter time in the target area, if required. The author's longest combat mission in Vietnam was flown to IV Corps with Wing Commander Jack Boast, the Commanding Officer at the time, on 3 March 1970, clocking up 3 hours 55 minutes 'wheels-to-wheels' in Canberra A84-231.¹⁹⁹

The average sortie time for each Mk 20 Canberra mission in Vietnam was just over 2 hours, based on 16 758 hours flown over 8026 sorties. The Canberra's endurance did not go unnoticed by a USAF analyst who noted that: 'The aircraft's long endurance has proved a most useful feature, and FACs tend to hold Canberras and use them when shorter-endurance aircraft are not immediately available'.²⁰⁰

LOW LEVEL UNDER-THE-WEATHER ABILITY

Most, if not all, tactical fighter aircraft in South Vietnam were dive bombers because the aircraft had to be in a dive for the weapon sight to acquire the target. The TACAIR system, especially the interaction between the fighter pilots and the FACs, was based on this performance profile. The introduction of the level-bombing Canberra into this environment took some

RAAF Canberras and Riverine Operations

getting used to by those involved. Where the Canberra had a distinct advantage over these dive bombing aircraft was in bad weather conditions.

Tropical monsoon weather was a key feature of the climate in the lush Mekong Delta. From June to October, with consistently high levels of moisture and temperature, clouds would build up rapidly, as soon as the sun rose over the horizon. Strike missions in IV Corps needed to be planned to get underway early in the morning, before daily thunderstorms took over. In such situations, the base of the cloud might lift to around 1500 ft above the terrain. RAAF Canberra crews were capable of flying below this altitude to drop their bombs, whereas the rest of the high-performance allied TACAIR fleet, dive bombing aircraft, which normally started their attacks from 4000 ft or higher, were somewhat constrained by the extant cumulonimbus 'thunder bumpers'.



Phan Rang seasonal contrast

If the weather was fine at Phan Rang, it was usually poor in IV Corps, and vice versa. Outside the monsoonal season, the weather was sometimes quite clear, but an extensive misty haze or dust could rapidly settle over the countryside, causing major visibility problems for flyers, resulting in many deferred or cancelled missions. Numerous No 2 Squadron reports record instances of Canberras being diverted from IV Corps missions due to weather problems.²⁰¹

While the inclement weather affected all aircraft equally, the Canberra's loiter capabilities gave its crew extra time to find alternative ways of overcoming these difficulties, whereas USAF tactical fighters such as the F-100 Super Sabre, operating in IV Corps, had to refuel from a USAF KC-135 tanker orbiting in the 'feet-wet cab rank' offshore, over the South China Sea.

Air Vice-Marshal Graham Neil, RAAF (Retd), who flew as a FAC (callsign *Issue 21*) in South Vietnam in 1969–70, and who directed several bombing strikes by the author, has recalled that many attack aircraft would arrive in his tactical area of operations in III Corps, having been unable to drop ordnance in IV Corps, due to low cloud layers.²⁰² For its first year in-country (1967-68), No 2 Squadron found this unsettling and, on numerous occasions, Canberra crews were forced to turn back and look for alternative targets further north, when the weather clamped in. Between late February and late April 1970, 11 *Magpie* missions were diverted from IV Corps to III Corps and 19 were cancelled due to bad weather in the Mekong Delta.²⁰³

Dreadful Lady over the Mekong Delta

The Canberra Mk 20 was not fitted with any weather radar, to assist in avoiding storms. Fortunately, in Vietnam, the squadron was able to avoid most threatening cloud build-ups with the help of friendly USAF flight-following radar operators. The control and reporting centre (CRC), callsign *Portcall*, located on a small Hon Tre Island, north of Phan Rang, and *Paris* CRC, located at Tan Son Nhut, near Saigon, would monitor TACAIR traffic travelling to and from assigned targets and warn of hazards ahead, including bad weather.

The amazing variety of different aircraft, military and civilian, travelling through South Vietnam airspace, in a region of total allied air superiority, created a uniquely hazardous situation, especially when using disparate communications networks. Despite the efficiency of the CRCs, it was not uncommon for a Canberra crew proceeding to its IV Corps target with a full bomb load, to sight unreported combat aircraft, or even civil airliners flying in and out of Saigon, at a similar cruising altitude of 24 000 ft or so. It was fun to speculate what passengers, sipping their in-flight drinks, might think, looking out their window at a strange-looking bombed-up military aircraft flying close by—a peculiar feature of a bizarre war.

However, once the *Magpie* changed frequency and descended down into the target area, the crew had to be on 'auto alert' and place full reliance on their wits and visual sightings of conflicting traffic, especially in and out of cloudy conditions which were often the order of the day. In his report for March 1968, No 2 Squadron Commanding Officer, Wing Commander David Evans, noted that: 'Weather conditions throughout South Vietnam have been extremely poor during the month. Generally, daylight visibility has rarely exceeded three miles in thick haze which has made visual bombing difficult and greatly increased the collision risk in busy target areas. Crews have become surprisingly adept at a heads up/instrument bombing run.'²⁰⁴

'Guard' was the term used for emergency communications frequencies. All aircrews monitored Guard in order to be aware of possible dangers, for example, warnings of artillery firings or B-52 multiple bomb drops. However, Guard's utility was diminished, at times, by extraneous chatter, much of it originating from unrestrained, combat-shocked US Army helicopter pilots ('cowboys'). A real emergency call or hastily made, mid-air-collision warning could be, and sometimes was, missed as a result. Some of this chatter can be heard on audio recordings of missions, taped by the author, and held by the RAAF Museum and the Australian War Memorial.²⁰⁵



Beside the pilot in the Canberra's cockpit

DAYLIGHT VISUAL LEVEL BOMBING

From the outset of its arrival at Phan Rang in April 1967, the Mk 20 Canberra of No 2 Squadron RAAF was an enigma to much of the tactical air community operating in South Vietnam. For several months, as the squadron got up to speed in adapting to a complex wartime environment, most missions were confined to ground-controlled radar-directed bomb (*Combat Proof*) drops. Many of these were flown late at night or in the small hours of the morning and offered very little, if any, feedback on target damage. This proved to be frustrating for those Australian crews with years of experience flying visual bombing missions against communist insurgents from RAAF Base Butterworth, Malaysia in the 1960s.²⁰⁶

However, as already discussed previously, aided by strong advocacy from Wing Commander Tony Powell, Headquarters Seventh Air Force was soon persuaded to frag *Magpies* for daytime visual level-bombing strikes under FAC direction. It wasn't long before the results proved this change was most worthwhile. It also raised collective morale at the squadron.

Former RAAF historian, Dr Alan Stephens, in dealing with the history of the RAAF in *The Royal Australian Air Force, The Australian Centenary History of Defence, Volume II* noted: 'Low level daylight bombing ... started in September (1967) with forward air controllers invariably used to mark targets and direct attacks. So good were the results that by November half of the Squadron's sorties involved visual bombing, even though challenging terrain, poor weather and ground fire often made low-level attacks difficult. Contrary to the expectations of its critics, the Canberra proved to be an excellent close support aircraft in the prevailing conditions.'²⁰⁷



USAF F-100 rolls in to attack VC in IV Corps tree line

Sir Neville McNamara, former Chief of the Defence Force Staff, who served as Commander RAAF Vietnam (COMRAAFV) from April 1971 to February 1972, also noted: 'The Canberra bomber ... proved itself as an aircraft capable of delivering its attack under circumstances when the aircraft that would normally have been employed by the USAF could not do so. In other words, it could do bombing of ground targets at low level when the cloud base precluded, say, F-4s from getting in. I know that utility was highly valued by the US forces, and there were many times when the Canberra provided very valuable support in that regard.'²⁰⁸

The RAAF Canberras were the only full-time level-bombers based in South Vietnam. The only other allied strike aircraft conducting level bombing missions over South Vietnam was the USAF B-52 Stratofortress flying in from bases in Guam, Thailand and Okinawa. Each B-52 dropped, typically, 108 bombs on each run—84 × Mk-82 500 lb bombs and 24 × M.117 750 lb bombs.

Under Operation *Arc Light*, B-52s conducted saturation bombing of area targets from high altitude, usually over 30 000 ft and, in the majority of cases, under radar control from the ground. The area covered by each B-52 in an *Arc Light* strike was a three kilometre by one kilometre box. With so many bombs raining down from each B-52, it paid any aircrew

RAAF Canberras and Riverine Operations

in the vicinity of these Arc Light strikes to be very alert and keep well out of the way. An impending Arc Light strike was usually announced to all aviators over the commonly-used Guard emergency frequency, as an 'airborne artillery warning'. The name of these warnings emphasised the Army-centric nature of South Vietnam 'close air support' missions under MACV. It was definitely one message on a crowded Guard channel that the Magpies took seriously in order to avoid blundering into a mass of bombs falling from on high.

As previously noted, all other strike aircraft in South Vietnam were essentially dive-bombers.

MISSION BRIEFS

MISSION BRIEF						
A/C No.	Callsign	Mission No	CRC	MSA/PAC	Freq.	
AS4-247	MAGPIE 31	5006	PADDY	DAVID 71	344.7	
Recall	Hawk Squawk		Mig Call	Sam Call		
IR	Pre of 00	Post of 00	IN CLEAR	IN CLEAR		
	05	26				
Arclite	B.R.A.		Survival	Other		
AQ	5000'		SK	-		
WEATHER				NOTAMS		
LOW LEVEL		HIGH LEVEL		115 R/W 1ST 1300' OUT 73 TACAN OFF		
W/V	TEMP	W/V	TEMP			
1000	060/10 +	5000	/ +			
3000	080/12 +	10000	/ +			
3000	110/15 +	10000	/ -			
4000	120/20 +	20000	/ -			
QNH	1012.2MB	30000	/ -			
ETS	ETD	ETA R/V	ATS	ATD	ATA	DURATION
0730	0740	0820				
REFUSAL	SAFETY	ACCN. 50K	ACCN. 100K	BINGO FUEL		
125 KT	170 KT	20 SEC	25 SEC	4800LB		
R/V COORDS	TRACK		ALTITUDE	EST TIME		
220/57/115	238°		24.5	37 MIN		
<u>ARTILLERY</u>						
STATION	RADIALS		RANGE		MAX HT	TIMES
	FROM	TO	FROM	TO		
75	260	350	2	7	8000	UFN
PT	360	030	25	37	18500	0800-0830

No 2 Squadron navigator/bomb-aimer's mission brief

Dreadful Lady over the Mekong Delta

Navigator/bomb-aimers of No 2 Squadron made up their own mission briefs for carrying on board the Canberra, recording with erasable, chinagraph marking pencils on self-made, clear-adhesive-covered, cardboard charts for ready use in flight. These mission briefs contained details obtained from the frag order for their mission, as well as other useful information, such as predicted artillery and weather. Notices to Airmen (NOTAMs) concerning the status of relevant alternative recovery airfields, and pre-calculated take-off speeds based on total weight of the Canberra Mk 20 bomber, were also included as shown in the photo of the author's actual brief.

Once armed tactical aircraft arrived in the target area, the crew would advise the FAC of the aircraft's mission number and weapons carried. The FAC would then brief the incoming aircrew on:

- the nature of the target,
- its location,
- his plan of attack, including the number of bombs per run and preferred fuze settings,
- location of friendly troops,
- the nearest emergency landing field and/or bail-out area (sometimes in the Delta it was 'feet wet', meaning 'over the sea'),
- local QNH (altimeter setting) at the nearest airfield, usually Binh Thuy,
- how he intended to mark the target, normally with a white phosphorous smoke rocket, and
- after consultation with the strike crew, the preferred bombing run-in direction.

CANBERRA BOMBING SYSTEM

As a bombing platform, the Canberra was very stable, although it didn't have powered controls or an autopilot. As former No 2 Squadron Canberra pilot Flying Officer Bob Sivyer observed: 'It was hands-on all the time, and the secret was to trim the aircraft out at (bomb) delivery speed, so that adjustments to height and direction were finger-tip movements'.²⁰⁹

Virtually the whole bombing system was either of World War II vintage or designed during that time frame, including the instruments fitted at the bomb-aimer's position in the nose, the relatively large bomb bay for such a moderately sized aircraft and the bomb carriers and fittings in the bomb bay. The bombs that No 2 Squadron dropped during its first year in South Vietnam were also of World War II vintage. Armourers familiar with servicing and maintaining Avro Lancaster bombers with RAF Bomber Command in the 1940s would have been entirely at home with the RAAF's Canberra features in the 1960s—time stood still for over two decades.

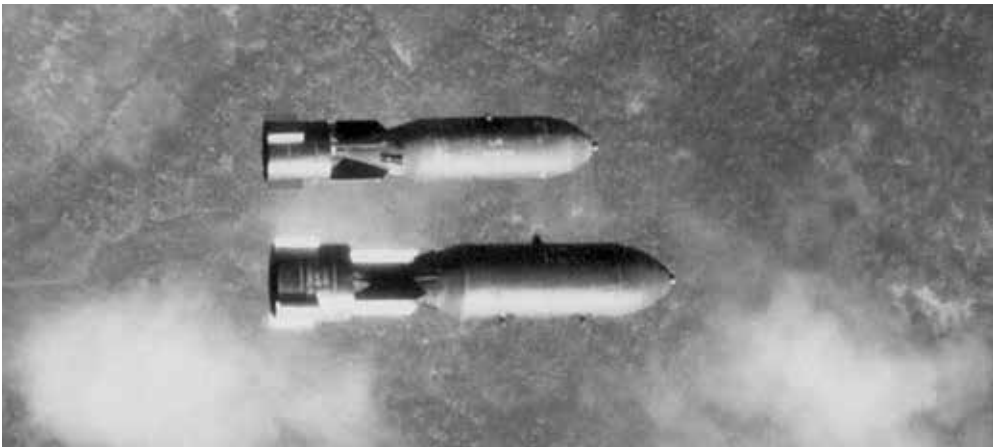
The Canberra Mk 20 bomb bay was built around a main longitudinal bomb beam which was an integral part of the aircraft's structure. In order to carry up to ten World War II-vintage 500-lb or six 1000-lb bombs internally, two auxiliary bomb beams were connected to, and beneath, this main beam. UK-origin, Avro triple-bomb carriers were initially connected to

RAAF Canberras and Riverine Operations

these beams, and they could each carry three 500 lb or 1000 lb bombs. These bomb types were the standard inventory for over a year, comprising various marks and were fitted with several different types of tails (fins), fuzes and arming mechanisms, depending on the mission.²¹⁰

In April 1967, for the first month of high level, *Combat Proof/Combat Skyspot* ground radar-controlled, bombing missions, the *Magpies* carried an internal bomb bay load of six single-lug, medium capacity (MC) Mk IV 500 lb or general purpose (GP) Mk I 1000 lb bombs. Three bombs were carried on each of two Avro triple carriers, with two on the normal rack and a third jammed up in between, as tight as possible to the first two. By mid-May, No 2 Squadron armourers had managed to squeeze eight 500 pounders into the bomb bay on three triple carriers, while two twin-lug, Mk XIII 500 lb bombs were carried on the Canberra's wingtips.

Unfortunately, due to unstable force moments around the single lug used on the Mk IV 500 lb bombs, when the bomb bay doors were opened, turbulent airflow would often wobble these bombs on their lugs. Even when the bottom bomb was released first, the other two would also shake in the bomb bay and wobble upon release.²¹¹ No doubt this problem was known before the Canberras arrived at Phan Rang. Armourers at No 1 Central Reserve at Kingswood, between 25 January and 15 February 1967, worked in three shifts per day, seven days a week, to convert British single-lug bombs to American double-lug configuration under Operation *Rapid Pack*. These Australian Mk XIII bombs were then hastily packed and sent by ship to South Vietnam.²¹²



Two 500 lb medium capacity bombs cleanly leave the Canberra bomb bay
(Source: No 2 Squadron Photographic Section)

May 1967 was a bad month as significant armament troubles beset the squadron. A number of hang-ups occurred (when bombs failed to release from the carrier), as well as bombs falling off the carriers inside the bomb bay. Fortunately, safety devices worked as they should, preventing the bombs from arming. These defects continued for a month or so, mainly attributed to electrical faults with the Avro triple carriers.²¹³ As John Bennett rightly pointed

Dreadful Lady over the Mekong Delta

out: 'These problems had highlighted the danger of going to war without having established and trained with these configurations in peace-time'.²¹⁴

The early bombs also had a tendency to lose their tail units, presumably weakened by the in-flight buffeting. There was also a report of 1000 lb bombs 'corkscrewing' as they fell from the Canberra's bomb bay.²¹⁵ Remedial action to counter the latter problem, such as expanding the time taken between individual bomb releases from the bomb bay, appeared to have little effect.²¹⁶



Two 1000 lb bombs fall awkwardly from the Canberra bomb bay
(Source: No 2 Squadron Photographic Section)

In May-June 1967, a small team from the RAAF's Aircraft Research and Development Unit (ARDU) flew into Phan Rang to investigate causes of the malfunctioning Avro triple carriers, but were unable to resolve the problems. The defective carriers were accordingly replaced by 'new' Avro 100/1000lb standard carriers.²¹⁷

Difficulties with the older bombs continued, however. In January 1968, it was found that when the Mk-37 bomb tail was fitted to the 1000 lb Mk-IV bomb, it caused a high rate of instability. This led to an unacceptable unexploded bomb (UXB) rate, so the squadron ceased using them. As the only tails remaining in stock were the longer Mk-13s, the squadron was forced to rearrange the Canberra's bomb bay configuration. Instead of the normal load of six being carried in the bomb bay, only four could be fitted in.²¹⁸

Prior to moving from Butterworth to Phan Rang, No 2 Squadron's bombers had flown only with fuel tanks attached to their wingtips when engaged on extended range missions—

RAAF Canberras and Riverine Operations

No wingtip-mounted bombs were carried. In 1966, ARDU, tested out and cleared a combination of a US-made, 14-inch, twin-suspension MA-4A bomb rack and locally built pylons bolted onto the wing-tips.

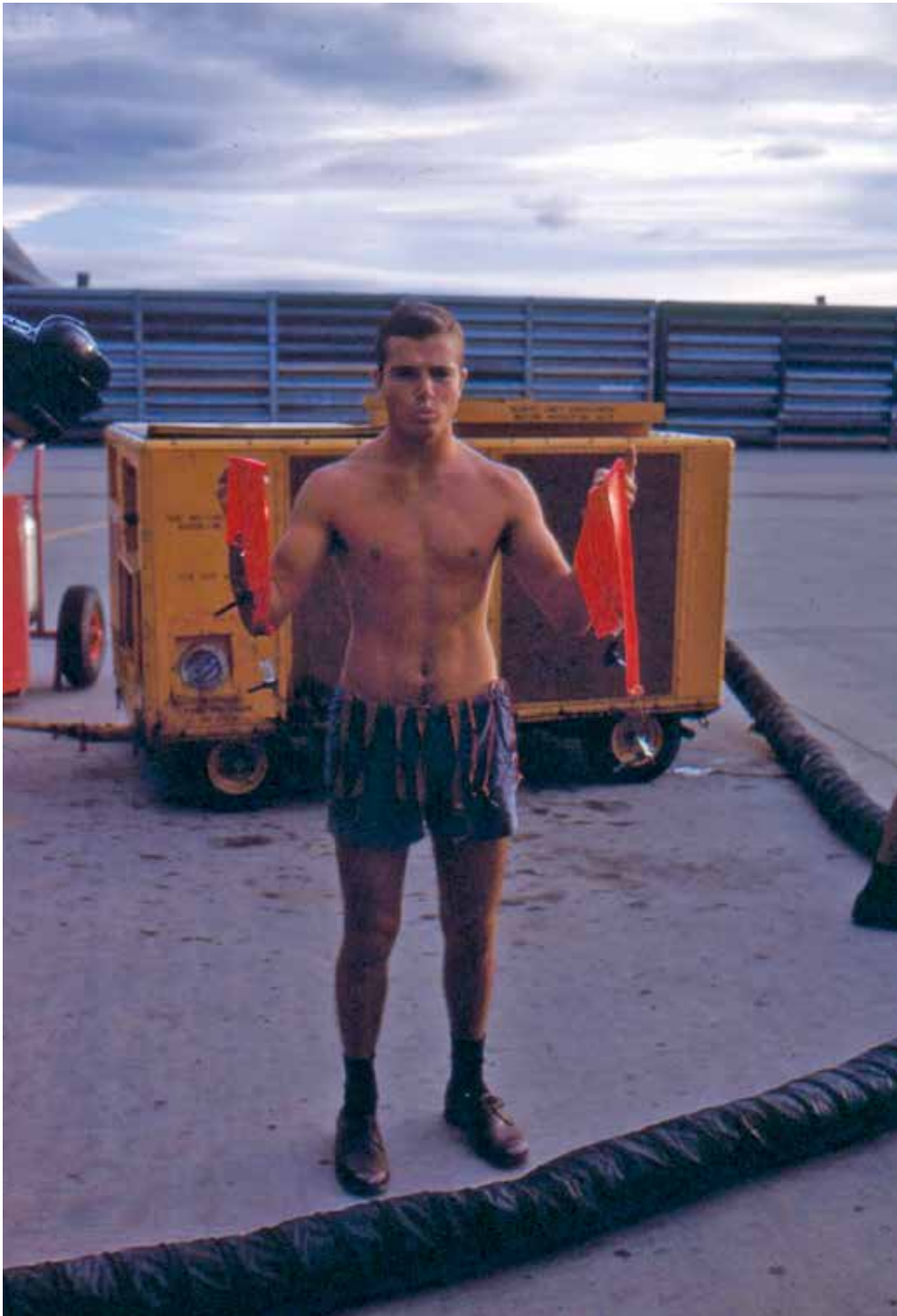
In conjunction with engineers from the Design and Production Departments of the Government Aircraft Factory (GAF), the manufacturers of the Mk 20 Canberra, the RAAF rewired the Butterworth-based aircraft destined for Vietnam service, connecting the bomb release system to each wing-tip and mating the MA-4A rack/pylon combination with the tips. The Canberras flew across to Phan Rang, fitted for, but not with, the wingtip bombing system, which was then promptly introduced by No 2 Squadron engineering staff. This enabled the carriage and release of an additional two Mk XIII 500 lb bombs on each combat mission, beginning on 15 May 1967.²¹⁹

However, this rack-pylon combination was only cleared up to a maximum capacity of 820 lb. Despite the pleas of the Commanding Officer, No 2 Squadron, Wing Commander R.B. (Rolf) Arosen, in May-June 1967, for ARDU to expand clearance of the wingtip system to carry the 1000 lb bomb, it wasn't done.²²⁰ Thus No 2 Squadron Canberras, for over a year in South Vietnam, carried only 500 lb bombs on their wing-tips.

Knowing that stocks of World War II bombs held by the RAAF would soon be used up by operations in South Vietnam, the RAAF looked to US sources for additional supplies. An agreement was drawn up with the Australian Government paying for the supply of a replacement bomb—the US-supplied 750 lb M.117 bomb.²²¹ The olive-green coloured M.117 bomb was initially used in the Korean War. It was normally filled with Tritonal—a mix of 80 per cent trinitrotoluene (TNT) and 20 per cent atomised aluminium powder. The M.117 was longer than most of the earlier bombs, so this meant that no more than four could be fitted into the Canberra's bomb bay and only then in a tight squeeze.²²²

The M.117s dropped by No 2 Squadron used US-made mechanised M904 nose fuzes and M905 tail fuzes, both of which were fitted with arming vanes that rotated with the slipstream. Each bomb was connected to an MA-4A rack by twin suspension lugs, 14 inches apart. Two wires, clamped to the racks, connected the bomb electrically, via the bomb bay and wingtip pylons, to the Canberra's internal bomb release system. One wire joined the forward M904 fuze, the other connected to the rear M905 fuze. A safety pin was also placed across the fuze-arming vane to stop any wind motion on the ground from turning the small propeller and starting the arming process. Prior to boarding the Canberra, the aircrew would ensure that the duty armourer had withdrawn the safety pins, which were made readily visible with attached lengths of red tape.

Dreadful Lady over the Mekong Delta



Armourer LAC Evan 'Grassy' Hopper with M.117 bomb safety pins

RAAF Canberras and Riverine Operations

USAF tactical air units had available to them a greater variety of fuze options and specialised adaptor kits than did the *Maggies*. For example, neither the low-drag ('slick') nor high-drag version of the Mk-82 500 lb bomb was used by No 2 Squadron in South Vietnam, but were commonly carried on USAF F-100 and A-37 fighter aircraft. When dropped accurately, they proved to be most useful against targets on, or close to, the surface.

On 31 March 1968, No 2 Squadron dropped the first M.117 750 lb bombs in anger. The Commanding Officer, Wing Commander David Evans, and navigator/bomb-aimer Squadron Leader Mark Robin began what was, in effect, a four-day long initial trial of these new bombs.²²³ Over this period, one mission per day carried four M.117s in the bomb bay and one on each wingtip, for a total of six per sortie.²²⁴ The remainder of the squadron continued to conduct a mix of *Combat Proof/Combat Skyspot* and visual bombing (VB) missions using both 500 lb and 1000 lb bombs, with a plan to simultaneously exhaust both types of bomb during July 1968.²²⁵

A more extensive seven-day trial began on 13 June 1968 and, for the duration, between five and eight sorties per day carried and dropped six 750 lb bombs, with the other missions continuing to use the older bombs, configured with four 1000 lb bombs in the bomb bay and a 500 lb bomb on each wingtip. The trial finished on 20 June 1968 with only a single sortie out of the daily eight carrying the six 750 lb bomb load.²²⁶ Thereafter, the squadron reverted to disposing of its vintage bombs, dropping, on average, 52 × 500 lb and eight 1000 lb bombs daily. The two night *Combat Proof/Combat Skyspot* or day visual missions each carried four 1000 pounders in the bomb bay and one 500 lb on each wingtip, while the remaining six daily missions were configured with six 500 pounders in the bomb bay and one on each wingtip.²²⁷ Finally, on 11 August 1968, sixteen months after starting bombing operations in South Vietnam, the eight Canberra bombers of No 2 Squadron began to drop a regulation 48 × M.117 750 lb bombs daily, each aircraft carrying four in the bomb bay and one on each wingtip.²²⁸

The M904 and M905 fuzes fitted to the M.117 750 lb bomb could contain both instantaneous and delay fuzing elements. Delayed fuzing was useful for avoiding premature bomb detonation when hitting targets under thick jungle. Triple canopy growth was common in II and III Corps, with clumps of trees over 100 feet in height. In IV Corps Delta country, delay fuzing was useful against bunkers embedded along the banks of canals or rivers. It provided a brief interval where the bomb could penetrate the ground cover heaped over a bunker, before exploding.



Wingtip mounted M.117 750 lb bomb, nose and tail fuzed

In the air, as the crew prepared for each bombing run, the Canberra bomb-aimer could select, using a switch near their 12/24-way bombing panel, either 'Nose', 'Tail' or 'Nose and Tail' fuzing, depending on how the FAC wanted the target attacked. When 'Nose and Tail' was selected, the wires to both fuzes would remain attached to the MA-4A rack as the bomb fell away, allowing both fuzes to arm. With the other settings, one wire would be released with the bomb, leaving one of the two fuzes inoperative. In order to ensure safe separation of the bomb from the aircraft, No 2 Squadron armourers would pre-set, in the ground arming area at Phan Rang, an arming delay time of either 4 or 6 seconds between bomb release and start of the arming process.



M.117 750 lb bomb leaves the starboard MA-4A wing-tip rack over the Mekong

The changeover from World War II–vintage to the more modern bombs was not without some difficulty. After three cases of unexploded bombs (UXBs) in August 1968, squadron armourers discovered that inferior fuzing wire supplied with the M.117 bombs, was causing damage to the MA-4A fuzing units.²²⁹ Using their initiative, the Canberra armourers improvised by making their own wire connections, almost from the proverbial fencing wire. Some M.117s were also believed to have suffered from poor quality assurance (QA) prior to delivery, with suspect weight and balance, probably due to incorrect explosive filling.²³⁰

In the early days of M.117 bomb usage, No 2 Squadron used what it called ‘duplicate double fuzing’—fitting instantaneous fuzing elements in both M904 nose and M905 tail fuzes, or delay fuzing elements in both. However, rather than ensuring better performance, the UXB rate rose to 0.5 per cent for the month of December 1968, so this configuration was dispensed with.²³¹

At one stage, when the *Magpies* dropped exclusively M.117s in the delayed, tail-fuzed configuration, an increased UXB rate was observed. As a temporary fix, a reversed fuzing policy was adopted, where delay fuzing elements were fitted into the M904 nose fuze of the bombs, with instantaneous fuzing elements in the M905 tail fuze. This seemed to resolve the problem. Presumably a new batch of serviceable fuze elements saw this practice cease, as thereafter it became normal practice for No 2 Squadron to use only a single (instantaneous) fuzing element in the M904 nose fuze and a single (delay) fuzing element in the M905 tail fuze, the latter set at 0.025 seconds delay time.²³²

Dreadful Lady over the Mekong Delta

Later on, in 1969, a supply of folding-fin, high altitude high speed (HAHS) 1000 lb bombs was found surplus to Royal Air Force requirements for their Canberras and V bombers. A stock of these was obtained from the United Kingdom, via the auspices of RAAF London. An examination of bombing records for No 2 Squadron contained in daily *Unit History Sheets (Forms A.51)*, shows that the first of the 'new' bombs was used on 19 November 1969, continuing until 7 January 1970. A total of 892 were dropped. Either a second batch arrived in April 1970, or for some reason none were used in the intervening three months, when another 662 were dropped from 1 April 1970 to 13 May 1970. Following this, the squadron resumed using M.117 750 lb bombs only until the final *Magpie* bombing mission on 31 May 1971.²³³

CANBERRA MK 20 BOMBING PROFILE

Fitted with an RAF-origin Mk XIV bombsight capable of viewing through a clear plexi-glass nose, it was in the daytime that the Canberra's level bombing technique came to the fore, especially in the IV Corps region. This area was literally covered with long, straight, criss-crossing canals, joining small streams and feeding into and out of the mighty Mekong River itself.²³⁴



RAAF Canberra Mk 20 bomber's Mk XIV bombsight

As noted previously, the racetrack bombing pattern trialled on 25 June 1967 showed the Seventh Air Force that the Canberra Mk 20 was able to carry out level bombing effectively under FAC direction. However, for the next month or so, No 2 Squadron continued to be

RAAF Canberras and Riverine Operations

fragged by the Seventh Air Force TACC predominantly for nighttime *Combat Proof/Combat Skyspot* missions, with relatively few daytime missions.

Having started regular visual daytime bombing missions, it took some time to reach an acceptable level of proficiency. Since arriving in-country, No 2 Squadron had dispensed with its much-acclaimed, peacetime aircrew categorisation training scheme and opted to classify crews as either operationally proficient or non-operational.²³⁵

Canals, streams and rivers were usually clearly visible from the air, while common targets such as enemy storage areas and base camps were often embedded amongst the lush undergrowth either side of these waterways. From a visual bombing perspective, the closer the Canberra flew to the ground, the narrower or flatter became the forward sighting angle, and the higher the apparent rate of passage of ground features beneath the bomber, travelling at 270 knots IAS. This meant less time was available for the two-man crew to obtain a visual lock-on to the intended target. Even when the FAC had marked the target with a 'Willie Pete' rocket smoke in IV Corps terrain, it wasn't always readily visible, especially if the smoke rocket had landed in the water or was smouldering beneath vegetation. It was not unusual for Canberra crews to 'go through dry' (not dropping bombs) in these circumstances, as professionalism meant swallowing one's pride and going around, acknowledging that positive identification of the target had not been achieved during the final part of the low level bombing run.²³⁶

It certainly wasn't easy work for RAAF pilots, manually flying the Mk 20 Canberra at low level over the rice paddies and canals of the Mekong Delta, without an automatic pilot. Even before settling in to the standard bombing pattern, Canberra pilots might have a problem or two to resolve, including being unable to see out of the aircraft when the cockpit canopy fogged up after descending rapidly from the colder air at height into the high temperatures and humidity lower down. This meant turning on a hot air blast to counter the condensation on the cold canopy, not—as some uninitiated pilots used to believe—turning the Canberra's somewhat weak air pressurisation and conditioning system to a colder setting. Averting mid-air collisions was also a useful pre-occupation.

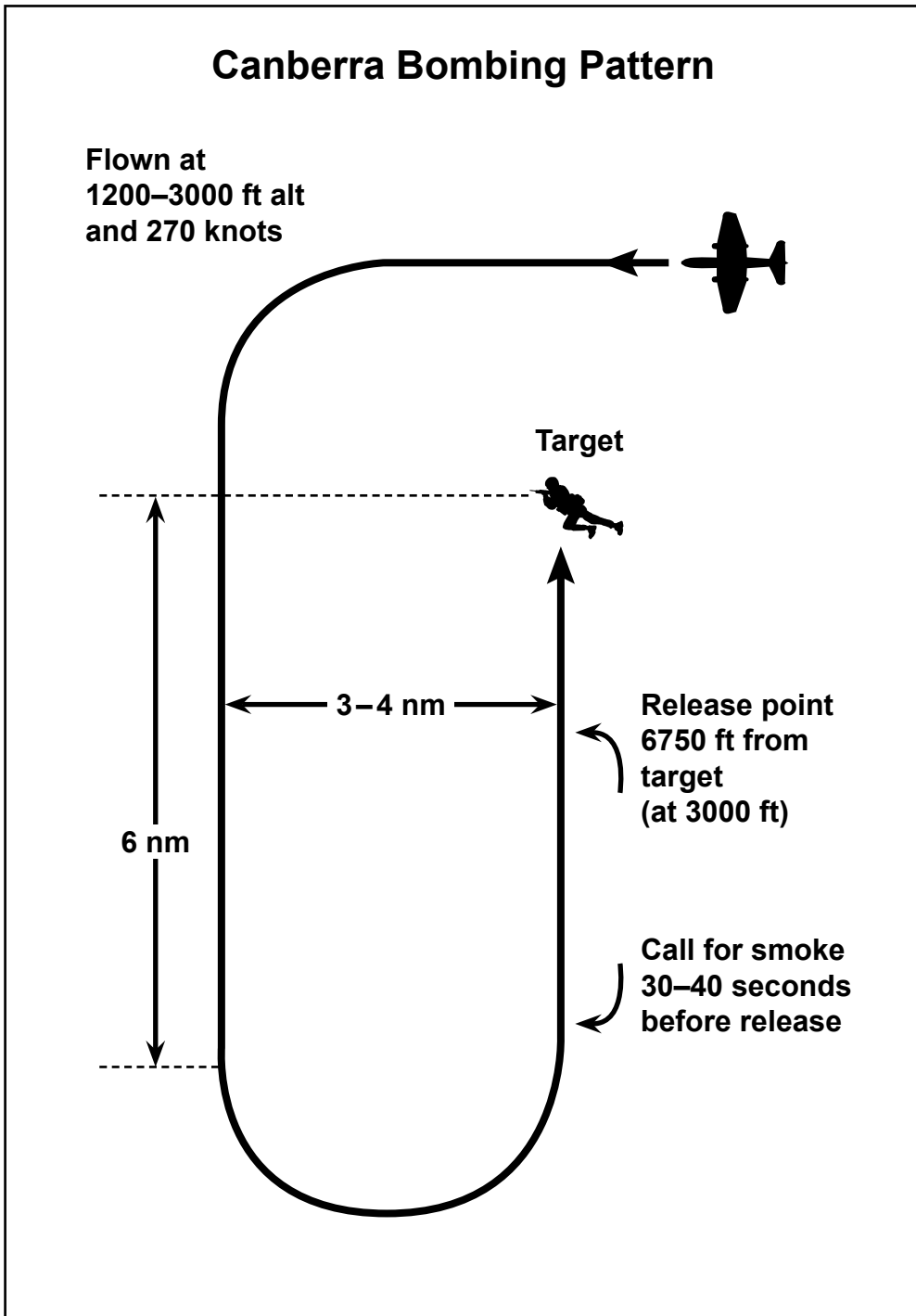


Figure 5–1: No 2 Squadron Canberra level bombing race-track pattern

RAAF Canberras and Riverine Operations

Having flown abeam the target on a heading 180° from the planned bombing direction, i.e. the downwind leg of the racetrack pattern, the pilot would turn his Canberra onto the base leg (perpendicular to the downwind heading and usually in a standard left-hand turn) up to 5 miles past the target. This was so that he was in a good position to line up on the narrow canal feature. On the final run-in, getting closer to the target, the pilot now had to maintain constant bombing height and airspeed, without having any real target frame of reference, as it had by now disappeared from view beneath the nose of the aircraft. He was also required to open the bomb bay doors—an act which altered the trim of the attacking bomber. This required trim corrections to regain stability and return to a straight-and-level configuration, albeit with increased drag and buffeting. Canberra pilots were required to maintain a constant airspeed of 270 knots, or advise the bomb-aimer of any change either side of this reference, so that the correct bombing angle could be calculated, and set, by the bomb-aimer.

Then the pilot had to react swiftly, but smoothly, to the bomb-aimer's increasingly anxious calls to turn left or right, as the target rapidly moved into the visual frame of reference, beneath the illuminated bombsight graticule. Any pronounced movement of rudder or ailerons close in to the target could deny the bomb-aimer the right geometry to ensure an accurate bomb drop. A change in pitch angle (nose up or down) as a result of the bomb doors opening, or a pilot seeking to regain lost altitude, would also reduce accuracy. Bomb-aimers, if not memorising the data, carried in their briefing folder a list of corrections needed, relying on the pilot to say precisely what had happened on the run-in.

As former No 2 Squadron navigator/bomb-aimer, Wing Commander John ('Wang') Miller noted:

'Visual bombing sorties were quite demanding and required well-coordinated teamwork between the nav and the pilot. The imperatives for accurate bombing were accurate height and speed control, smooth heading changes on the bombing run by the pilot, early visual acquisition and smooth target tracking by the navigator with early calls on heading changes.'²³⁷

Once in the target area, and having received bombing instructions from the FAC, the navigator would set on the Canberra's 12/24-way intervalometer the first and last bombs, the spacing between them and requisite bomb fuzeing. Unplugging his oxygen mask and disconnecting from the internal communications system (intercom), while retaining his helmet ('bone dome') on his head, then unstrapping from his Martin Baker Mk 1C ejection seat (an insane act in itself), he would re-connect his oxygen and radio to a 'wander lead' attached to the starboard side of the aircraft.

Ready to proceed forward, he squeezed past any passenger sitting in the 'jump seat' next to the pilot, and crawled on his stomach to lie in a prone position in the cramped nose section of the Canberra jet bomber. Having to withstand wayward 'g' forces as the pilot swung the Canberra around to point at the target, he would transform into a bomb-aimer, with a major surge in workload on the run-in to the target.

Dreadful Lady over the Mekong Delta

Upon positioning in the nose, and checked in again on the intercom with his pilot, the Canberra bomb-aimer's responsibilities would then include ensuring that:

- 1 the Mk IV bombsight's optical collimator (set firm before take-off to resist in-flight vibration) was unlocked and gyro control was turned on,
- 2 the see-through glass reflector, and its electrically-illuminated reticle in the shape of a cross (with an extended longitudinal axis and smaller across-beam section), was brightly shining, and the collimator, which rotated according to angular input, was unrestricted,
- 3 by observing readings on a *Green Satin* Doppler radar repeater panel on the left-hand side of the nose compartment (which had been fitted especially for Vietnam missions into the Canberra Mk 20), the correct ground speed and drift readings were being fed automatically to the bombsight's gyro control unit, to reflect the right bombing angle downwards and drift angle (left or right) ,
- 4 if the ground speed and drift readings were suspect, due to unlocking of the radar beams, or obviously wrong when being fed from the *Green Satin*, he disconnected the *Green Satin* feed line and manually set in correct, or best guess, parameters to the gyro control unit (known as the Fixed Sight-Head technique),
- 5 he reminded the pilot to switch on the Master (Arming) Safety Switch, and to open the bomb bay doors (confirmed with a 'bomb doors open' light on the gyro control panel located next to his head on the forward right hand side of the nose compartment),
- 6 he reminded the pilot to check that the 12/24-way intervalometer panel was set to stop (first bomb), start (last bomb), with correct spacing set between bombs, and fuzing set to 'nose', 'nose and tail' or 'tail',
- 7 the pilot read off from his gauges in the cockpit the remaining fuel quantity in all tanks (in pounds weight), so the bomb-aimer could determine the aircraft's all up weight (AUW), and apply a correction to sight head levelling,
- 8 the pilot was given precise corrections to set his altimeter to the calculated altitude above the target, based on known or estimated target height above sea level, and a predicted density altitude correction, based on estimated temperature and atmospheric pressure settings at the Canberra's bombing altitude,
- 9 should the bombsight gyro appear to have toppled as a result of sudden or excess aircraft manoeuvring, the 'fast erect' button on the gyro control unit was pressed,
- 10 he had spotted the correct aiming point, with or without the FAC's smoke marker, by looking ahead intently through the clear nose canopy,
- 11 if in doubt about the precise target location, he used a microphone transmission switch located in the nose, to talk directly to the FAC in order to clarify any doubts about target identification,
- 12 he was fully alert to call timely heading changes for the pilot on the intercom (standard calls of 'left, left, ... right, ... steady', just as his World War II Lancaster bomb-aimer predecessors had done), of course allowing for the pilot's reaction time, while ...

RAAF Canberras and Riverine Operations

- 13 ensuring that the target image, now lost visually to the pilot as it traversed under the Canberra's nose, tracked precisely towards and under the illuminated cross-hairs of the Canberra's bomb sight,
- 14 as the intersection of the illuminated cross-hairs became superimposed on the target aim point, he 'pickled' (pressed the bomb release button) with the call 'bomb(s) gone' to his pilot (and maybe the FAC as well), and then ...
- 15 turned the camera on to record the drop, while ...
- 16 he observed the bombs emerging safely from the bomb bay underneath the aircraft and descend onto the target below, to explode as expected (noting any anomalies such as dud bombs or unusual bomb trajectory behaviour),
- 17 ensuring that the pilot had not inadvertently closed the bomb bay doors while the camera was still running, taking photos frame-by-frame (and which he could hear as an electrical motor movement),
- 18 he switched the bombing camera off, normally after he had seen the bombs detonate below,
- 19 he reminded the pilot to switch off the Master (Arming) Safety Switch and close the bomb bay doors, and
- 20 he recorded details of the aim points and bomb drop accuracy (using his china-graph pencil to mark his log sheet for post-mission reporting back at base).

Upon releasing all bombs, the navigator/bomb-aimer reversed along the tunnel, reconnected with his ejection seat oxygen and radio leads and re-buckled his opened parachute harness in the navigator's compartment behind the pilot. Before departing the target area and before the pilot had changed radio frequency to the nearest control and reporting post (*Paddy* in IV Corps), he recorded, in his bomb-aimer's log, the FAC's post-mission summary. This included the time on target, time off target, percentage of bombs within the target area, percentage of bombs effective and any bomb damage assessment (BDA) that could be given, from on-the-spot observations by the FAC, from low flying observation helicopters or from troops on the ground.

Just after turning base on the bombing run, the *Magpie* crew (pilot or navigator/bomb-aimer) would either call for, or the FAC would fire off, a white phosphorous smoke rocket to mark the target location. This flight pattern ensured that the bombing crew had a good opportunity to steer the Canberra bomber along a canal or river bank, thus minimising line error (bombing left or right of the target) and allowing the main focus to be on stabilising the aircraft platform. This eliminated any under- or over-shoot tendency, which would result in range error (dropping bombs short or long of the target). On the run into the target, should the bomb-aimer find that the Canberra was offset from the release point by a significant distance, say 50–100 metres to the left or right, a very quick decision was required either to 'go through dry', or get his pilot to make sharp corrections and hope the Canberra regained stability before he released the bomb load.

Dreadful Lady over the Mekong Delta

One degree of pitch attitude change (nose up or down) could introduce a 100-metre range error on the ground from normal bombing altitude of 3000 ft and one degree variation left or right of inbound track would see a 36-metre line error. Bombing from 1000 ft above the target usually gave smaller errors but they could still be significant, as shown below.

- A 10-knot speed error resulted in a 40-metre bombing (range) error.
- A change in attitude of only 1 degree could result in an 80-metre over- or under-shoot.
- A height differential of 30 feet gave a 30-metre bombing range error.
- One degree of drift error gave 20 metres of line error, left or right of the target.²³⁸

This level bombing mode and the ability to drop, at selected spacing between them, a consecutive stick of six bombs (usually 750 lb or 1000 lb bombs, with instantaneous or delayed fuzing), made the RAAF Canberra ideally suited for bombing targets on straight and narrow canals typical of the Mekong Delta.

LOW LEVEL FLYING HAZARDS

It was not until August 1969, by which time No 2 Squadron had been regularly using US-origin M.117 750 lb bombs, that self-damage from exploding bombs started to occur. Prior to this time, there were six incidents of small-arms fire inflicting damage on the Canberras and two of unknown causes, most likely small-arms fire as well. From this time onwards, there were four instances of own-bomb damage to aircraft (understood by the author to have all occurred in IV Corps) and five more incidents of damage from small-arms fire, fortunately resulting in no fatalities or loss of aircraft.²³⁹

In the Mekong Delta, many strikes were conducted from low altitudes, particularly when intrepid Canberra crews flew under the cloud base and were reluctant to pull-up prematurely on the basis of ensuring that troops on the ground received the most accurate bombing support. In late 1969, 2100 ft above target height was considered to be a relatively safe altitude where the risk of being hit by fragments of one's own bombs was low.²⁴⁰ When bombing below this altitude, crews were advised to pull up immediately after bomb release, to minimise the chance of being hit. However, not surprisingly, there were still times when crews returned with self-damage.²⁴¹

Ironically, the author, having observed his own Bombing Leader's rule, was lucky to escape unscathed on 11 March 1970, when Canberra A84-238, piloted by Pilot Officer Barry Carpenter, was hit on a IV Corps mission, by a fragment of one of the six 750 lb bombs dropped on the target, a VC base camp. Having bombed at 1200 ft, the pilot immediately pulled up to 2100 ft to avoid self-damage, and then proceeded to climb to a routine return-to-base altitude of around 23 000 ft, blissfully unaware of any impact. After making a normal approach to Phan Rang air base, landing and shutting down the two Avon Mk 109 engines, the crew emerged, crouching, from the opened crew hatch, to be met by the No 2 Squadron Senior Engineering Officer, Squadron Leader C M 'Avro' Anson. He suggested a look underneath the aircraft's wing, where one of his airmen, conducting a routine post-flight inspection, had found a hole, and, feeling inside, had discovered a piece of a M.117 bomb, a sizeable chunk, in fact.



Squadron Leader Anson inspects A84-238's bomb fragment damage

As shown in the photo, with Squadron Leader Anson holding the bomb fragment, it had hit the by-then empty integral fuel tank in the port wing.²⁴² Fortunately for the crew, introduction of a nitrogen-purging system before No 2 Squadron Canberras departed Butterworth for Phan Rang, had minimised the chances of a fire breaking out. In South Vietnam, the standard jet fuel used by USAF and RAAF jets was JP-4, a 50-50 mix of kerosene and gasoline. Instead of volatile fumes remaining in the empty fuel tank, they had been replaced by inert nitrogen gas.²⁴³

While the advent of the M.117 750 lb bomb resulted in increased self-damage and, although the fragment that hit A84-238 was obviously part of the bomb casing, other bomb parts believed to have struck the bombing Canberras included suspension lugs and bomb fuzes.²⁴⁴

STRIVING FOR BOMBING ACCURACY

Accuracy in the context of No 2 Squadron's bombing campaign in South Vietnam simply meant how close bombs would fall to a specific target, identified and chosen by the controlling FAC. *Magpie* bomb-aimers generally aimed at a smoke marker, or a nominated point located at some bearing and distance from the smoke's source. Occasionally in the absence of FAC-launched smoke markers or when economy of their use was required, bombing crews would be asked to aim directly at, or at some bearing and distance from, a visual or geographical feature. The feature could be the intersection of two canals, an obvious bend in a

Dreadful Lady over the Mekong Delta

river or even tree shapes that stood out from the background. Any complete statistical analysis on the breakdown of different aim points can only be obtained from the original reference source, *No 2 Squadron Bombing Books*, rather than any other routine post-flight reports or intelligence-gathering summaries, which didn't go so far as to require such detail.



'Hit my smoke, *Magpie*'

Accuracy in terms of how the bombs fell in relation to the real target (a bunker complex, base camps or supply areas) was a second order issue, as this decision was entirely out of the hands of the crew of the attacking aircraft, who responded entirely to directions from the FAC. The nature of the target was virtually of no real consequence to the squadron at the time, except in terms of bomb damage assessment (BDA) obtained following the strike, and normally relayed to the bombing aircraft by the FAC at the end of each mission. The relationship between No 2 Squadron's perception of bombing accuracy and BDA counts was therefore an indirect one, although it was logical to expect improved BDA with more accurate bombing, assuming that the FAC knew exactly where the bombs should fall (which was not always the case).

Trying to achieve bombing accuracy from the Mk 20 Canberra jet bomber flying a level bombing pattern in the 'dumb bomb era' demanded a good knowledge of, and close attention to, many key variables. These included precision flying, a fully operative and finely-tuned bombing system and being at the right position to ensure that, when released, the bombs hit the intended target. There were basically two types of errors – aiming and ballistics.

Even before getting off the ground, considerable attention had to be paid to the Canberra aircraft's weight and balance and bombing configuration, as Air Marshal Evans recalled when he was Commanding Officer of No 2 Squadron at Phan Rang. 'Technically, the squadron did

RAAF Canberras and Riverine Operations

everything possible to ensure the accuracy required. Every aircraft had the bombsight string aligned after each sortie.²⁴⁵ The 'level datum' for the aircraft also needed calibration as each aircraft differed from its original technical design. The design standard called for a defined quantity of fuel in the aircraft while parked on the tarmac, and in Butterworth it was normal procedure for each aircraft to be filled with this amount and the level datum reading would be checked. Sometimes, significant errors were found. In 1963, RAAF Canberra bombing crews noted the individual aircraft's datum error and applied it to the calculated fixed bombing angle for that sortie and got much improved results at a 600 ft bombing altitude.²⁴⁶

Precision flying in the Canberra was no mean feat as the aircraft was flown manually. Positioning the aircraft platform in the right space at the right time required careful calculations, trust in the aircraft's instrumentation and precise setting of the bomb sight. This ensured that the bombs were released at the right height above the target, the right speed and the right aircraft attitude, to pursue their predicted ballistic flight path onto the target.

While serving as a RAAF FAC with the 1st Australian Task Force in Phuoc Tuy Province in 1969-70, Flight Lieutenant Dave Robson (callsign *Jade 07*) succinctly summed up the rationale, when he made this comment. 'In our province, we Aussies experimented with air power in direct support of the troops as we sought to maximise the result of minimal resources – we needed accurate, safe, low-cost weapons. We knew that in future wars we could never have the massive firepower of the USAF. We played with precision weapons delivery before we knew about smart bombs'.²⁴⁷

The IV Corps region lent itself to more accurate level bombing by No 2 Squadron's Canberras than other military regions of South Vietnam, because it was flat and at sea level. This produced no real problems in determining target height, one of the critical factors in dropping bombs accurately.²⁴⁸

Elsewhere in Vietnam, especially in the mountainous terrain of I Corps to the north, squadron bomb-aimers were faced with much greater challenges in calculating correct bombsight angular settings, in the absence of accurate target height data. In many cases in the latter territory, dropping a single bomb as a 'sighter' was virtually a pre-requisite, so that subsequent bomb drops could be adjusted to hit the target, based on corrections arising from where the first bomb had landed. In such inhospitable terrain, any bomb that fell away from its intended target was most unlikely to create any collateral damage to innocent inhabitants, as the area was largely uninhabited.

No 2 Squadron, at the outset of its operations in South Vietnam, faced a major challenge in achieving any reasonable standard of consistency with its bombing, as it had inherited surplus stocks of World War II-vintage 500 lb and 1000 lb bombs with a variety of tail fin, arming and fuzing arrangements. Wing Commander Vin Hill, the inaugural Executive Officer posted in with the squadron at Phan Rang in April 1967, exemplified the frustration when he noted: 'each bomb combination has its own ballistics ... life was much simpler when the last of the

Dreadful Lady over the Mekong Delta

old Australian stocks were used up after about 7 months and the squadron was supplied with standard 750 lb (M.117) bombs from USAF sources'.²⁴⁹

Endeavouring to achieve an all-round bombing average of 20 metres circular error probable (CEP) for such unguided bombs was a laudable aim. However, given the diversity of terrain across South Vietnam, the variable weather conditions and many other uncontrollable factors, the reality was that the overall squadron 50 per cent CEP was unlikely to approach this figure. In fact, between 1969 and 1971, when around 50 per cent of the Canberra bombing missions were conducted in IV Corps, No 2 Squadron's 50 per cent CEP averaged out, broadly speaking, at 40 m, with a 90 per cent CEP of 100 m.²⁵⁰

Magpie navigator/bomb-aimers were the record-keepers for each bombing mission. Earlier aerial navigator's methods of recording, using pencil and paper logs, had become obsolete by 1969, but it was well before hand-held computers, laptops or mobile phones came into common use.

In South Vietnam, there was no need for traditional navigation techniques, such as plotting latitude and longitude, or calculating tracks based on wind conditions, as the basic navigation aid (navaid) was the Tactical Air Navigation system (TACAN). The entire country was covered, electronically speaking, by this system, which the TACAIR community virtually used exclusively. Refer to the author's TACAN map, shown on Map 5-1, which was used with every mission.

As with mission briefs, No 2 Squadron aircrews produced their own report logs, with a standard format, incorporating all information vital for the mission. One of the tasks of every newly arrived navigator/bomb-aimer was to produce his own log. Drawn up manually in tabular form, stuck to cardboard and covered in clear self-adhesive contact plastic, with a china-graph pencil to record data passed on by radio, these were one of the key items carried with every flight, as shown in the photo. Somewhat primitive—but it worked.

RAAF Canberras and Riverine Operations

VC: DAVID 71 R/V: 220/87/118 FREQ: 344.7
 TGT DESCRIPTION: VC BASE CAMP
 TGT HT: 10' QNH: 1012.8 RECOVERY: 73 BAILOUT: SEA
 FRIENDLYS: 2 K WEST GROUND FIRE: YES/NO

	RUN #1	RUN #2	RUN #3	RUN #4	RUN #5	RUN #6
RUN IN HDB	320	317				
RUN IN WFS	3000	3007				
BOMB NOS.	1+2	3-6				
SPACING	50m	50m				
INST/DELAY	I	I				
SIGHT HEAD	6.7	6.6				
SMOKE DIRECTION	↗	↗				
AIMING PT.	SMK	20L SMK				
DRIFT & G/SPD	313/3P	311/24P				
ACCURACY	200V	2H				
REMARKS						

Pressure (inches)	BAROMETRIC READINGS FROM INCHES TO MILLIBARS									AWJ CORRECTIONS (2701AS)	
	2.36	2.41	2.46	2.51	2.56	2.61	2.66	2.71	2.76		
28.0	948.2	949.6	950.9	952.3	953.6	954.9	956.2	957.5	958.8	960.1	14000 lb +.5
28.1	951.4	952.7	954.0	955.3	956.6	957.9	959.2	960.5	961.8	963.1	12000 lb +.4
28.2	954.6	955.9	957.2	958.5	959.8	961.1	962.4	963.7	965.0	966.3	10000 lb +.3
28.3	957.8	959.1	960.4	961.7	963.0	964.3	965.6	966.9	968.2	969.5	8000 lb +.2
28.4	961.0	962.3	963.6	964.9	966.2	967.5	968.8	970.1	971.4	972.7	6000 lb +.1
28.5	964.2	965.5	966.8	968.1	969.4	970.7	972.0	973.3	974.6	975.9	4000 lb 0
28.6	967.4	968.7	970.0	971.3	972.6	973.9	975.2	976.5	977.8	979.1	
28.7	970.6	971.9	973.2	974.5	975.8	977.1	978.4	979.7	981.0	982.3	
28.8	973.8	975.1	976.4	977.7	979.0	980.3	981.6	982.9	984.2	985.5	
28.9	977.0	978.3	979.6	980.9	982.2	983.5	984.8	986.1	987.4	988.7	
29.0	980.2	981.5	982.8	984.1	985.4	986.7	988.0	989.3	990.6	991.9	
29.1	983.4	984.7	986.0	987.3	988.6	989.9	991.2	992.5	993.8	995.1	
29.2	986.6	987.9	989.2	990.5	991.8	993.1	994.4	995.7	997.0	998.3	
29.3	989.8	991.1	992.4	993.7	995.0	996.3	997.6	998.9	1000.2	1001.5	
29.4	993.0	994.3	995.6	996.9	998.2	999.5	1000.8	1002.1	1003.4	1004.7	
29.5	996.2	997.5	998.8	1000.1	1001.4	1002.7	1004.0	1005.3	1006.6	1007.9	
29.6	1000.0	1001.0	1002.0	1003.0	1004.0	1005.0	1006.0	1007.0	1008.0	1009.0	
29.7	1003.8	1004.8	1005.8	1006.8	1007.8	1008.8	1009.8	1010.8	1011.8	1012.8	
29.8	1007.6	1008.6	1009.6	1010.6	1011.6	1012.6	1013.6	1014.6	1015.6	1016.6	
29.9	1011.4	1012.4	1013.4	1014.4	1015.4	1016.4	1017.4	1018.4	1019.4	1020.4	
30.0	1015.2	1016.2	1017.2	1018.2	1019.2	1020.2	1021.2	1022.2	1023.2	1024.2	
30.1	1019.0	1020.0	1021.0	1022.0	1023.0	1024.0	1025.0	1026.0	1027.0	1028.0	
30.2	1022.8	1023.8	1024.8	1025.8	1026.8	1027.8	1028.8	1029.8	1030.8	1031.8	
30.3	1026.6	1027.6	1028.6	1029.6	1030.6	1031.6	1032.6	1033.6	1034.6	1035.6	
30.4	1030.4	1031.4	1032.4	1033.4	1034.4	1035.4	1036.4	1037.4	1038.4	1039.4	
30.5	1034.2	1035.2	1036.2	1037.2	1038.2	1039.2	1040.2	1041.2	1042.2	1043.2	
30.6	1038.0	1039.0	1040.0	1041.0	1042.0	1043.0	1044.0	1045.0	1046.0	1047.0	
30.7	1041.8	1042.8	1043.8	1044.8	1045.8	1046.8	1047.8	1048.8	1049.8	1050.8	
30.8	1045.6	1046.6	1047.6	1048.6	1049.6	1050.6	1051.6	1052.6	1053.6	1054.6	
30.9	1049.4	1050.4	1051.4	1052.4	1053.4	1054.4	1055.4	1056.4	1057.4	1058.4	

BDR

COORDINATES: VA976352 R/V 0821 ONCRIS OFF0850
 % IN AREA - % TGT COVERAGE: 100/65
 KBA 1 CONF BEST 5/4 STRUCTURES 6/5 BUNKERS
 OTHER: 2/1 SAMPANS 1 SEC EXPLOSION

No 2 Squadron bomb-aimer's log

Dreadful Lady over the Mekong Delta

Upon returning to base, data from the navigator/bomb-aimer's post-strike log would be transferred by verbal debrief to the No 2 Squadron Operations Officer. Key details were also entered by returning crews on the USAF's obligatory post-mission intelligence form. The log would then be rubbed clean for re-use on the following mission.

The post-mission intelligence summaries were sent daily to Headquarters 35th Tactical Fighter Wing, to be added to those from Phan Rang-based F-100 tactical fighter squadrons. All daily reports were then passed up the chain to Headquarters Seventh Air Force, where the data was no doubt fed to MACV and into early generation computer systems. US Defense Secretary Robert McNamara had these computers developed so that they produced volumes of data that he, and other leaders, could pour over with great interest.

No 2 Squadron also had a standard procedure for recording and assessing bombing accuracy. Proof of accuracy was required and, after each sortie, *Magpie* navigator/bomb-aimers duly recorded, in the especially made-up Bombing Books already mentioned, pertinent details of their bomb drops, which had been recorded on their in-flight logs, as shown in the photo.

Photographic Section personnel ensured that onboard cameras were loaded and set to look slightly forward from the vertical. Cameras used were either vintage F-24s with a 5-inch lens or F-52s with a 10-inch lens and they were pre-set to achieve a healthy overlap of successive photos for as long as the camera was switched on.²⁵¹ These cameras were fitted into the Canberra bomb bay and had to be switched on by the bomb-aimer during the bomb release sequence, after the bomb bay doors were opened. Hopefully, the pilot remembered not to close the bomb bay doors too promptly, before bomb impact could be recorded.

The crew could be compromised at low level. They needed, on one hand, to climb away as soon as possible after bomb release, in order to minimise possible self-damage from the exploding bombs, but on the other hand, they wanted to remain overhead the target with bomb bay doors still open in order to record the bomb strike on film. In an effort to resolve the quandary, Bombing Leader instructions were issued in October 1969, which advocated: 'No photography below 1500 ft'.²⁵²

Back at Phan Rang, part of the crews' debrief process was to provide details in the Bombing Book originated by and unique to the squadron. Required details, recorded in flight on the navigator/bomb-aimer's log, included run-in heading, bombing altitude, bombs used, bomb spacing (if in multiples), bomb fuzing (instantaneous or delay), sight-head setting, wind direction, actual aim point relative to smoke marker origin, ground speed and drift at bomb drop and the bomb-aimer's own estimate of the accuracy of the bomb drop.²⁵³

On the tarmac, after the Canberra's two jet engines were shut down, the squadron's Photographic Section personnel would remove the film cartridge from the bomb bay camera for developing, marking and printing that evening. The following day, the processed prints, containing the photographer's hand-written record of the names of the crew and aircraft number, would be examined by the squadron Bombing Leader, who was normally an

RAAF Canberras and Riverine Operations

experienced senior navigator. The Bombing Leader would measure distances on the printed photos, using as a standard reference, the bombing aircraft's altitude above the target and type of camera and lens used. In this way, an accurate assessment of the closeness of each bomb drop was made, comparing pictorial measurements with pre-recorded crew estimates.

No 2 Squadron, in South Vietnam, assessed its performance in terms of bombing accuracy, based on these photographic records. This policy did not extend to a formal assessment of the category (A, B or otherwise) of each crew or individual, as had occurred in peacetime in RAAF Canberra squadrons. In part, the reason for this was that the limited number of two-man crews based at Phan Rang (usually 12 at any one time), resulted in a wide mix of pilot and navigator combinations, as annual posting rotation, leave, sickness and other aspects affected crew continuity.

Dreadful Lady over the Mekong Delta



Overlapping F-24 camera images, *Magpie* bomb drop, IV Corps
(Source: No 2 Squadron Photographic Section)

RAAF Canberras and Riverine Operations

Nevertheless, great emphasis was placed upon getting these assessments right and, in a truly democratic fashion, all aircrews had the right to ask for a revision of the assessment, if they thought the Bombing Leader had erred in assessing the photos, or had misinterpreted what had been recorded, or what the crew had meant to record, in the Bombing Book.²⁵⁴

When he was Commanding Officer of the squadron at Phan Rang in 1968, Wing Commander Evans would personally peruse these bombing records, in conjunction with the Bombing Leader at the time. Should any anomalies be detected, in particular indicating bombsight problems, the subject aircraft's Mk XIV bombsight system would be re-aligned on the ground, usually overnight after day missions had been completed, in an effort to remove any errors arising from instrument misalignment.²⁵⁵

Throughout their year-long posting in South Vietnam, No 2 Squadron's ground crews prided themselves in maintaining very high standards of aircraft and equipment serviceability. The maintenance work was carried out on a 24-hour-a-day seven-days-a-week basis, with the maintenance troops often working late into the night, rectifying problems that occurred with predominantly daytime Canberra bombing missions. They maintained the highest RAAF traditions in this context.²⁵⁶

Photographic assessment was the sole means by which the squadron determined bombing accuracy performance, but even this data was not fully representative of all bombing missions undertaken. There were many reasons why photographic confirmation of all daytime bomb strikes was not possible, including cloud cover, aircraft pulling up rapidly from low-level flight, failure to turn the camera on and bomb bay doors being closed too quickly.

When the author took over as Bombing Leader in September 1969, having previously served on the instructional staff at No 1 (Canberra) Bomber Operational Conversion Unit (1OCU) at RAAF Amberley, the number of long-serving Canberra aircrews being posted into Phan Rang had reduced significantly. Most had already completed their tour of duty in South Vietnam and many were already on training programs in expectation of the delivery of the F-111C.²⁵⁷ As the knowledge base shrank with the departure of the more experienced crews, newcomers to the Canberra bomber were less able to rely on word of mouth, a rather haphazard way of ensuring continued bombing professionalism. Accordingly, relevant data was put together by the author into a brief summary and published as a bomb-aimer's guide.

Dreadful Lady over the Mekong Delta

4. DOWNWIND.
- a. Visual drift check against doppler drift; inform pilot of accurate drift to lay off.
 - b. Check groundspeed for head/tail wind component for run-in
 - c. Set sig/mem to MEM and set expected run-in drift and groundspeed.
 - d. Fast erect to check roll-stabilisation of gyro. If suspect, fast erection will be necessary on run-in.
 - e. Adjust sight-head level for AUW.
 - f. Checks as per cockpit check list.
 - g. Pilots should not turn on until nav has finished checks.
 - h. Be sure to remove 5 degrees from the sighthead when bombing 2000' or below. Be aware of two sets of bombing angles for the 1500 - 2000' range.

Extract from No 2 Squadron bomb-aimer's guide, October 1969

No 2 Squadron was proud of its bombing accuracy compared with brother Seventh Air Force fighter squadrons operating in South Vietnam. When then-Wing Commander Evans arrived at Phan Rang in late 1967 to take over as Commanding Officer, he commented: 'It was immediately evident that the Canberra achieved at least the same accuracy as the F-100 fighter squadrons located at Phan Rang'.²⁵⁸

A Headquarters US Pacific Air Force CHECO (Contemporary Historical Examination of Current Operations) report noted that the pilots of USAF dive bombers, such as the B-57B Canberra 'as well as those of other US fighter-bombers, had to start at altitudes like 10,000 feet, track the target, compensate for wind, and keep their attention on other matters during the dive. As a result, their accuracy could not be as good as the Australians'.²⁵⁹

On the other hand, the US Army's 9th Division RAAF FAC, Flight Lieutenant Garry Cooper, noted: '... the accuracy of their (No 2 Squadron) level bombing from high altitude was not as good as dive-bombing, particularly in strong crosswinds when the smoke marker would drift downwind'.²⁶⁰ Several times in his book, Flight Lieutenant Cooper cites the Canberra as dropping from 'high altitude' (i.e. 5000 ft), which seemed, at first glance, somewhat anomalous, in view of the squadron's normal practice throughout most of the campaign of bombing from 3000 ft, safely above enemy small arms fire.²⁶¹

However, from April to July 1968, No 2 Squadron, under the command of Wing Commander Evans, went through a four-month period of experimenting with variable time (VT) fuzing on its vintage bombs. At this time of the year also, weather associated with the transition of monsoonal seasons from north-east to south-west played havoc, at times, with weapon dropping accuracy.²⁶² Operating with VT-fuzed 1000 lb bombs, the *Magpies* did indeed fly at 5000 ft, and certainly, No 2 Squadron's bombing accuracy would be expected to decrease with

RAAF Canberras and Riverine Operations

these higher altitude bomb drops. It was unfortunate that this period happened to coincide with Cooper's tour as a FAC with the 3rd Brigade, 9th US Army Division.

While the low flying F-100s were usually quite reasonable in terms of 'dumb bomb' accuracy, the faster more-powerful F-4 Phantom jets were generally seen to be less accurate than the Canberra Mk 20, specifically in regard to the initial bomb drop. Data obtained by the author, at the time, from USAF F-4 Phantom squadrons, suggested they achieved average (50 per cent CEP) accuracies in the region of 65–70 metres.²⁶³ Upon being given corrections by the FAC after the first (sighter) bomb missed the target, their accuracy improved considerably.

With the Canberra's extended in-flight endurance, *Maggie* crews sometimes had a ring-side seat to observe, virtually from high overhead, dive bombing strikes by limited-range, allied, strike fighters. Flying the slower, more stable A-37 Dragonfly, both USAF and Vietnamese Air Force pilots were reputed to be able to bomb fairly accurately and this was confirmed from high above.

In the absence of any appropriately verified recorded data on bombing accuracy for these tactical aircraft, it wasn't possible to make a valid comparison amongst the Mk 20 Canberra, F-100, F-4 and the A-37, as to which was the more accurate weapons delivery platform in combat conditions. Investigations by the author, while in South Vietnam, into the ability of USAF dive-bomber pilots to assess their own bombing accuracy, showed that various techniques were attempted, but in the main, they were pretty rough. None could achieve the level of clarity and precision of the printed photos obtained by No 2 Squadron from the reliable, World War II–vintage F-24 and F-52 cameras.

USAF F-111 bombing accuracy in North Vietnam was gauged by first taking a pre-strike picture of the target using a specialised photo-reconnaissance (PR) aircraft, then taking in-flight photos of the F-111's radar display and matching these with a post-strike PR image of the target.

Feedback from *Sharkbait* pilots of 557th Tactical Fighter Squadron (557 TFS) indicated that their F-4C Phantoms might have carried a 50-mm (single frame) camera for taking photos in the dive, but its use suffered from triangulation problems. Assessing dive angle with any degree of accuracy wasn't easy, nor was determining the height above the target at the time the photos were taken. They also tried out a 16-mm movie camera, but lost accuracy with unknown height determination and through aircraft manoeuvres in the dive. Bien Hoa-based F-100s and A-37s sometimes carried a 70-mm movie camera, but this was more to collect bomb damage assessment (BDA), rather than assess bombing accuracy to any degree.

F-105 Thunderchief pilots flying into North Vietnam also carried a movie camera. Their bombing accuracy was assessed by counting the number of photo frames from the bomb burst back to release height, to give a benchmark for calculating how far the bomb fell from the intended target.



USAF F-105 Thunderchief visits Phan Rang from Thailand

Towards the latter part of No 2 Squadron's tour of duty in South Vietnam, bombing accuracy began to suffer. From mid-1970 onwards, the *Magpies* began to be fragged with a higher percentage of missions over relatively hostile mountainous terrain, such as Tiger Mountain in I Corps, and closer to the Demilitarized Zone (DMZ) that separated North and South Vietnam. Away from the flatter IV Corps territory, monthly bombing averages blew out accordingly, although there were still instances when very accurate bombing was achieved.

The distinction between close air support and interdiction became blurred in this counter-insurgency war. *Magpie* missions in the region across to the 'Seven Sisters' on the Cambodian border, where the continuing presence of friendly troops was minimal, tended to support the view that the enemy was being interdicted. Certainly, allied riverine forces saw much of their activities as being interdiction.

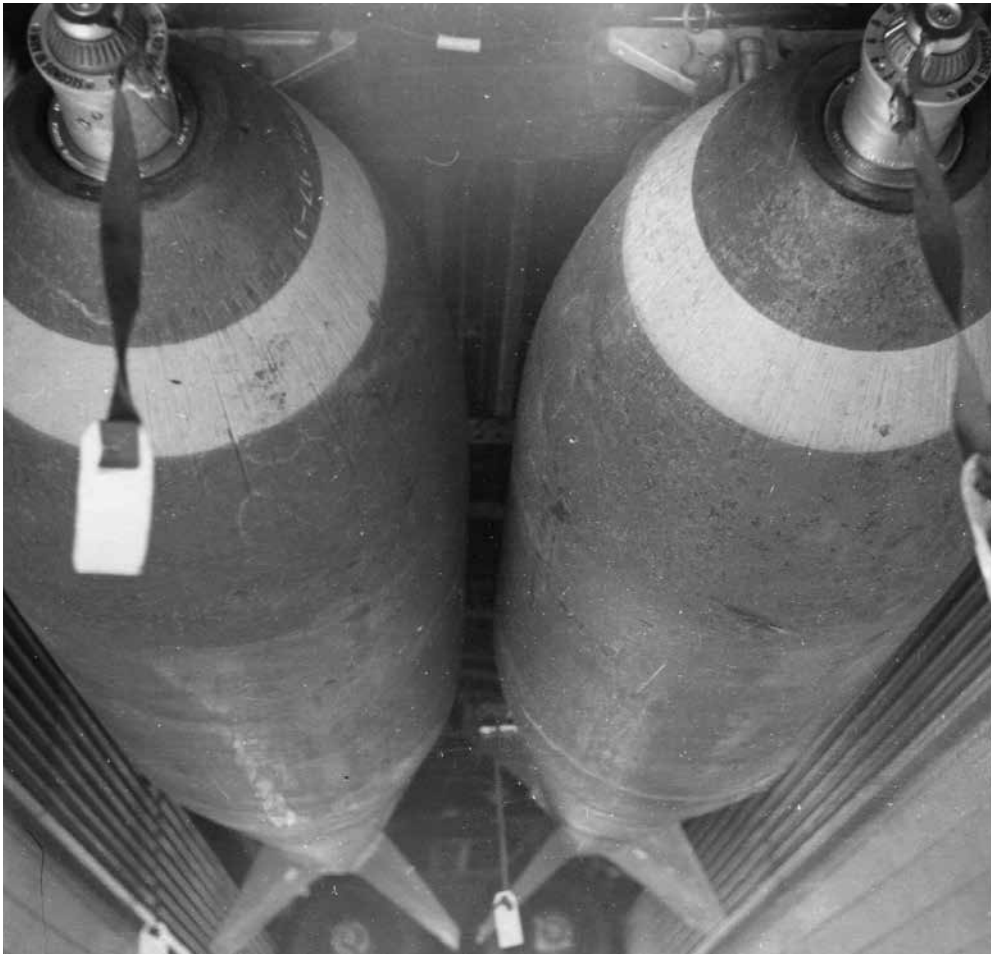
RAAF Canberras and Riverine Operations

From a tactical bombing perspective, while the nominal aiming point for *Magpie* bombers was a small smoke source, in effect most targets attacked were of such large dimensions that it was indeed rare to be directed by IV Corps FACs to bomb a single pinpoint target. No more than 10 per cent of the targets in IV Corps could be described as point targets, with the rest of the squadron's Mekong Delta targets often spread, narrowly, along one or both sides of canals or dike lines.

Although the squadron was unable to achieve any real flexibility in carrying different mixes of weapon types, one particularly valuable feature unique to the Canberra level bomber was its ability to drop a stick of bombs. Sticks of six × 500, 750 or 1000 lb bombs up to ten × 500 lb bombs could be dropped by one Canberra in a row, with set intervals between them, in what could be termed narrow, or elongated, area bombing. Put more than one Canberra together and you had a decent area bombing capability. A single Canberra Mk 20 could spread a load of six M.117 750 lb bombs, in one bombing pass, up to a kilometre long. A pair of *Magpies*, bombing side-by-side, could cut a decent swathe through the terrain below.²⁶⁴

Whereas multiple RAAF Canberras could cover a reasonable area, this was nowhere near the size of single or multiple B-52 *Arc Light* strikes, with 'kill boxes' each of 3 km x 1 km.²⁶⁵ Nevertheless, the *Magpies* did have advantages over these giants, including being much more self-reliant, flying much closer to their targets and having the ability to fly low underneath cloud bases, thus affording greater accuracy compared with bombing from on high.²⁶⁶ However, the fire power of a formation of four Canberras could never match the shock effect of 100 or more bombs falling from the sky without any warning from a single B-52.

By using the 12/24-way intervalometer, a *Magpie* bomb-aimer could set a delay timing between bombs as low as 0.06 seconds, although this placed bombs dangerously close to each other as they left the bomb bay. This setting was used only when wingtip bombs (#5 and #6 in the case of M-117 750 lb bombs) were dropped, or when the last internal bomb (# 4) was dropped in combination with the two wingtip bombs. Otherwise, the standard minimum setting for normally operating bombs was 0.18 seconds between each of six bombs, which gave a distance of roughly 30 metres apart at 300 knots groundspeed.²⁶⁷



Four M.117 750 lb bombs tightly squeezed into the Canberra bomb bay

Separation distance between bombs could be extended out to 200 metres. Targeted hooches (houses) along the canals of IV Corps were often 75 metres apart, and *Magpie* crews would occasionally be tasked by the FAC to drop a stick of six with 75 metres spacing between bombs, when attacking a row of these structures. If the first bomb resulted in a direct hit on a targeted hooch, the next five buildings in a row were likely to be destroyed as well. If the first hooch was missed, of course, the rest would also be missed.

This stick bombing facility was also most useful when the enemy dug bunkers along considerable stretches of the narrow canals and rivers throughout IV Corps. Although it is uncertain if No 2 Squadron was supporting this particular operation, an example of the dimension of an enemy target complex was shown when a joint US Army/US Navy force was conducting beach landings along the Rach Ba Rai (River) in the Delta on 15–16 September 1967. They encountered an intense ambush by an enemy force concealed in bunkers along at

RAAF Canberras and Riverine Operations

least 1 km of the river. From their bunkers, the enemy fired 57-mm recoilless rifles, automatic weapons, RPG-2 and RPG-7 rocket-propelled grenade launchers at the allied force.²⁶⁸

In IV Corps regions, the use of a cluster of RAAF Canberras, either in close formation side-by-side or in close trail, dropping one after the other, each disgorging a stick of six 750 lb bombs, along a canal or river with minimum line error, seemed to be a favoured tactic of some local ground commanders. The extent of the target complex under attack could be determined from FAC BDA reports, which included reference to target coverage and specific details of target elements that had been hit, and either destroyed or damaged.

As early as June 1967, when the squadron was focussing on late-night, ground-based radar-controlled *Combat Proof/Combat Skyspot* missions, target coverage featured in post-mission reporting, as relevant No 2 Squadron Unit History Sheets show. For example, the unit history sheet for 13 June 1967 noted that one Canberra had dropped all ordnance on target and achieved 70 per cent target coverage, i.e. the target extended beyond the aircraft's bombing capacity at that time. On 15 July 1967, two *Magpie* crews flying *Combat Proof/Combat Skyspot* missions returned from their missions, having reported respectively, that one had dropped 50 per cent of ordnance on the target and had achieved 50 per cent target coverage. The other had put all (100 per cent) ordnance on the target and had achieved 100 per cent target coverage.²⁶⁹

In September 1967 when the squadron began flying two visual FAC-controlled missions daily supporting the 1st Australian Task Force (1ATF), they sometimes bombed as a pair. On three such occasions over the next few months, they received varying target coverage results, such as 100 per cent of ordnance on target with 70 per cent coverage, 100 per cent of ordnance for 20 per cent coverage and 60 per cent for 30 per cent coverage, respectively.²⁷⁰ These results showed that even a pair of Canberras couldn't fully cover the extensive tunnel systems used by NVA/VC troops to hide from the Australians in Phuoc Tuy Province. No amount of bombing on its own seemed to be able to dislodge them.

Another factor to illustrate the extent of target complexes attacked by the *Magpies*, and contained in BDA results, was the actual number of target elements impacted. For instance, on 16 May 1970, Canberra A84-231, *Magpie 21*, flown by Pilot Officer Barry Carpenter, with Navigation Leader and bomb-aimer Squadron Leader Frank Lonie attacked a VC base camp in IV Corps. The crew was given a significant BDA result of 45 bunkers destroyed and a further 10 damaged.²⁷¹ *Magpie 51*, on 15 February 1970, flown by Squadron Leaders Brian Sweeney and Frank Lonie destroyed 25 bunkers and damaged a further ten.²⁷² Obviously, these were not small targets and thus could be described as area targets, each hit by only one Canberra with six 750 lb M.117 bombs. If these effects were magnified by conjoining the Mk 20 Canberras in multiples, it was evident that serious target damage could be applied by No 2 Squadron over a wide area.

Dreadful Lady over the Mekong Delta



Bombs in flight along a IV Corps waterway

(Source: No 2 Squadron Photographic Section)

As part of his research associated with writing this book, when the author conducted an analysis of squadron bombing data extracted, albeit with some difficulty, from US archival sources, the only interpretable data covered a mere two months—January and February 1970. It showed that of 215 effective *Magpie* strikes flown in IV Corps over this period, only 36 per cent were conducted by single Canberras, with 60 per cent being in pairs. The remainder were a trio and a quartet.²⁷³

RAAF Canberras and Riverine Operations

Anecdotally speaking, and based on BDA results, it was logical to conclude that the large number of multiple *Magpie* strikes in IV Corps were most effective in attacking extended tunnel and bunker complexes, spread out underground over many hundreds of metres. While multiple-aircraft missions, continuing throughout the air campaign, attested to their popularity in IV Corps, at the same time the contributions of other forms of ‘artillery’ should not be overlooked in this context. As the degree of complexity increased, so too did the challenge of deriving any meaningful conclusions.²⁷⁴



Magpies join up off Vung Tau
after a multi-bomber strike on the Long Hai Hills

Dreadful Lady over the Mekong Delta

Although some pairs strikes were conducted in close formation with both aircraft dropping simultaneously, often the IV Corps *David* FACs would employ them as a loose pair, bombing in trail, one behind the other. At other times, one Canberra crew waited at a higher altitude while observing the other's efforts in dropping their set of bombs. Based on the results of the first drop, the second aircraft would be directed to attack another part of the target not covered by the first. Not only did this procedure ensure good extended target damage, it also allowed for better accuracy, as the second bombing crew knew, from the lead's experience, the actual wind speed and direction, both in the air and on the ground, so proper settings could be inserted into the Mk XIV bombsight, without the need for an initial sighter bomb.

This kind of area or carpet bombing, if it could be called that, even on such a minimalist scale, was carried out far less in the other military districts in South Vietnam by No 2 Squadron. Occasionally, 'show' formation drops were conducted with the 1ATF in III Corps, fragged by Seventh Air Force TACC at the 1ATF's request, allowing a rare joint Australian close air support strike.

In IV Corps, the approach worked well, with good BDA results, and was seen by the squadron as an effective way of supporting allied riverine forces in the Mekong Delta. Not only that, it suggested that, at least local ground commanders were aware of the Canberra's capabilities, and had requested the TACC to task/frag the *Magpies* appropriately.

LIMITATIONS AND VULNERABILITIES

As well as the distinctive and positive capabilities that separated RAAF Canberras from the remainder of the US tactical air system, and for which No 2 Squadron became well renowned, there were a number of limitations, constraints and vulnerabilities that precluded the *Magpies* from achieving optimum performance. They included:

- command and control difficulties,
- a professional lapse,
- lack of night operations capability,
- limited and outdated weaponry,
- inflexible bombing pattern,
- bombing system deficiencies, and
- an unstable bomb sighting system.

COMMAND AND CONTROL

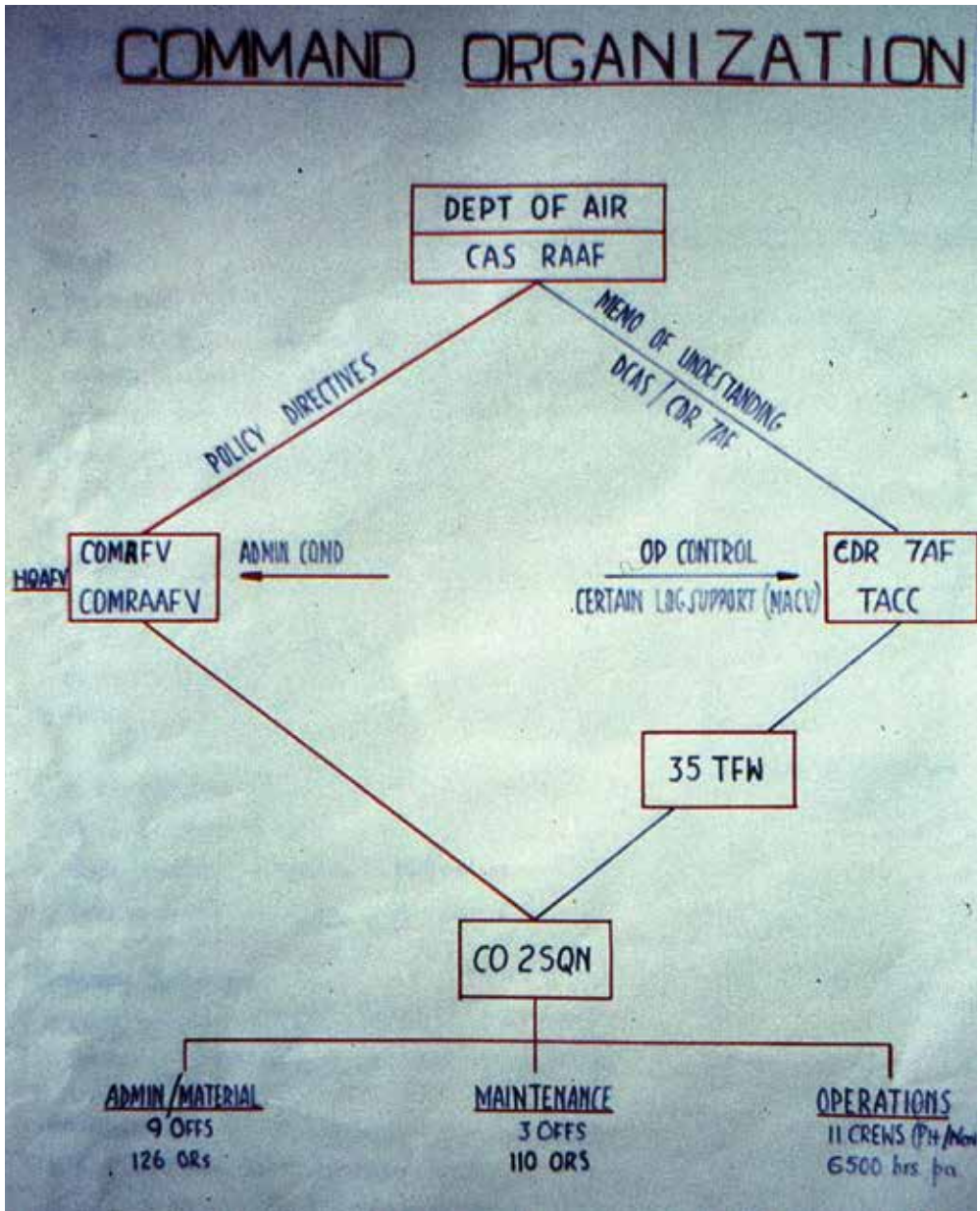


Figure 5-2: No 2 Squadron command and control briefing page, August 1969

No 2 Squadron’s command and control arrangements with the Seventh Air Force, Headquarters RAAF Vietnam and the Department of Air in Canberra are shown in Figure 5-2. This brief was photographed by the author, showing the standard, low technology, ‘butcher’s paper’-based briefing given to VIPs visiting Phan Rang in August 1969.²⁷⁵

Dreadful Lady over the Mekong Delta

Air Marshal Evans noted in his autobiography *Down to Earth*, that, on the control side, as Commanding Officer No 2 Squadron, he was subordinate to the USAF's Commander 35th Tactical Fighter Wing and operational tasking/control for the squadron came from the Seventh Air Force. He was under the direct command of the Commander RAAF Vietnam (COMRAAFV), who also had 'administrative command' of the other RAAF units in South Vietnam. In 1969, these were No 1 Operational Support Unit, No 35 Squadron (G-7 Caribous) and No 9 Squadron (UH-1 Iroquois), all based at Vung Tau. In addition, COMRAAFV was also Deputy Commander Australian Forces Vietnam (DCOMAFV), a contentious issue with the Australian Army.²⁷⁶

While some former commanders might disagree, there seemed to be a weak link in regard to the relationship between Headquarters RAAF Vietnam and Seventh Air Force. The origins of this go back to before the RAAF moved to Vietnam.

The combined ability of RAAF Vietnam and No 2 Squadron commanders to influence Seventh Air Force decision-makers was limited, and no doubt depended very much on establishing and retaining personal relationships. But for most of the time, both Australian commanders would have been too busy, focussing on their primary jobs, to put extra effort into cultivating close and enduring contacts to advantage.

While the No 2 Squadron Commanding Officer had access to the TACC at Headquarters Seventh Air Force, via Headquarters 35th Tactical Fighter Wing and Headquarters RAAF Vietnam, both were indirect means. The RAAF had no senior-level officers, or operational bombing-qualified specialists, permanently working at the TACC at any level, with whom he could make direct contact and use to plead his case.²⁷⁷ This is despite the fact that some years earlier the USAF 2nd Air Division—the precursor to the Seventh Air Force—had invited the RAAF to place an appropriate person at the TACC.²⁷⁸

The frustrations experienced with the TACC by respective No 2 Squadron Commanding Officers were at times not trivial, especially as the RAAF commander was required by Australian authorities to employ non-standard equipment within a US operational and support system. The Canberra Mk 20 itself, and its *modus operandi*, were non-standard, let alone the outmoded set of World War II-vintage weapons, carriers, lugs, fuzes, bomb tails and other equipment that went along with it. Educating US allies on the unique capabilities of the Canberra Mk 20 bomber weapon system, especially as it was classed as a 'tactical fighter', was not an easy task for the RAAF in South Vietnam.

PROFESSIONAL LAPSE – DENSITY ALTITUDE

Aside from turbulence experienced in rough weather, tropical conditions also posed quite a different and unique challenge for No 2 Squadron, in seeking to bomb as precisely as possible. Despite the average land height in the Mekong Delta being not more than 5–10 metres above sea level, a combination of both high temperatures and high humidity could generate, at sea

level, a 'density altitude' of up to 2000'.²⁷⁹ This feature had major consequences for helicopter and light aircraft engine power and flight performance, particularly when required to carry heavy loads. For unwary operators, this high density altitude took these aircraft close to, or over, their all up weight for take-off.²⁸⁰

It was only when a thorough assessment of No 2 Squadron's bombing accuracy history was carried out by the author in late 1969, that a significant undershoot was discovered across the total of all recorded *Magpie* bomb drops, up until that time. In conjunction with No 2 Squadron Navigation Leader, Squadron Leader Frank Lonie, an analysis was conducted of the reasons for this error. The conclusion was that the squadron had either been unaware of, or had ignored, the density altitude effect on air pressure measurements. This had a direct impact on the Canberra's bombing altitude.

If a density altitude correction was not applied to the altimeter reading, the effect was equivalent to raising the actual bombing altitude above the target. No 2 Squadron aircrews, when positioning for their final bombing runs, were fastidious in ensuring that their aircraft altimeters were adjusted to take into account the atmospheric pressure reading given by the FAC. This was normally obtained from the control tower operator by the FAC when departing his home base.²⁸¹ Known as QNH, this pressure setting was manually adjusted by the pilot, who wound a small knob located on the altimeter dial on the front instrument panel. This brought the pressure setting in millibars, shown in a small window at the bottom of the altimeter dial, into alignment with the given QNH.²⁸²

QNH would be set on the Canberra's altimeter before departure from Phan Rang, so that the pilot would have an accurate indication of the airfield height, if he needed to return promptly to land. On the climb to cruise altitude, both pilot's and navigator's altimeters would be cross-checked and adjusted to a global standard pressure setting (1013.2 millibars or 29.92 inches) when passing 10 000 ft in altitude, and on the descent into the target area, they would be adjusted back to the local QNH figure. QNH was a crucial input to the altimeter setting before commencing a bombing run, assuming of course that the target's altitude was also known.

Across the flooded southern part of the Mekong Delta, target height was known fairly precisely, due to the flat nature of the terrain. As part of their bombing briefing given by the FAC, which included target height, almost invariably *Magpie* crews would be given the QNH from the nearest and only significant air base—Binh Thuy. IV Corps FACs were well aware that the Canberra, with its level bombing modus operandi, needed to have the best QNH information at hand for effective bombing, and it also made sense for all aircraft in the vicinity, and flying at low altitude, to use the same barometric pressure reading.

The undershoot identified from the bombing analysis showed that, collectively, the squadron was flying up to 100 ft too high, at the standard bombing altitude of 3000 ft above target. Squadron Leader Lonie and the author consulted the local Phan Rang USAF Meteorological Service, whose personnel helped draw up a table of corrections. Once aircrews were instructed

Dreadful Lady over the Mekong Delta

on how to use it, and began to employ the table, it was not long before the systemic undershoot error disappeared, i.e. Canberra crews were now flying at the right bombing altitude above the target.

Subsequently, the No 2 Squadron Commanding Officer's Monthly Report for December 1969, submitted by Wing Commander Jack Boast reported that a complete review of the squadron's bombing accuracy assessment methods had been undertaken that month. The report noted: 'some minor inconsistencies were revealed which amounted to an understatement (previously) of the squadron's 50% and 90% CE errors by approximately 12%, i.e. by about five metres (50%) and 11 metres (90%)'.²⁸³

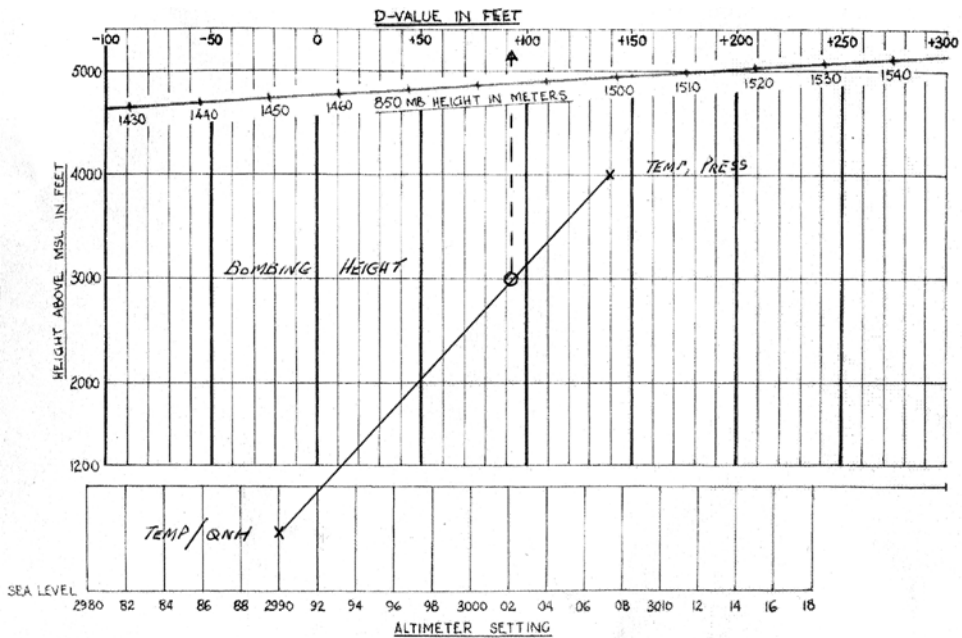


Figure 5-3: No 2 Squadron density altitude correction chart, late 1969

Another change in assessing bombing accuracy was also noted in Wing Commander Boast's report: 'to describe squadron accuracy in terms of CE (circular error) assumes a circular error distribution and such is not the case. Future bombing accuracy assessments will be made in terms of range and line error, both measured at the 50% and 90% levels'. This approach was based on the same analysis of bombing results that revealed the 20-metre generic under-shoot. The non-circular (elliptical) distribution of bombs reflected very much the predominance, at the time, of low-level Canberra bombing missions flown in the Mekong Delta environment.

Indeed, the previous commanding officer, Wing Commander John Whitehead, had stated in his report for August 1969, that 75 per cent of operational missions that month were in IV Corps.²⁸⁴ With the aircraft's good endurance, RAAF Canberra crews obviously had the luxury of plenty of time to line up on the narrow canals and rivers containing the majority of

targets. These were either bunker systems dug in beside the waterways, or strips along either side which might contain underground caches of weapons, or tree lines which friendly troops on the ground wanted cleared, so they could undertake less restricted riverine force landings.

In spite of the utmost efforts by aircrews to get the best out of their platforms armed only with dumb bombs, at the end of the day, the design of the aircraft defined the extent of its capabilities. Certainly, neither the design configuration of the Canberra Mk 20 jet bomber, nor its suite of avionics and weapons systems, was optimised for tactical close air support operations against a guerrilla force operating in a swampy terrain.

VISUAL NIGHT OPERATIONS

One of the RAAF Mk 20 Canberra's major deficiencies in the guerrilla war being fought in South Vietnam was an inability to be used in a visual role at nighttime, especially for 'troops-in-contact' (TIC) situations. Doubts were even expressed concerning its effectiveness in this role in daytime.²⁸⁵ The reality was that the enemy mainly moved or fought at night, and rested and recuperated in the day, especially in IV Corps.²⁸⁶

A number of attempts to turn night into day were tried in the form of *Night Owl* missions. These were quite complex, particularly when they were conducted amidst a crowded air environment, frequented by light utility helicopters, helicopter gunships and a miscellanea of transiting fixed wing aircraft, many *en route* to attack their own targets. In addition, artillery shells criss-crossed the countryside, often reaching heights of 20 000 ft or more. The *Night Owl* procedure involved a slow moving transport aircraft (normally a C-47 Dakota, C-7 Caribou or sometimes a C-130 Hercules) flying a circular orbit, at 4000 ft or 5000 ft altitude, dropping extremely bright parachute flares. The Canberra bomber would execute its normal racetrack pattern at 3000 ft. Below this, the FAC in his O-1 Bird Dog tried to confirm where the target was and fire off a smoke marker, so the *Magpie* crew could drop their bombs before the descending flares burnt out. The element of surprise certainly was not at the forefront of *Night Owl* doctrine.

With the Canberra's tortuous pre-bomb release preliminaries, timing was of an essence in executing this type of attack effectively. With a high degree of professionalism needed to fly these missions, No 2 Squadron leaders imposed stringent conditions on crews flying these specific profiles, requiring a minimum of 50 operational bombing sorties in the logbook before clearance was given. Because of their complexity, and presumably their doubtful value compared with alternative strike profiles, *Night Owl* missions were rare for No 2 Squadron generally, and even rarer in IV Corps.²⁸⁷

The only other nighttime bombing alternative was the use of ground-based radar (*Combat Proof/Combat Skyspot* strikes) and despite the phenomenal flying accuracy that No 2 Squadron pilots were renowned for, it was unusual for such missions to be flown in support of troops in contact.²⁸⁸

Dreadful Lady over the Mekong Delta

Yet another limitation was the inexperience of RAAF Canberra crews in conducting night formation bombing missions. Air Marshal Evans has recounted that when he served as Commanding Officer of No 2 Squadron in 1968, he was keen to have his crews proficient in this form of flying. Before Vietnam, 'the RAAF bomber force tactic was for a bomber stream—aircraft at three-minute intervals, at the same height and heading'.²⁸⁸ Night formation was not routinely flown by RAAF crews. However, he was aware that collegiate USAF 35th TFW units at Phan Rang were carrying out formation missions every night. Having been ordered by Seventh Air Force TACC to carry out a night formation of two aircraft for a radar-directed attack on a target in I Corps, he accordingly authorised two senior crews, including himself, to fly a pairs formation strike, which went very well and the target was reported as destroyed.

He tells: 'The odd sequel to that mission was a signal for me from Air Force Headquarters in Canberra warning of the danger of carrying out formation flying at night, particularly in tropical areas. My blunt reply was modified by my boss, the Commander RAAF Vietnam in Saigon, but it carried the message'.²⁸⁹ Thereafter, no further night formation missions were attempted by the squadron.

LIMITED AND OUTDATED WEAPONRY

Amongst the bomber population operating in the South Vietnam skies, the Canberra Mk 20 was a lightweight, struggling to carry ten 500 lb bombs on triple-bomb carriers that were unable to cope. This was done for a very short period of just over a month (May-June 1967). Thereafter, the maximum bomb load carried was eight 500 lb bombs and when they ran out, six M.117 750 lb bombs.

The heavyweight champion of bombing was the B-52 Stratofortress, which was capable of carrying a mixed load of up to 108 Mk-82 500 lb and M.117 750 lb bombs, using an internal bomb bay and wing carriers. The next in line, the 'middle weights', were the F-4 Phantom and the A-6 Intruder, both US Navy designs. US Marine Corps F-4Bs and US USAF F-4C Phantoms had a bomb payload of 16 000 lb, i.e. up to 32 Mk-82 500 lb bombs, and the US Navy A-6 Intruder (essentially focussed on bombing in North Vietnam) could carry 14 000 lb or 28 Mk-82 bombs. Neither the F-4 nor A-6 had a bomb bay, so all bombs were carried externally, but even then, they dropped up to three times the Canberra Mk 20's load per mission. The A-6 had tandem triple-carrying bomb racks, two per wing, to hold its 24 wing-mounted Mk-82s, with an additional four attached in pairs to tandem centre-line racks beneath the fuselage. Even the diminutive Cessna A-37B Dragonfly, with four underwing hard points, could carry eight or more Mk-82 bombs, as well as being fitted with a nose-mounted 7.62-mm AN/GAU-2 Gatling-type mini-gun.

The Mk 20's American cousin, the Martin B-57B Canberra, carried more weapons, making good use of an internal bomb bay with a rotating door and extra mounts under the wings. This enabled it to carry up to 4500 lb of bombs internally, and 2800 lb underwing, as well as four 20-mm M-39 cannon in the wings, with 290 rounds per gun.²⁹⁰

The diversity of terrain across South Vietnam meant that flexibility in air weapons was needed. Unlike most tactical fighters, No 2 Squadron's Canberra jets were not equipped with guns, rockets or specialised bomb adaptor kits. The only flexibility was vested in the bombs themselves and during its four years in Vietnam, the squadron experimented with a number of bomb-fuze-tail combinations. For example, between April 1968 and July 1968, variable time (VT) fuzeing was employed on World War II-vintage 1000 lb bombs dropped by *Maggie* crews. VT fuzeing ensured that bombs detonated above ground level, thus spreading the blast and deadly shrapnel across a wide area. This facility was commonly used in World War II for clearing foliage away to expose targets underneath, or to help create landing zones for airborne paratroopers and gliders. It was seen to be relevant to similar pre-strike operations in South Vietnam.

For VT fuzeing to work properly, wiring was joined between the aircraft's electrical system to bomb bay release mechanisms, so that in mid-flight, the crew could select a time interval matched to the expected nature of the target. If the aim was to clear trees away, say to help ground troops prepare a landing zone for helicopter insertions, the fuzeing could be set to trigger a bomb detonation between 60 and 200 ft above the target, using a pressure sensing device in the bomb's fuze.

Unfortunately, the initial batch of VT fuzes employed by the squadron proved to be unreliable, as witnessed by Wing Commander Evans on one eventful trial of VT fuzeing with 1000 lb bombs. After releasing his bombs from medium altitude on a *Combat Skyspot* mission, Wing Commander Evans descended with the intention of observing their impact, only to see puffs of smoke above him, indicating that all but one bomb had detonated prematurely, following release from the Canberra's bomb bay.²⁹¹

Undeterred by these initial setbacks, and confident that the matter had been resolved as a result of tests by ARDU at the Woomera test range, No 2 Squadron planned to resume VT-fuzed bombing. The squadron's own armament experts advised that the best method was to insert a delay fuze in the nose and a VT fuze in the tail of the bomb, and that this would achieve close to 100 per cent reliability. However, in the meantime, the Seventh Air Force had also undertaken its own set of trials in South Vietnam and they determined that there were still high risks associated with the fuzes in question. Thus, as a CHECO Report on the *RAAF in SEA* noted: 'The fight to use VT fuzes ended in defeat' and a total ban on these fuzes was introduced by Headquarters Seventh Air Force.²⁹²

INFLEXIBLE BOMBING PATTERN

For FACs familiar with directing strikes by fast fighters, hovering high above the target in a tight space, ready to pounce in at 450 knots and pull 7g to manoeuvre into position for a high-angle, dive attack on the target, the Canberra Mk 20's ponderous racetrack bombing circuit tended to generate frustration at times. Unimpressed, and caught in the 'World War II bombs and VT' phase of the squadron's bombing in early-to-mid 1968, RAAF FAC,

Dreadful Lady over the Mekong Delta

Flight Lieutenant Garry Cooper (*Tamale* 35), was most forthright in pointing out inherent deficiencies. He gave a specific FAC perspective of the bombing pattern employed by the Canberras, noting that they 'ran in from about eight kilometres out and were hard to keep in sight due to their distance from the target'.²⁹³

He further admitted, 'I did not enjoy working with the Australian Canberra. I guess my baptism of fire was all with high-speed, high-intensity action and the Canberra's bombing procedure was just too slow for me'. He did add a caveat, however, saying, 'This attitude was entirely my fault as the Canberras did good work'.²⁹⁴ Yet, he was right, especially from a perspective of being heavily involved in close air support strikes in a high-intensity environment, in which US Army 9th Division's troops operated, and which has been described many times over.

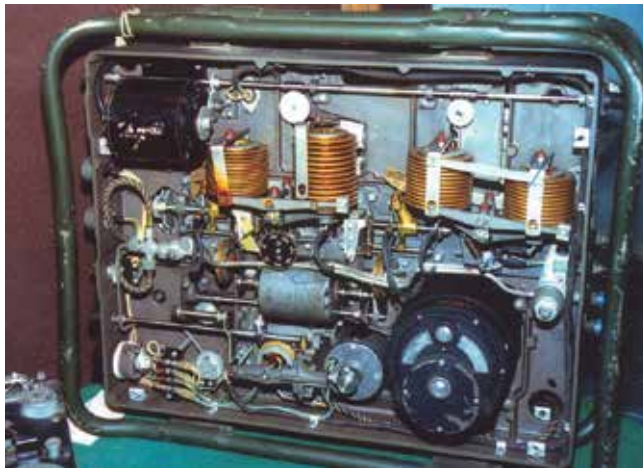
Because of its more leisurely bombing profile, the Canberra was better suited to the less intensive situation than a shorter-range, dive-bomber. The aircraft was more suited to air interdiction missions than close air support, such as in ARVN territory in the southern provinces of the Mekong Delta, where transiting NVA and VC troops would often be attacked while resting up in their base camps.²⁹⁵ This is not to say, however, that southern Mekong Delta operations were any less dangerous, as major riverine battles occurred in these regions also.

Certainly, there were occasions when FACs had a choice between the Canberra and other tactical aircraft and preferred to work with the latter first.²⁹⁶ Whether the mission was close air support or interdiction, the Canberra Mk 20 bombing pattern remained the same. Even though low level bombing over the flat, flooded regions of the Mekong Delta offered the advantage of greater accuracy compared with higher bombing altitudes, there were nevertheless costs associated with this. These included changed visual perspectives, increased threat of being hit by either ground fire or own bombs, problems with the Canberra's *Green Satin* Doppler radar and conflicting aircraft bombing patterns.

On rare occasions, some bomb-aimers, finding themselves off line late in the bombing run, would actually direct the pilot (without adding to his problems by telling him of this devious plan) to turn away from the target, rather than veer towards it. The bomb-aimer's intention was to release the bombs as the aircraft briefly banked away from the target, thus imparting a centripetal force to throw the bomb(s) closer to the target. It worked. Another variation on the theme was recorded when, due to heavy cloud build-up in the target area, the formation leader of three Canberras decided that the formation would change from their normal straight-and-level bombing profile to conduct dive bombing on the target. There is no record of how this was accomplished and how accurate the bombing was, given that the pilots had no sighting systems in their cockpits.²⁹⁷

UNSTABLE *GREEN SATIN*/T-4 COMPUTER BOMB SIGHT SYSTEM

Another factor adversely affecting bombing accuracy at low level was the Canberra's only on-board radar system, the Marconi ARI.5851 set, code-named *Green Satin* by the Royal Air Force, its original users. *Green Satin*'s two wing-mounted antennae pointed towards the ground at angles slightly off vertical, transmitting and receiving reflected pulsed radar beam signals. These antennae were connected to an ingenious electro-mechanical device, called a T-4 computer (a later version of the RAF T-1), which turned the signals into groundspeed and drift information, by measuring the time difference between the transmitted and received pulses, based on the Doppler principle.²⁹⁸



RAF T-1 Bombing Computer, precursor to the RAAF's T-4

The *Green Satin*-T4 system was designed for high altitude flight, and allowed for plenty of time for the reflected signal to be received, processed and displayed. However, when the Canberra flew closer to the ground, the returning radar signal could either be scattered away or arrive much earlier than at high altitude, and a stage would be reached where the processing time within the T-4 computational system was insufficient to measure time differences accurately any more. To the bombing crews, this was known as the *Green Satin* 'unlocking' as the indicated computations varied randomly.

The squadron was well aware of this problem before arriving in South Vietnam, when, during the troubled times of Indonesian Confrontation, Butterworth-based Canberra crews concentrated on perfecting 'high-low-high' mission profiles. These were designed to counter the threat of heavily defended target areas, alerted by modern Soviet early warning radars. The crews planned to fly at high altitude *en route* to the assigned target area, descend to very low level to get under the radar and then carry out their visual bombing runs at 300 knots and 600 to 1000 ft above the target, climbing upon bomb release to return to base at high altitude.

As former No 2 Squadron bomb-aimer Flight Lieutenant Bob Bruce observed, '... as *Green Satin* was unreliable at low level, the squadron would use a fixed sight head (FSH) bombing

Dreadful Lady over the Mekong Delta

technique'. This was a challenging proposition as all inputs to the sight head needed to be manually set by the bomb-aimer lying prone in the Canberra's nose position.²⁹⁹ For this task, he needed to know the temperature at the bombing altitude, to convert indicated air speed (IAS) to true air speed (TAS), and also the wind, which, applied to TAS and heading, would produce ground speed and drift. He relied on the pilot providing heading and IAS information, and having adjusted the sight head for these settings, it was left to the pilot to advise the bomb-aimer of any subsequent departure from the steady state, so corrections could be applied at the bombsight.

After experimenting in 1967-8 with alternative bombing profiles, by 1969 No 2 Squadron had settled on a standard pattern of 270 knots IAS and 3000 ft above target height. Under these conditions, the *Green Satin*-T4 system worked reasonably well on most occasions, feeding accurate groundspeed and drift information automatically into the bombsight. For missions in I, II and III Corps, over flat, undulating or mountainous terrain, the system functioned normally, including when bombing at higher altitudes, such as over the Tiger Mountain region. However, in IV Corps, on many occasions, *Magpie* crews needed to release their bombs as low as practicable for reasons already explained, such as flying under low cloud bases, especially when attacking targets where accuracy was paramount.

But the Mekong Delta terrain posed problems for the *Green Satin* Doppler radar, which was designed to receive firm signals reflected off a solid land mass. Even at 3000 ft above sea level in IV Corps, the downward-pointing radar beams could glance off the flat, watery surface below, resulting in a weakened return signal, insufficient for the T-4 computation processing to calculate a meaningful answer. Furthermore, flying lower or deviating from a perfect straight-and-level attitude on the run-in to the target could easily result in an unlocked Doppler radar, with confused electrical messages imparted from the computer to the Mk XIV bombsight. Canberra crews bombing in IV Corps would experience these conditions from time to time, leaving them with no option but to run through 'dry' and start their bombing circuit all over again.

Despite the high reliability of the ageing *Green Satin* equipment, aircrew frustration grew as a result of these inconsistencies in IV Corps.³⁰⁰ This resulted in the introduction, towards the end of 1969, of a variable ratio gearbox (VRGB) solution. Initial trials were undertaken by experienced Canberra navigator/bomb-aimers Flight Lieutenants Geoff Cramer and Hugh McIndoe at Amberley.³⁰¹ The VRGB was connected between the T-4 computer and the Canberra's Mk XIV sight head in order to modulate irregularities of groundspeed and drift signals feeding into the sight head.

Expectations were high that the introduction of the VRGB would:

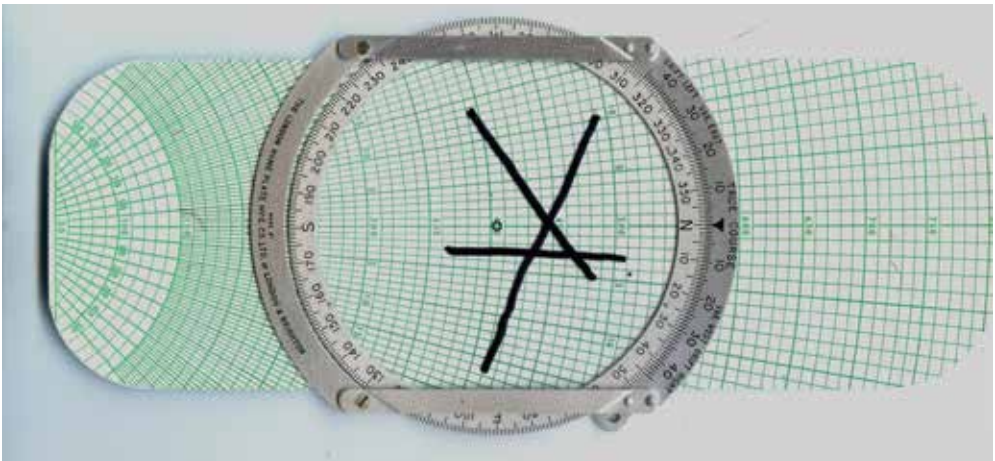
- improve crew coordination, by giving the bomb-aimer more time to concentrate on ensuring that the pilot manoeuvred the Canberra into a precise bombing position in a timely manner,

RAAF Canberras and Riverine Operations

- provide a much improved measure of tactical freedom during the final phase of the bombing run, and
- nullify, to a large extent, bombing errors resulting from incorrect aircraft attitude and ground speed at the time of weapons release.³⁰²

Unfortunately, upon its introduction in the field, the VRGB had some teething problems. The worst-case situation occurred when the VRGB slipped, which it did in the more turbulent conditions of midday III Corps missions, and bombs fell where they were not intended. Moreover, even if a single sighter bomb was dropped first, not being aware of the cause of the error or its magnitude, the bomb-aimer would be unable to make the right corrections for the next bomb drop. Thus, some bomb-aimers preferred to use the fixed sight head (FSH) technique exclusively, relying on their own calculations and judgement, and correcting their bombsight settings after first dropping a single sighter bomb. The general consensus at the time was that the VRGB was too sluggish to feed in the required correction.

The FSH approach relied on basic navigator skills, taking visually observed or forecast wind speed and direction and computing groundspeed and drift using the standard RAAF navigator's (Dalton) Mk 4A 'Computer Dead Reckoning', or 'prayer wheel', as it was colloquially known. It was also common practice for *Maggie* bomb-aimers, operating in the same target area at the same time, to advise each other of wind, drift and groundspeed information.



Navigator's 'prayer wheel'

A comparison of these two bombing techniques, undertaken by the author in April-May 1970, showed only a marginal difference between them. The 289 VRGB bomb drops resulted in a 50 per cent CEP of 32 metres and 90 per cent CEP of 78 metres, while 388 FSH drops averaged 50 per cent CEP of 35 metres and 90 per cent CEP of 85 metres.

CHAPTER 6

NO 2 SQUADRON'S EFFECTIVENESS IN RIVERINE OPERATIONS

IV CORPS MISSIONS

No 2 Squadron conducted bombing missions in IV Corps from the outset of its four-year stay in South Vietnam, starting in April 1967 with *Combat Proof* (later renamed *Combat Skyspot*) ground-based, radar-directed bomb drops, mainly at night.³⁰³ As high-level commanders at the USAF's Headquarters Seventh Air Force became more familiar with the unique place of the Canberra Mk 20 jet bomber in this particular wartime environment, an increased number of visual daytime missions were scheduled. By December 1967, the *Magpies* averaged 50 per cent night *Combat Proof/Combat Skyspot* and 50 per cent day bombing missions. By early 1969, the squadron was being fragged for seven or eight visual bombing missions daily with only one *Combat Skyspot* mission at night, with a good proportion of the day sorties allocated to Mekong Delta operations. These involved either interdiction of infiltrating enemy troops or close air support of allied forces engaged in riverine operations.

As shown in Table 6–1, just under 14 000 missions were flown over South Vietnam by No 2 Squadron RAAF during the four years from April 1967 to June 1971, and close to 40 per cent (5501 in total) were flown in IV Corps.³⁰⁴

YEAR	I CORPS	II CORPS	III CORPS	IV Corps	TOTAL
1967	445	853	1322	718	3338
1968	399	633	1093	1601	3726
1969	43	153	741	1985	2922
1970	451	106	998	1148	2703
1971	1118	105	21	49	1293
TOTAL	2456	1850	4175	5501	13 982
%	17.6	13.2	29.9	39.3	100.0

Table 6–1: No 2 Squadron bombing missions by corps/military region

Tables 6–1 and 6–2 show that in 1967, less than a quarter of all *Magpie* missions were flown in the Mekong Delta region. This doubled in the following year to 43 per cent and peaked in 1969 at 68 per cent but reverted to 43 per cent in 1970. In the final year, it dried up to only 49 sorties as the squadron focussed its efforts on I Corps strikes, before leaving for Australia

Dreadful Lady over the Mekong Delta

in mid-1971.³⁰⁵ In the same time frame, combined US-Vietnam riverine operations conducted in the Mekong Delta peaked in the 1968-69 years, before the departure of the US Army's 9th Infantry Division from South Vietnam.

YEAR	I CORPS	II CORPS	III CORPS	IV Corps	TOTAL
1967	13.3	25.6	39.6	21.5	100.0
1968	10.7	17.0	29.3	43.0	100.0
1969	1.5	5.2	25.4	67.9	100.0
1970	16.7	3.9	36.9	42.5	100.0
1971	86.5	8.1	1.6	3.8	100.0

Table 6–2: Percentages of No 2 Squadron bombing sorties by corps/military region by year

BOMBING LOAD

Around 76 300 bombs, at a nominal weight of about 27 000 short tons, were dropped by No 2 Squadron over the four years in South Vietnam.³⁰⁶ Assuming that the 39.3 per cent figure for IV Corps missions in Table 6–2 also equated with the percentage of bombs dropped, the tally for IV Corps was around 30 000 bombs, weighing 10 610 tons.

TARGETS

Table 6–3 lists a set of IV Corps targets attacked by the author during his 260-mission tour of 1969-70, illustrating the spectrum typical of Mekong Delta missions flown by No 2 Squadron RAAF. A good percentage of strikes involved softening up targets prior to riverine operations being undertaken, either in daylight or, what was more likely, planned for the forthcoming night hours when most of the fighting took place.

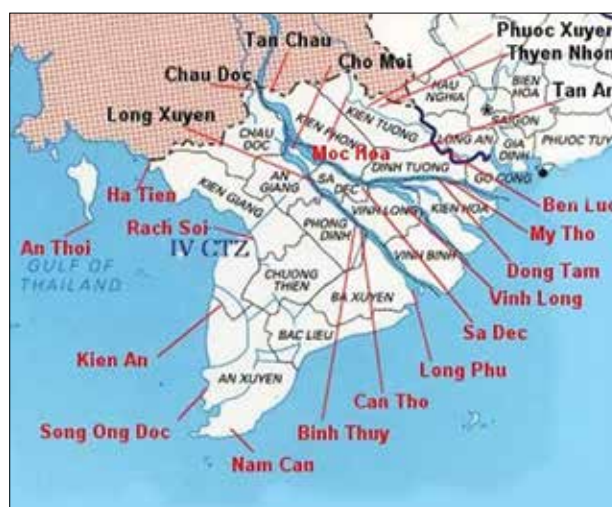
Many of these targets were located along the myriad of streams and canals in the region, irrespective of whether they were classified as:

- clearing areas for impending helicopter-borne troop landings (i.e. landing zone preparations or 'LZ Preps' as they were called),
- pre-strike missions (keeping enemy heads down pending an airborne and/or ground assault), or
- drops on known or suspected, dug-in, troop concentrations, in either houses (either referred to as structures or hooches) or underground bunkers.

IV Corps TARGETS	
LZ Preps (canals, base area, structures)	36
Pre-strike	7
VC Base Camps/Areas (canals, canal lines, hooches/structures, storage area, active, 300VC, bunkers, bunker complexes)	64
VC companies (exposed, in bunkers, in hooches, in caves, concentrations, suspected, 100VC, in tree line/grove, location, suspected enemy location (SEL), dike line)	12
Logistics/supply/assembly areas (supply route, supply point, supply base, VC rice mills, VC dam, tax collectors staging area)	8
Rocket and mortar positions	1
HQ complex	1
VC radio stations	2
Naval support, Swift boat ops, occupied sampans	3
TOTAL	136

Table 6-3: Author's IV Corps targets, 1969-70

TYPICAL RIVERINE OPERATIONS



Map 6-1: Key IV Corps locations
(Source: Bob Stoner)

Although *Magpie* crews were not specifically briefed on details of the operations underway, when conducting their bombing missions in IV Corps, Table 6-4 illustrates the likely involvement of No 2 Squadron Canberra jet bombers in riverine operations over the Mekong Delta during its time in South Vietnam.

Dreadful Lady over the Mekong Delta

DATE	OPERATION	DELTA REGION
Early 1967	-	Rung Sat Special Zone (Saigon)
November 1968	<i>Search Turn</i>	Rach Gia/Soi to Bassac River Canals
November 1968	<i>Foul Deck</i>	Cambodian Border Canals
December 1968	<i>Silver Mace I</i>	Nam Can Mangrove Forest
December 1968	<i>SEALORDS</i>	IV Corps (master strategy)
December 1968	<i>Giant Slingshot</i>	Parrot's Beak
January 1969	<i>Barrier Reef</i>	LaGrange Canal
April 1969	<i>Silver Mace II</i>	Nam Can Mangrove Forest
June 1969	<i>Ready Deck</i>	Saigon River
June 1969	<i>Sea Float</i>	Ca Mau Peninsula
September 1969	<i>Breezy Cove</i>	U Minh Forest, Kien An
January 1970	<i>Solid Anchor</i>	Ca Mau Peninsula

Table 6-4: No 2 Squadron bombing and Mekong Delta riverine operations

The following examples illustrate typical *Magpie* bombing missions supporting riverine operations in the Mekong Delta, based on the best information available to date. Details of a significant number of the missions cited below have been extracted from the author's personal records, as well as from No 2 Squadron *Unit History Sheets* and US archival records.³⁰⁷



Magpie's cockpit view over the Mekong, early morning

LOWER BASSAC CANALS – OPERATION *SEARCH TURN*

Operation *Search Turn* saw riverine expeditions into the interior canals extending from the coast at Rach Gia, north-east to the Song Hau Giang at Long Xuyen, beginning in November 1968. No specific missions connected with this operation at this time have yet been identified, however as 290 *Magpie* missions out of a total of 559 (52 per cent) were flown in IV Corps during the months of November and December 1968, it can be presumed that some Mk 20 Canberra bombers may have supported this operation.³⁰⁸

The region from Rach Gia/Rach Soi, up to the Cambodian border was known to be sparse of friendly troops and *Magpie* aircrew took seriously the advice of *David* and *Bomber* FACs that the best bail out area, if their Canberra was hit by enemy fire, was 'feet wet' over the Gulf of Siam, rather than on land. At least, in the water, downed crews would stand a reasonable chance of being rescued by friendly riverine forces. Fortunately, RAAF Canberra missions over IV Corps suffered no serious damage, testifying both to luck and the ruggedness of this well-liked aircraft.

During 1969-70, numerous *Magpie* missions were flown in this locale, especially in the region of the 'Three Sisters'. The enemy had infiltrated into this area either by sea, or overland, and had occupied caves and tunnels in the low lying hills. Many bombing interdiction strikes were called in over a prolonged duration to deal with this threat. Personal records show that the author conducted nine strikes on the 'Three Sisters' altogether, the most at any one location. A number of secondary explosions included in BDA reports received from the *David* FACs confirmed that stockpiles of enemy weapons existed here, and on one occasion, occupied sampans being used to carry weapons and supplies were successfully attacked by a *Magpie* strike.



***Magpies* over Dung Island, Bassac River**
(Source: Peter Nuske)

Dreadful Lady over the Mekong Delta

Specific strikes on the 'Three Sisters' known to have occurred during this period include the following:

- Flying as *Magpie 51* on 24 May 1969, Canberra A84-232 (pilot Squadron Leader Ivan Grove, navigator/bomb-aimer Flight Lieutenant Bob Howe) attacked a VC base camp, under the direction of a *David* FAC, in his Cessna O-1 Bird Dog. Dropping a single stick of six M-117 750 lb bombs, which hit with a line error of 30 metres to the left of the intended impact point, BDA given was one cave entrance damaged and 200 metres of enemy defensive position destroyed.
- A week later, on 31 May 1969, Pilot Officer Dick Allchin (pilot) and Flight Lieutenant Bob Howe (navigator/bomb-aimer) in A84-236 (*Magpie 31*) collaborated with a *David* FAC in a clearing operation. Aiming at the middle hill of the 'Three Sisters', they made two drops each of three M.117 750 lb bombs, from 3000 ft above the target, averaging a 50 metre undershoot for each first bomb. Following another *Magpie* in attacking the same target, *Magpie 31* achieved a BDA of one weapon position destroyed and 1500 square metres of defensive position cleared.



Pilot Officer Dick Allchin, Flight Lieutenant Bob Howe
with Canberra Mk 20, Phan Rang, 1969

No. 2 Squadron's Effectiveness in Riverine Operations

- On 12 July 1969, Canberra A84-228 (*Magpie 31*, pilot Squadron Leader Ivan Grove, navigator/bomb-aimer Flight Lieutenant Bob Howe, carrying Commander RAAF Vietnam (Air Commodore Keith Robey) as an observer, attacked a series of enemy bunkers in company with two other Canberras. Bombing early in the morning from 3000 ft altitude, each aircraft released a salvo of six M-117 750 lb bombs with minimum spacing between them. As *Magpie 31* was bombing its target between the hills, the *David* FAC noted that the descending bombs narrowly missed a group of people (presumably enemy troops) who seemed to be watching the strike with interest. *Magpie 31*'s BDA was three structures destroyed, one structure damaged, five bunkers damaged, two gun positions destroyed and 60 square metres of encampment area destroyed. What happened to the spectators was anybody's guess.
- Canberra A84-241 as *Magpie 51* (pilot Squadron Leader Ivan Grove, navigator / bomb-aimer Flight Lieutenant Bob Howe) bombed a target located on a small hill on the southern part of the 'Three Sisters' on 30 July 1969 with FAC *David 65* in an O-1 Bird Dog directing the strike against a suspected enemy location (SEL). Dropped from an altitude of 3000 ft, the stick of six bombs narrowly missed the hill, landing further on and resulting in a paltry BDA of one structure damaged, one cave entrance exposed and 40 metres of VC base camp area destroyed. Prior to this strike in the same vicinity, another Canberra, *Magpie 41* had successfully obliterated a pagoda which was being used to store enemy supplies. Not long after, *Magpie 71*, having followed *Magpie 51* to bomb in the same target area, was struck by a 7.62-mm bullet in one of the Canberra's Avon engines, but the crew returned to base safely.
- On 6 October 1969, Squadron Leader Arthur Barnes (pilot) and Flight Lieutenant Bob Howe (navigator/bomb-aimer), flew in A84-238 as *Magpie 81*, on an early morning pre-strike mission, aiming at a target half-way up the north western edge of the southern of the 'Three Sisters', with friendly forces on top of the 600 ft hill. With bad weather in the vicinity, the crew were forced to fly below the cloud base at 1200 ft above the ground, executing a sharp pull-up immediately following bomb release. FAC *David 64*, flying his O-1 Bird Dog, reported that the ground commander was 'quite pleased' with the direct hit achieved from a single stick of 6 M-117 750lb bombs. BDA was three bunkers destroyed, one cave entrance destroyed and three caves damaged.
- A84-244 (*Magpie 81*) flown by Pilot Officer Barry Carpenter and Flight Lieutenant Bob Howe) on 10 January 1970 struck a tax collectors staging area on the edge of the coast below the 'Prick' in An Xuyen Province. The mission was directed by FAC *David 63* (Lieutenant Gary Cave, USAF) flying a Cessna O-1 Bird Dog. They dropped a stick of six M-117 750 lb bombs with no recorded result.

CAMBODIAN BORDER – OPERATION *FOUL DECK*

In November 1968, Operation *Foul Deck* took place on the canals bordering Cambodia and the south-west Mekong Delta. Under the terms of the Australian/United States Military Working Agreement covering operations in South Vietnam, Australian servicemen were not allowed to take part in operations near (i.e. within 10 kilometres of) the Cambodian border, so no specific missions by No 2 Squadron, connected with this operation, should have been fragged. Nevertheless, some *Magpie* missions may have been flown in conjunction with this operation, at the appropriate distance inside South Vietnam.

Much later, on 17 December 1969, A84-234 (*Magpie 81*, Pilot Officer Dick Allchin, and Flight Lieutenant Bob Howe) worked with FAC *Bomber 42* in the ‘Seven Sisters/Mountains’ region, reasonably close to the no-fly zone near the Cambodian border, and an hour’s flight time from Phan Rang. BDA was one bunker destroyed, five cave entrances destroyed and 150 metres of base camp destroyed. Following this good bomb drop, *Bomber 42* pleaded with the *Magpie* crew for more No 2 Squadron Canberras to conduct similar bombing missions in his area of operations. He also expressed frustration at having to direct an Australian bombing attack on a ‘rock-pile’, whereas there were many ‘juicy targets across the border’.

No 2 Squadron aircrews were not the only Australians tempted to consider engaging ‘hot’ targets inside the Cambodian border. RAAF FACs, RAN destroyer commanders and RAN EMU helicopter crews also faced the same dilemma. Flying Officer Ken Semmler (*Issue 28*) noted that, as a RAAF FAC supporting the US Army’s 9th Division’s 2nd Brigade, he ‘looked forward to going with 2nd Brigade across the border into Cambodia to even up a score or two’ but ‘as we well know, politics stinks and the Australian heavies decided we were not to cross the border. What a load of... !!?’.³⁰⁹

Another RAAF FAC, Flying Officer Ken Mitchell (*Issue 23*), also stated that, ‘Our AO [area of operations] was on the border with Cambodia. On a night mission, it was possible to see the headlights of the North Vietnamese Army trucks on the other side of the border unloading their munitions and supplies’ (that had presumably come all the way from North Vietnam via the Ho Chi Minh trail).³¹⁰



Bird Dog airborne at Can Tho, 1969

While US Army 135th Aviation Company crews joined in the combined US and Vietnamese forces drive into Cambodia in May 1970, RANHFV helicopter personnel had to be excluded from these operations. 'The enforced absence of the Australians hampered the efficiency of the 135th and it was soon re-assigned to supporting operations elsewhere in the Delta.'³¹¹

NAM CAN FOREST – OPERATION *SILVER MACE I*

Operation *Silver Mace I*, conducted in December 1968, involved riverine missions into the mangrove forest of Nam Can in the southern-most region of the Ca Mau Peninsula, where the Gulf of Thailand meets the South China Sea. The distance from Phan Rang to the southernmost tip of the Mekong Delta is 315 nautical miles, only 20 miles less than the distance north to the DMZ at the 17th parallel. While no specific *Magpie* missions connected with this operation have yet been identified, again it is possible that Canberra bombing missions contributed to this campaign.

PARROT'S BEAK – OPERATION *GIANT SLINGSHOT*

Also beginning in December 1968, two thrusts by combined forces under Operation *Giant Slingshot* occurred up the Vam Co Tay (from Tan An to Moc Hua) and Vam Co Dong rivers (from Ben Luc to Tay Ninh), either side of the Parrot's Beak where Cambodian territory drew close to Saigon. Although a number of RAAF FACs became quite familiar with the Parrot's Beak region, no specific No 2 Squadron missions connected with this operation have yet been identified. However, it is possible that some of the 108 *Magpie* missions carried out in III Corps during December 1968 could have been directly in support of Operation *Giant Slingshot*.

May 1970 saw the end of Operation *Giant Slingshot*, in which 35 US Navy personnel were killed in action and 518 wounded.³¹² Over this period, No 2 Squadron's Canberra bombers conducted numerous strike missions in the vicinity of the northern fork of the catapult/slingshot adjacent to the Parrot's Beak and around the Tay Ninh region.

Examples of these missions included the following.

- A84-235 (Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe with callsign *Magpie 71*) on 3 June 1969, conducted a morning drop of six M.117 750 lb bombs from 3000 ft against a bunker complex in III Corps, 11 nm north-east of Tay Ninh, close to the Song Vam Co Dong. The crew were quite busy avoiding clouds, at and below bombing altitude, staying clear of a 3235 ft mountain close to the bombing run-in, and keeping a watchful eye out for a number of CH-47 Chinook helicopters and C-47 Dakotas operating in the vicinity. Despite these distractions, the bombs were well directed, with a BDA given of four bunkers destroyed, two bunkers damaged and four fighting positions damaged.
- On 28 January 1970, A84-244 (*Magpie 81*, Pilot Officer Carpenter and Flight Lieutenant Bob Howe) conducted an afternoon sortie on a base camp in III Corps, 4 nm south-east of Dau Tieng along the Saigon River. They were working with a *Sluggo* FAC from the 19th Tactical Air Support Squadron (TASS), flying an OV-10 Bronco. The crew dropped six M.117 750 lb bombs 1100 metres away from friendly troops. BDA was reported as 75 per cent of the intended target destroyed, with five bunkers destroyed and two damaged. That day, three *Magpie* sorties were cancelled due to very bad haze and low cloud over the III Corps region.

Along the southern fork of the catapult/slingshot in the north-west of IV Corps, Canberra missions included strikes in the region of the 'Wagon Wheel', a conjunction of five canals located at UTM coordinates WS9855. Two of these missions were as follows.

- The first No 2 Squadron mission of the day on 28 May 1969 (*Magpie 11*) was A84-240 (Squadron Leader Ivan Grove, Flight Lieutenant Bob Howe) bombing from 3000 ft altitude just south of the 'Wagon Wheel'. Under the direction of FAC *David 32*, a VC Company in bunkers and foxholes was attacked. Conducting three drops each of a pair of M.117 750 lb bombs with reasonable accuracy (two out of the three within a 100m x 50m box), *Magpie 11* achieved a BDA of two enemy estimated killed, and four bunkers and seven foxholes destroyed.

No. 2 Squadron's Effectiveness in Riverine Operations

- On 10 June 1969, A84-240 (*Magpie 51*), piloted by the Commanding Officer, Wing Commander John Whitehead, with Flight Lieutenant Bob Howe, hit a bunker complex under a house, amongst plantations in III Corps near 'the Testicles' (at UTM coordinates XS6857). Directed by a *Tamale* FAC in an O-1 Bird Dog, Canberra A84-240 dropped four single M.117 750 lb bombs and one pair, to receive a BDA of one structure destroyed, two bunkers destroyed, four fighting positions destroyed and one tunnel complex partly collapsed. The FAC's intention was to eliminate two houses, and while the first was easily disposed of with a direct hit with the first bomb, the second house remained standing despite multiple impacts, all reasonably close, within 50 metres. The blast effect of the remaining bombs was inhibited for some reason, possibly the nature of the soil.

U MINH FOREST – OPERATION *BREEZY COVE*

Operation *Breezy Cove* patrols by riverine forces began in September 1969, along the Song Ong Doc, bordering the partly dense and isolated U Minh Forest region. No 2 Squadron conducted over 31 bombing missions in the U Minh Forest region in the five months from September 1969 to January 1970. Nineteen of these were against VC base camps or storage areas, including one headquarters complex and one tax collectors staging area, nine were LZ Preps, two were pre-strikes (clearing territory immediately prior to troop insertion), while one was aimed at cleaning up mines and booby traps located by troops on the ground.

Sometimes, up to four Canberra bombers at a time travelled in formation to the same IV Corps target, dropping their sticks of six M.117 750 lb bombs in quick succession, suggesting that a major operation was underway below.

Typical *Magpie* sorties in the latter half of 1969, in the U Minh Forest region, included the following.

- *Magpie 51* (Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe in A84-247) early on 15 August 1969, flying below the cloud at 1500 ft above target level, dropped a stick of six M.117 750 lb bombs on a VC supply area, in a very small tree line along the Song Ong Doc with good results. They received a BDA from FAC *David 73* of an estimated six enemy killed, four structures destroyed, two structures damaged, four bunkers destroyed, one bunker damaged and one sampan damaged.
- VC rice mills at 'VC Lake' in the U Minh Forest area (UTM coordinates VQ9494) were the target for Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe in A84-236 (*Magpie 11*) with Deputy Chief of Air Staff, Air Vice-Marshal W E Townsend on board as a very interested observer, on 20 August 1969. Undertaking two good bomb runs and releasing a stick of three M.117 750 lb bombs on each of two targets, the crew was given with an impressive BDA, by FAC *David 73*, of five enemy killed, three structures destroyed, five structures damaged, two bunkers destroyed, three bunkers damaged and one sampan destroyed.

Dreadful Lady over the Mekong Delta

- On 19 September 1969, *Magpie 11* (Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe in A84-241) accompanied by *Magpie 21* (Pilot Officer John Kennedy and Flying Officer Dave Palmer in A84-235) flew in support of a Swift Boat operation in IV Corps. The FAC (*David 75*) requested that *Magpie 11* drop a stick of six M.117 750 lb bombs along a canal target, while the second Canberra was to bomb on a reciprocal heading down the same canal. *Magpie 11*'s BDA was two enemy killed, four structures destroyed, four structures damaged, four bunkers destroyed, one sampan destroyed and one sampan damaged, while *Magpie 21* received a similar BDA.
- On 28 September 1969, A84-237 *Magpie 61* (Flying Officer Bob Sivyer and Flight Lieutenant Bob Howe) was directed by FAC *David 73* to bomb VC bunkers and hooches along two narrow canals in IV Corps, in a combined attack, which included B-52 *Arc Light* bomb drops and helicopter troop landings. As they departed the target area, the *Magpie* crew sighted a formation of ten troop-laden helicopters (Huey 'slicks') heading for the landing zone that the Canberra had helped prepare.
- A further mission to 'VC Lake' was flown by A84-247 on 7 October 1969 (*Magpie 51*, Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe) against a VC base camp. This mission involved a Vietnamese Air Force FAC (callsign *Eagle 24*) being tutored in directing bombing missions by experienced FAC *David 71* (Major Allen), seated in the rear seat of the O-1 Bird Dog. In bad weather, flying under the lip of an afternoon cumulonimbus thundercloud, and although dropping 90 metres short of the aiming point due to a bomb-aimer's error in setting the wrong groundspeed, the *Magpie* crew's single stick of six M.117 750 lb bombs covered the target area well. This resulted in a BDA of three enemy killed by air (KBA), five structures destroyed, two structures damaged, five bunkers destroyed, three bunkers damaged and one secondary explosion.
- Several weeks later, on 26 October 1969, while bombing a VC base camp in the U Minh Forest, Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe in A84-234 (*Magpie 71*), were lucky not to collide in mid-air with a dive-bombing VNAF A-37 Dragonfly. The A-37 pilot was intent on hitting his target and had presumably not seen the manoeuvring Canberra jet bomber positioning for its level bombing run.
- Just after 1100 hours on 27 October 1969, *Magpie 31* A84-232 (Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe) conducted a LZ Prep mission in the U Minh Forest, after two radar-directed B-52 *Arc Light* strikes had missed the same target, a narrow canal, by 300–400 metres. Having dropped 'an immaculate stick' of six M.117 750 lb bombs, the crew was advised by the FAC that their BDA was eight enemy KBA, five structures destroyed, six structures damaged and four bunkers destroyed. They arrived back at Phan Rang 2½ hours after take-off. Two other Canberras (*Magpie 41*, A84-234 Flying Officer Shane Welch, Pilot Officer Al Curr and *Magpie 51*, A84-237, Pilot Officer Peter Salvair with Pilot Officer Peter Growder) also bombed the same target area at that time, and were each given similar BDA results.

No. 2 Squadron's Effectiveness in Riverine Operations

- On 2 November 1969, directed by FAC *David 72*, A84-240 (*Magpie 41*, Pilot Officer John Kennedy and Flight Lieutenant Bob Howe) shared an LZ Prep mission with two dive-bombing VNAF A-37s and dropped a stick of six M.117 750 lb bombs 'with beautiful line', but with the first bomb hitting 50 m short of the marked target. Nevertheless, the crew received, via the FAC, a comprehensive BDA of one large junk destroyed, eight enemy KBA, six structures destroyed, eight structures damaged, eight bunkers destroyed, four bunkers damaged, two sampans destroyed, three sampans damaged, 500 gallons of POL (petrol, oil, lubricants) destroyed and 'five ducks confirmed killed'. This was the second Canberra that the crew had flown that day, as on their first take-off one engine sucked in a small bird and stalled at about 70 knots. The fully-armed aircraft aborted the take-off safely, and the relieved crew returned to the Phan Rang ramp for a replacement aircraft already fitted with bombs.



VNAF A-37 returns from bombing mission, Binh Thuy, 1969

- On consecutive days (7 and 8 November 1969), three Canberras were despatched to the U Minh Forest region to undertake LZ Prep missions. On the first day, A84-237 (*Magpie 11*, Squadron Leader Ivan Grove, Flight Lieutenant Bob Howe) was given a BDA of four estimated KBA and six bunkers destroyed. On the second day, A84-241 (*Magpie 41*, Flying Officer Shane Welch and Flight Lieutenant Bob Howe) flying with *Magpie 21*, A84-237, flown by Flight Lieutenant Merv Lewis and Flying Officer Bob Molony, and *Magpie 31*, A84-236, Flight Lieutenant Brian Hammond and Pilot Officer John Wilkinson) were awarded a BDA of six estimated KBA, seven structures destroyed, five structures damaged, two bunkers destroyed and two sampans damaged.

Dreadful Lady over the Mekong Delta

- On 9 December 1969, A84-248 (*Magpie 21*, Pilot Officer Dick Allchin and Flight Lieutenant Bob Howe), fragged with a second Canberra to bomb in the upper U Minh Forest target area early in the morning, found several VNAF A-1 Skyraiders and A-37 Dragonflies (callsign *Panther*) already dive bombing, with their usual enthusiastic professionalism. The *Magpies* had an extended wait on the cards, due in part to a geopolitical problem where the *David* FAC in his O-1 Bird Dog realised that he had moved across a province boundary into one where the local province chief had not given permission for the Canberras to bomb on this target. The IV DASC coordinator cancelled the strike and the *Magpie* crews were allocated alternative targets. A84-248 was diverted to attack an enemy base camp near Vung Tau in III Corps, working with a *Jade* FAC and an Australian Army *Possum* helicopter. It landed back at Phan Rang 2 hours 40 minutes after departure, followed later by the other Canberra (*Magpie 31*, A84-234), piloted by Flying Officer Bob Sivyer and navigator bomb-aimer Pilot Officer Keith Padgett), who had to call into Bien Hoa to refuel, after dropping their bombs with another III Corps FAC.

CA MAU PENINSULA - OPERATION *SOLID ANCHOR*

Operation *Solid Anchor*, which began in January 1970, focussed on enemy positions along the canals and rivers close to the southern tip of South Vietnam, where the Gulf of Thailand met the South China Sea. No specific No 2 Squadron missions connected with this operation have yet been identified.



Magpie 81's secondary explosion, IV Corps, 17 November 1969
(Source: No 2 Squadron Photographic Section)

No. 2 Squadron's Effectiveness in Riverine Operations

Possibly as a prelude to this operation, Canberra A84-244 (*Magpie 81*, flown by Flight Lieutenant Merv Lewis and Flight Lieutenant Bob Howe) on 17 November 1969, conducted a bombing mission on a VC storage area and supply point located 13 miles south-east of Ca Mau (UTM Coordinates WQ317951). The strike, dropping from 2000 ft above the target in two runs, using four instantaneous-fuzed 1000 lb bombs loaded in the bomb bay, and two delay-fuzed M.117 750 lb bombs dropped off each wing tip, resulted in a secondary explosion which was recorded by the 10-inch lens of the F-52 camera. The crew had scored a direct hit on a cache of weapons, possibly mines, hidden near the edge of a watercourse, within a nipa palm tree line. The resulting explosion, as described by the FAC, looked like a cluster bomb unit (CBU) bomb throwing projectiles over a wide area.

In addition to the secondary explosion, BDA for this mission, reported either by troops on the ground or low flying Army observation helicopters, was one confirmed KBA, six estimated KBA, five structures destroyed, four structures damaged, seven bunkers destroyed and two sampans damaged.

No 2 Squadron Unit History Sheet for 22 August 1969 records the receipt, three weeks late, of BDA for an outstanding bombing mission flown on 31 July 1969 by Pilot Officer Peter Nuske and Flying Officer Lloyd Brown (*Magpie 21*, A84-244). Fraggged against a VC base camp four miles south-east of Ca Mau, the local Air Liaison Officer (ALO) had received information that a VC cadre meeting was underway at the time. Ten VC were killed in the attack, including a high-level official in the local VC structure. Other BDA given was four structures destroyed, six structures damaged, four bunkers destroyed, two bunkers damaged, and one sampan damaged.

GENERAL

Other No 2 Squadron IV Corps missions worthy of note, in this context, included the following.

- Air Commodore Graham Dyke, former Executive Officer No 2 Squadron from September 1968 to September 1969, recalled one *Magpie* mission that he and navigator/bomb-aimer Flight Lieutenant Brian Bolger flew in IV Corps. The FAC directed the crew to bomb an enemy ship which was on one of the larger canals or rivers. It was undoubtedly loaded with explosives, as it blew up with a spectacular display of fireworks, when hit by the Canberra's bombs.³¹³ Being directed to attack a ship target was a rare occurrence for No 2 Squadron Canberra crews.
- On 21 May 1969, A84-236 (*Magpie 11*, Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe) was tasked for a naval support mission in the far southern region of the Mekong Delta with a *David* FAC. Arriving in the target region, the crew saw a convoy of boats heading in line astern towards the coastline from seawards (presumably originating from An Thoi, in the Gulf of Siam). However, this aircraft suffered, for the second day in a row, an electrical malfunction, resulting in bombs that were unable to be released (a hang-up). The Canberra returned to Phan Rang with its load of bombs still on board.

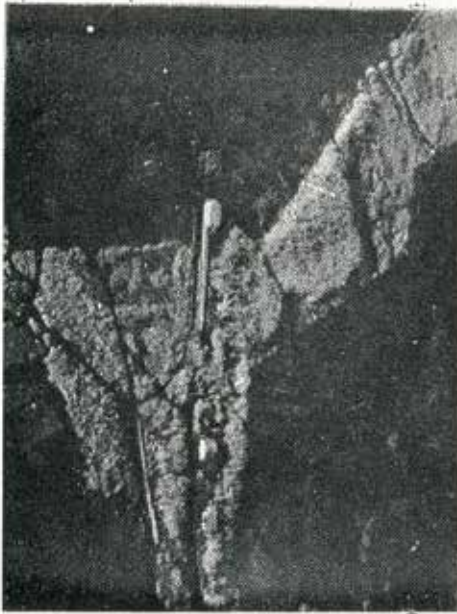
Dreadful Lady over the Mekong Delta

- On 23 May 1969, A84-236 as *Magpie 81* departed Phan Rang at 1920 hours for a nighttime *Combat Skyspot* drop over IV Corps. It was piloted by Squadron Leader Ivan Grove, with navigator/bomb-aimer Flight Lieutenant Bob Howe and with new Commanding Officer, Wing Commander Jack Boast, as an observing passenger. The target was a VC machine shop and VC company hidden in bunkers. The crew dropped six M.117 750 lb bombs in a single stick (with minimum spacing between bombs) from 15 000 ft altitude under the control of *Gap*, the USAF Binh Thuy-based, ground-control-radar site. BDA subsequently received from *Gap* was eight structures destroyed, seven structures damaged and six bunkers destroyed.
- *Magpie 71* (A84-247, Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe) bombed a VC company ensconced in bunkers near Truc Giang on the large Ben Tre Island, located at the estuary of the Mekong River, on 24 July 1969. Releasing six M.117 750 lb bombs from a bombing height of 2000 ft, the crew destroyed four bunkers and damaged three more.
- Taking off for IV Corps at 0700 hours on 9 October 1969, for a fragged pre-strike bombing sortie (location not recorded) A84-237 (*Magpie 41*) was flown by Squadron Leader Ivan Grove and Flight Lieutenant Bob Howe. Three other Canberras took part in the mission—*Magpie 21*, A84-234 Pilot Officer Shane Welch and Flying Officer John Bushell; *Magpie 31*, A84-236, Squadron Leader Arthur Barnes and Pilot Officer Peter Growder and *Magpie 51*, A84-238, Flight Lieutenant Merv Lewis and Flying Officer Bob Molony. Directed by FAC *David 71* (Major Allen, USAF), they bombed in line astern, each dropping a stick of six M.117 750 lb bombs one after the other, in support of Army troops fighting many enemy concealed in a tree line. BDA for A84-237's crew was one confirmed KBA, six estimated KBA and three bunkers destroyed.

MEASURING EFFECTIVENESS

Two measures of effectiveness (MOE) stand out in the case of No 2 Squadron bombing operations, namely bomb damage assessment (BDA) and bombing accuracy. While both aspects have been covered in some detail in this book, the next few pages contain a brief summation of their validity and relevance in assessing the contribution of the Australian Magpies in the context of riverine operations conducted in the Mekong Delta region.

No. 2 Squadron's Effectiveness in Riverine Operations



Before



After

An effective *Magpie* mission
(Source: No 2 Squadron Magazine, 1969)

BOMB DAMAGE ASSESSMENT

If bomb damage assessment (BDA) was the best measure of effectiveness in the tactical war over South Vietnam, then the evidence was sufficient to demonstrate that No 2 Squadron, with its Canberra Mk 20 jet bomber, rated very highly. Dr Coulthard-Clark, RAAF Historian, reported that the squadron's total BDA for the four years at Phan Rang, from April 1967 to June 1971, totalled 786 confirmed KBA (killed by air), 3390 estimated KBA, 8737 structures destroyed, 15 568 bunkers destroyed, 1267 sampans destroyed and 74 bridges destroyed.³¹⁴

Unfortunately, the reliability of BDA data was questionable as the process created, amongst US operational units and in higher command headquarters in Vietnam, a propensity to stretch the truth. RAAF FAC Flying Officer Barry Schultz (callsign *Jade 07*, flying in support of the 1st Australian Task Force in Phuoc Thuy Province in 1970), was concerned about this matter at the time. Flying higher up and moving relatively fast, he recognised his own limitations in determining BDA accurately, and preferred to have a low flying helicopter (in his case, Bell 47G Sioux light observation helicopters of the Australian Army's 161 Reconnaissance Flight) to take a closer look at the results of air strikes. In his opinion, 'a lot of other BDAs (given solely by FACs) were estimations and sometimes exaggerations'.³¹⁵

Dreadful Lady over the Mekong Delta

To what extent No 2 Squadron's results were contaminated by false estimations will probably never be known. The squadron's prominence on the BDA charts was in no small way attributable to operations in IV Corps, a BDA-rich environment. The Mk 20 Canberra's ability to reach out and loiter over distant target areas in the Mekong Delta gave *Magpie* aircrews the extra capacity to take their time to attack their targets with greater precision than their more fuel-hungry, shorter range, fighter counterparts.

Relating mission rates in Tables 6-3 and 6-4 to available BDA data showed how well No 2 Squadron performed. For example, by the end of 1969, the squadron was flying an average of 240 missions per month (eight sorties per day), while each of the four 35th Tactical Fighter Wing's Phan Rang-based F-100 squadrons flew 300 missions monthly (ten sorties per day), i.e. the *Magpies* flew 240 out of 1440, or 16.7 per cent of the 35th TFW's sorties.³¹⁶ However, as Table 6-5 shows, the squadron's share of 35th TFW's BDA (over a three-month period from November 1969 to January 1970) well exceeded the squadron's percentage of sorties flown. These results were most significant as, not only did this please respective commanders of the wing, but the joy extended up into Seventh Air Force Headquarters, demonstrating that the job was being carried out with proficiency.³¹⁷

Each Canberra mission dropped between 4500 and 5000 lbs of bombs, compared with the F-100's maximum payload of eight Mk-82 500 lb bombs (although it often carried much less, focussing on weapon diversity more than weight). Therefore, No 2 Squadron could be seen to have a advantage in the weight of bombs dropped per sortie, but this was countered by the reduced daily mission rate, which made the BDA difference in favour of the *Magpies* more impressive.

As seen in Table 6-5, only three BDA elements in No 2 Squadron's tally fell below the unit's sortie rate of 16.7 per cent of the wing's total, while most of the remaining elements were well above, in some cases up to four times as great. Furthermore, key target damage elements where the squadron significantly exceeded the average 35th TFW BDA, namely estimated KBA, structures destroyed or damaged, and sampans destroyed or damaged, reflected the results of the relatively high rate of bombing in the Mekong Delta environment by the *Magpies*. The emphasis on IV Corps missions accounted for No 2 Squadron's BDA performance, and no doubt for 35th TFW's success in overall USAF BDA terms.³¹⁸

Another factor that may have skewed this data further in favour of No 2 Squadron was the special relationship that grew between the *David* FACs of 22nd TASS at Binh Thuy and the *Magpies* at Phan Rang. Whether or not this camaraderie resulted in excessive generosity in awarding BDA results to friendly Aussies, who were seen as a very small, but highly professional, allied unit within the free world air forces, was uncertain.

Statistically speaking, only 10 per cent of the squadron's KBA results were confirmed, the remainder being estimates. When no proof could be provided for over 90 per cent of this element of reported BDA, the credibility of the data could be questioned. In some cases, No 2 Squadron bombing crews felt that the BDAs passed on to them by friendly IV Corps

No. 2 Squadron's Effectiveness in Riverine Operations

FACs were somewhat inflated, and it wasn't difficult to speculate that, when all TACAIR results were combined together into summaries for the day, week or month, the sum of the parts may have exceeded the whole.

Nevertheless, irrespective of the possibility of skewed BDA data, the fact was that these were official results, recorded in post-mission debriefings and reported, up the command chain, by Headquarters 35th Tactical Fighter Wing to Headquarters Seventh Air Force. In this context, and as retained by US national archival authorities, they constituted irrefutable evidence of the relative effectiveness of No 2 Squadron's bombing missions.

SQUADRON	352	612	614	615	2 (RAAF)	TOTAL	2 (RAAF) %
Call-sign	<i>Yellow Jacket</i>	<i>Tide</i>	<i>Lucky Devil</i>	<i>Blade</i>	Magpie		
KBA confirmed	43	33	35	35	23	169	13.6
KBA estimated	22	31	37	23	241	354	68.1
Structures destroyed	75	71	80	53	364	643	56.6
Structures damaged	42	41	41	22	265	411	64.5
Bunkers destroyed	270	239	255	232	532	1528	34.8
Bunkers damaged	78	61	155	85	165	544	30.3
Sampans destroyed	8	6	7	8	61	90	67.8
Sampans damaged	0.3	1.3	2.6	1.1	33	38.3	86.2
Gun positions destroyed	4	4	6	8	1.5	23.5	6.4
Metres of trench destroyed	646	585	527	695	664	3117	21.3
Secondary Explosions	26	13	17	17	32	105	30.5
Secondary fires	17	20	27	17	1.5	82.5	1.8
Caves	12	7	8	12	18	57	31.6
Fox holes	56	54	65	63	62	300	20.7

Table 6-5: 35th TFW squadron BDA comparison, November 1969 - January 1970

BOMBING ACCURACY

While BDA has been cited as the prime measure of bombing effectiveness in South Vietnam, it is worthwhile considering the alternative measure—bombing accuracy. Many members of No 2 Squadron regarded accuracy as the better method, and the preferred means of assessing bombing performance. No 2 Squadron's efforts to achieve good bombing accuracy have been described above. This section looks more at the effectiveness side.

Dr Coulthard-Clark noted: '... while the BDA statistics were freely quoted in monthly reports from the unit, this was never accepted as the sole or most important yardstick. Within the unit, greater emphasis was given to the ability to place bombs where they were called for, rather than on more debatable claims of damage caused'.³¹⁹ The zeal of Wing Commander David Evans, No 2 Squadron's Commanding Officer in 1968, in focussing on bombing accuracy, certainly bore fruit. In 1969, and during the time the author served as Bombing Leader, No 2 Squadron aircrew preferred to rate their capability in terms of accuracy, despite the inherent limitations of achieving sufficient results. Numerous references in monthly Commanding Officers' reports and Unit History Sheets attest to the popularity of bombing accuracy as a means of proving effectiveness.



Stick of six bombs along a IV Corps canal

(Source: Peter Nuske)

This alternative viewpoint, which separated the RAAF bomber squadron from the rest of the US tactical fighter community, has been described as signalling 'a move away from measuring success in terms of attrition effects, because they are an inaccurate measure of true effectiveness'.³²⁰ The claimant (Sergeant Mat Butler) went further to say, 'It possibly signals a realisation of effects-based targeting at the tactical level. This is further reinforced by the squadron realising that to achieve an effective hit against fortified positions, a bomb would have to be delivered within 20 metres of the intended target. This was the benchmark which aircrews sought to achieve for all bombs dropped'.³²¹ He was right in the sense that

No. 2 Squadron's Effectiveness in Riverine Operations

No 2 Squadron leaders recognised the need to seize this opportunity to refine procedures and practice techniques for maximising the utility of their meagre bombing resources.

Accordingly, bombing accuracy was institutionalised in the squadron through the monthly 'top gun' award, where to the author's knowledge, the *Magpies* were the only operational unit within the entire Seventh Air Force to adopt this model. USAF tactical fighter units continued throughout the war to award monthly 'top gun' to the pilot(s) who accumulated the most amount of bomb damage. To the Aussies, it was a somewhat bizarre experience to witness USAF 'top gun' award rituals and ceremonies, that had become prized social events. Shades of Joseph Heller's World War II-novel, *Catch 22*.

As this author well knew, having been Bombing Leader and suffering much (light hearted, yet emotional) abuse from aircrew who claimed they had been unduly penalised in the assessment process, competition within No 2 Squadron for being selected as the winner, based on assessed bombing accuracy, was fierce. This enthusiasm, in fact, reflected the unit's high *esprit de corps* and determination to be, and be seen, as professional as possible. No 2 Squadron aircrews were proud of the way in which their 'top guns' were chosen on a monthly basis—by accuracy of bombing rather than BDA, even though they also scored well compared with their 35th TFW brothers-in-arms in the BDA stakes.

The particular factor that stood out in enabling the squadron to go down this route was the age-old skill of aerial photography. The professionalism of No 2 Squadron's Photographic Section, in producing every day a set of prints from each bombing mission, deserved recognition in this context. As noted above, the USAF tried out different ways of recording bombing accuracy with their dive-bombing fighters, but with limited success. Amongst all of the TACAIR units serving in South Vietnam from 1967 to 1971, the quality and quantity of real evidence in recording No 2 Squadron's bombing accuracy was second to none.

In the month of July 1969, based on photographic assessment, No 2 Squadron achieved a 50 per cent CEP of 30 metres (radius) and 90 per cent CEP of 80 metres. The Commanding Officer at the time, Wing Commander John Whitehead, proudly proclaimed this as the best monthly results yet achieved.³²² John Bennett noted that, for the year between November 1968 and November 1969, the overall squadron results were 50 per cent CEP of 40 metres and 90 per cent of 100 metres.³²³ Over an extended duration, covering the period from January 1969 to May 1971, and based on figures contained in monthly Commanding Officers' Reports, the results stretch out to a 50 per cent CEP of 42.4 m and 90 per cent CEP of 107.3 m.³²⁴

Even though No 2 Squadron may have stood head and shoulders above the other units in its ability to assess bombing accuracy, using photographic means to do this did not provide the full picture of the squadron's bombing accuracy, let alone effectiveness. As described above, there were many occasions when photography could not be used, and probably no more than 25 per cent of No 2 Squadron's bombing missions were recorded on film and were assessable.³²⁵

Dreadful Lady over the Mekong Delta

Transferring the focus to the target end of proceedings, a more realistic, understandable performance measure might be the percentage of bombs that fell within the desired destruction distance from the target. In many IV Corps situations, especially in ensuring that buried bunker targets were hit effectively, the critical destruction distance was closer to, or less than, 10 metres.³²⁶ No 2 Squadron's actual record was 14 000 sorties with 15 500 bunkers destroyed, i.e. just over one bunker destroyed per sortie. Accepting that effective bombing meant that they had to fall within 10 metres to destroy a bunker, then squadron BDA results (also if accepted) could be interpreted to show that a high degree of accuracy was achieved.

To complicate the picture even further, bomb distributions were more elliptical, with many missions more akin to (narrow) area bombing rather than hitting point targets. As mentioned previously, at the author's instigation, from late 1969, official reporting of bombing accuracies in No 2 Squadron Commanding Officers' Reports steered away from a circular focus to report elliptical-shaped distributions.³²⁷

EFFECTS-BASED BOMBING

TROOPS-IN-CONTACT

The most rewarding strike missions in South Vietnam occurred when successful sorties were carried out in direct support of friendly ground troops, under siege from a determined enemy, known as troops-in-contact (TIC) missions.³²⁸ If the author's overall percentage of TIC missions is representative of his brother aircrew, No 2 Squadron can't claim to have been involved in any more than 10 per cent TIC out of all its missions. As a *Magpie* took 45 minutes from departing Phan Rang to being established in IV Corps region, the squadron's alert and scramble capability was of little use to a Mekong Delta ground commander engaged in a TIC operation. There is no evidence that the squadron was placed by the Seventh Air Force TACC on any regular alert status, apart from a small period in 1968, when armed with VT-fuzed 1000 lb bombs.³²⁹

Despite some doubts that the Canberra Mk 20 wasn't versatile enough to be used to any extent for the support of TIC, squadron crews generally perceived that they had performed well in this role. Indeed, such an opinion is anecdotally supported by a very graphic confirmation, that has unfolded in recent times, of the effectiveness of a TIC bombing mission in III Corps. On 21 September 1969, A84-236 (*Magpie* 31), flown by Commanding Officer Wing Commander John Whitehead and Squadron Leader Bruce Hunt were diverted from their fragged mission to fly in support of Australian 5th Battalion troops engaged with the enemy.³³⁰

SECONDARY EXPLOSIONS

There was little doubt as to the authenticity of a secondary explosion—the eruption of enemy weapons caches when hit by *Magpie* bombs. They were firm proof that (a) the target was indeed legitimate and (b) the loss of such a supply inhibited the enemy's ability to carry out future attacks. These events were occasionally captured on film by the Canberra's onboard cameras and proved to be spectacular evidence of bombing success.

An appropriate MOE in this sense might be the rate of secondary explosions per mission, which anecdotally was around 10 per cent. However, unless key post-mission bombing records (the Bombing Books) and photographic evidence from No 2 Squadron's bombing missions in South Vietnam can be retrieved for subsequent scrutiny, it is unlikely that future historians will be able to undertake a full analysis of the squadron's overall bombing effectiveness in South Vietnam from 1967 to 1971, whether or not it be focused on secondary explosions or other indicators.

AREA BOMBING

The popularity with ground commanders of multiple *Magpie* bomb drops in the Mekong Delta and the extensive spread of many underground targets, in particular bunker complexes, as well as tunnels, suggested that No 2 Squadron's Canberra Mk 20 bombers played a useful role in providing area coverage.

PACIFICATION

In the broader context, the basic aim of the allies in IV Corps, from 1967 to 1971, was to 'pacify' the region. Professor R. Blake Dunnavent, Louisiana State University studied the relationship between security and pacification in the Mekong Delta.

'While firefights suggest the flow of North Vietnamese logistics was being disrupted, the primary measure for the effectiveness of SEALORDS was the pacification of the delta. For pacification to take hold, an increased level of security was necessary. This meant that the local population could freely move on the waterways and on the land itself ... NAVFORV's operations and campaign, such as *Game Warden* and SEALORDS, proved successful in pacifying the Delta and other regions of South Vietnam. The local population which once travelled in fear on the canals and rivers of South Vietnam could easily transit these waterways and conduct commerce vital to the economy of the Republic of Vietnam.'

Professor R. Blake Dunnavent/*Rolling Thunder*³³¹

With a sublime touch of irony, he also stated: 'A testimony to the successes of the US Navy and VNN came after the collapse of Saigon in 1975, when the Delta was the last location to fall to the communist forces.'³³¹

Dreadful Lady over the Mekong Delta



Tucking in, after multiple *Magpie* drop, Phuoc Tuy Province

Vice Admiral Zumwalt referred to a temporary degree of success of operations in the Mekong Delta. 'By the spring of 1969, the Navy was blockading the entire river-and-canal system along the Cambodian border and as a result, General Abrams told me, Viet Cong activity in the delta was much reduced and overall US casualties were considerably reduced.'³³²

CHAPTER 7

SUMMARY AND CONCLUSIONS

Until full details of all *Magpie* missions undertaken in IV Corps, from 1967 to 1971, become available, and at the time of writing this seems unlikely, it is impossible to achieve a complete understanding of No 2 Squadron's contribution to riverine operations in South Vietnam. The missions cited above, which represent a small segment, help to paint a picture, or at least draw a sketch. From this edifice, it is possible to hypothesise that the squadron achieved considerable success in terms of both bomb damage assessment (BDA) and accuracy, as a direct result of the unique attributes of the Canberra Mk 20 which, coincidentally, best matched close air support (and interdiction) mission requirements in the Mekong Delta.

Despite *Magpie* crews in their Canberra bombers being separated from the forces they were assisting by up to 3000 ft in altitude, and by different communication systems, No 2 Squadron was nevertheless an integral element of a combined action against a common enemy. The way this was achieved was through the outstanding efforts of the forward air controllers (FACs), who served as the conduit, binding respective combat forces together.



Magpies return safely to Phan Rang Air Base

Dreadful Lady over the Mekong Delta

To those sent to fight in South Vietnam air campaigns, there existed an air of unreality, which affected all involved. In some ways, it was as surreal as depicted by *Catch-22*. The difference in Vietnam was that every allied airman knew that, collectively, they had the capability to win the war, but they also knew that in the absence of any real political will, this wasn't going to happen. In effect, they were being asked by their nation's leaders and senior Service officers to risk their lives for a lost cause. Many paid the ultimate price. Air Marshal Evans asserted that, in Vietnam, the Americans ignored almost the whole ten (then) Principles of War.³³³ Those 'leaders' who sent their soldiers, sailors and airmen into battle in the absence of such understanding had/have their own crosses to bear.

There was confusion and frustration, as aircrews obediently complied with seemingly unrealistic national rules of engagement imposed by political constraints that impeded their operational effectiveness. In some respects, the situation in the Mekong Delta reflected that to the north of the divided nation, where combatants were unable to prosecute crucial targets outside South Vietnamese borders. In the Mekong Delta, Cambodian targets were off-limits to No 2 Squadron, as well as to all other Australians serving in the region.

At times, there existed a pervasive feeling that those in authority back home did not really care what the squadron was striving to achieve. There was no pro-active effort, or concerted program, in Department of Air in Canberra, or anywhere else throughout the organisation, apart from those units at RAAF Base Amberley directly concerned, to seek feedback on how to improve the squadron's operational performance. That the Canberra was seen as an ageing weapons platform, and that RAAF leaders were more concerned with the politics surrounding the acquisition of the Canberra's replacement, the F-111C, were contributing factors to this sense of malaise. The Vietnam War was an inconvenient distraction from the normal chain of events taking place back in Australia.

Nevertheless, given these deficiencies, No 2 Squadron performed to the best of its collective ability, under challenging circumstances. As Dr Alan Stephens has noted, 'The RAAF performed with distinction in Vietnam' and 'operational skills forged in Vietnam provided the foundation for the RAAF for the next 20 years'.³³⁴

If the question is asked 'could the RAAF and No 2 Squadron have done better in South Vietnam', the answer has to be 'yes'. In terms of combat effectiveness over the four years, it can be argued that the employment of the ageing Canberra was deficient in a number of respects. These included a lack of flexibility in its weapons load, an inability to fly night bombing missions without ground radar-controlled direction and misunderstandings on mission tasking arising from command and control weaknesses.

Irrespective of these limitations and regardless of the complexity of the situation, it has to be concluded that No 2 Squadron's participation in riverine operations in the Mekong Delta, on the basis of information thus far available, was successful. This conclusion is limited to operations involving the dropping of unguided bombs, as accurately as possible, onto targets marked by FAC smoke markers and with the maximum impact that these bombs could provide.

Summary and Conclusions

The Canberra's World War II heritage and its Cold War design basis imposed inherent constraints on operational performance. Yet its combination of aerodynamic stability (ready ability to be flown manually at constant speed, attitude and altitude), endurance over the target area (extended loiter time compared with short-range fighters), bombing accuracy (at times down to 20 metres), target-weapon matching (sticks of six 750 lb bombs along straight and narrow canals) and tactical flexibility (flying beneath cloud where dive-bombing was impossible), ensured that No 2 Squadron 'punched above its weight' in the final stage of the 'dumb-bomb' era. The squadron's performance was the best that could be achieved in precision bombing before guided munitions became the norm for future conflicts.

Furthermore, the value of combining individual aircraft tactical capabilities was recognised by mission planners and strike commanders, who on many occasions called for formations of up to four Canberra bombers to undertake synchronous strikes on active enemy targets in IV Corps. The aim of these missions was to destroy enemy base camps comprising embedded underground bunker systems, widespread throughout the narrow canals and waterway systems of the Mekong Delta. However nearly 45 years after these events, neither communications amongst No 2 Squadron veterans nor searches of relevant archives and websites unearthed sufficient data to reveal the full nature of the unheralded relationship between No 2 Squadron operations and allied riverine operations conducted in the Mekong River Delta.

Joint and combined riverine campaigns, undertaken from 1967 to 1971 in the Mekong Delta under leaders such as Vice Admiral Zumwalt, were successful in pacifying the Delta. For a short time, they allowed the local population, which once travelled in fear on the waterways of South Vietnam, to conduct commerce vital to the economy of the nation. In this book, it can be seen that No 2 Squadron made a distinct contribution, even though *Magpie* efforts in this regard were virtually unknown to friendly forces below and are seldom given due recognition today.

Taken together, BDA and bombing accuracy attest to the high quality of No 2 Squadron's bombing performance in Vietnam and, most significantly, in the Mekong Delta, where the nature of the terrain and the targets were uniquely suited to the Canberra's level bombing profile, especially at low altitude and high speed.

While weapons technology has moved on apace since the Vietnam War, it behoves Australia not to ignore the past, especially with regard to riverine operations. Australia's regional neighbourhood in South-East Asia hosts many inland waterways. Like many other weapons that were foreshadowed to be superseded, the 'dumb bomb' may well remain in many air force inventories, including the RAAF, for some time to come, merely because it is relatively cheap to make, and therefore can still be cost-effective. Lessons learnt from prior campaigns such as that of No 2 Squadron's in IV Corps, Mekong Delta, may still yet be relevant to the future.



'THE MAGPIES'

No 2 Squadron badge with the motto

CONSILIO ET MANU – TO ADVISE AND TO STRIKE

NOTES

CHAPTER 1 NOTES

- 1 Naval History Division, US Navy, *Riverine warfare: the US Navy's operations on inland waters*, US Government Printing Office, Washington, DC, 1969, viewed 1 July 2014 at <www.history.navy.mil/library/online/riverine.htm>
- 2 Charles Mohr, *Attack on farm exemplifies confusion of the Vietnam War*, The New York Times, 5 January 1966, p. 4
- 3 Major General William B. Fulton, US Army, *Vietnam studies, riverine operations 1966-1969*, Department of the Army, Washington DC, 1973, p. 17
- 4 Naval History Division, US Navy, *Riverine Warfare*, pp. 40-41
- 5 GMCM(SW) Robert H. Stoner (Retd) *SEAL/MST operations from SEA FLOAT/SOLID ANCHOR in 1970*, viewed 1 July 2014 at <www.warboats.org/stoner1.htm>
- 6 Colonel David H. Hackworth, US Army, (Retd) & Julie Sherman, *About face: the odyssey of an American warrior*, MacMillan, The Griffin Press, Adelaide, South Australia, 1989, p. 670

CHAPTER 2 NOTES

- 7 The term 'corps' is used throughout this book, as it was officially employed at the time the author served in South Vietnam. From August 1970, No 2 Squadron complied with prevailing convention and referred to Military Regions. As *No 2 Squadron Unit History Sheet*, dated 2 August 1970, paragraph 4 noted: 'The term "Corp" (sic) as applied to Military Divisions no longer applies. In keeping with "Vietnamization" of the war, the term Military Region (MR) will now be used.'
- 8 Major General William B. Fulton, US Army, *Vietnam studies, riverine operations*, Department of the Army, Washington DC, 1973, p. 24
- 9 Fulton, *Vietnam studies, riverine operations*, pp. 3-8
- 10 Fulton, *Vietnam studies, riverine operations*, pp. 8-17
- 11 Colonel Victor J. Croizat, US Marines, who failed to get mentioned in Fulton's history of Vietnam riverine operations (told from a US Army perspective), discussed the origins of the South Vietnam Navy and South Vietnam Marines in *Proceedings*, US Naval Institute, February 1973.
- 12 Colonel David H. Hackworth (US Army, Retd) & Julie Sherman, *About face: the odyssey of an American warrior*, MacMillan, The Griffin Press, Adelaide, South Australia, 1989, p. 705.
- 13 Several key references, focussing on the positives of their own service involvement, tended to downgrade the degree of inter-service rivalry, which was a natural function of combining Navy and Army resources in a joint, combined campaign of riverine operations in hostile overseas territory. Indirect references can be found, however, for example, Vice Admiral Elmo Zumwalt referred in his memoirs (Elmo R. Zumwalt Jr, *On Watch – A Memoir*, Quadrangle, The New York Times Book Co., New York, New York, 1976, p. 39), to COMUSMACV General Abrams over-ruling his own Army's IV Corps Senior Advisor, who opposed Navy plans to create *Sea Float*. The allied chief planner for Mekong Delta riverine operations, then-Colonel Fulton admitted that: 'Determination of the mission and area of operation of the Mobile River Force in relation to the 9th Infantry Division ... was a continuous source of friction between the (Army) brigade and (Navy) flotilla commanders.' (Fulton, *Vietnam studies, riverine operations*, p.87)

Dreadful Lady over the Mekong Delta

- 14 Respective COMUSMACVs were General Paul D. Harkins from February 1962, William C. Westmoreland from June 1964, Creighton W. Abrams from July 1968 and Frederick C. Weyand from June 1972.
- 15 Fulton noted that: '... there was no Navy echelon equivalent to the 9th Infantry Division under the Navy chain of operational control', and in the event of disagreement between component commanders 'the commander of the 9th Infantry Division would then have to pass the matter to the commander of II Field Force, who, in turn, would co-ordinate with the parallel Navy commander.' (Fulton, *Vietnam studies, riverine operations*, p.87)
- 16 Operational control of joint operations sometimes functioned harmoniously in Zumwalt's time. For example, he described the Mobile Riverine Force as 'a sort of transportation and escort service for the Army's 9th Division' (Zumwalt, Elmo R Jr, 1976, *On Watch - A Memoir*, Quadrangle/The New York Times Book Co, New York, New York p.37) and commented favourably on his association with Commander 9th Division, then-Major General Julian Ewell, whom he saw as 'a brilliant tactician' (Zumwalt, *On Watch*, p. 38). Nevertheless, when respective commanders disagreed over command and control of riverine warfare in the Mekong Delta, resolution was necessary at Joint Chiefs of Staff level or even higher with Secretary McNamara, undertaking his own determinations. Major General George S. Eckhardt noted 'General Westmoreland proposed that one brigade of the arriving 9th Infantry Division be the Army component of a mobile joint task force. The Navy component would consist of tactical and logistic ships and craft to support the brigade afloat on riverine operations. General Westmoreland further proposed that the joint task force be commanded by the assistant commander of the 9th Division, who would have a small joint staff of operations, logistics, and communications personnel. In Honolulu, General John Waters, Commander in Chief, US Army, Pacific, concurred with General Westmoreland's proposal. Admiral Grant Sharp and the Commander-in-Chief of the Pacific Fleet, however, favoured a command arrangement in which the naval force, CTF-116, would be under the operational control of the commander of the River Patrol Force (a task force which was already conducting operations in the Mekong Delta) and would operate in support of the ground forces involved. A compromise solution ultimately developed, which placed US Army units conducting riverine operations in the III and IV Corps Tactical Zones under the operational control of the commanding general of II Field Force. He could exercise control through a designated subordinate headquarters, such as the 9th Infantry Division. According to this arrangement, Navy units would be under the operational control of Admiral Ward, who could also operate through a designated subordinate Navy commander. (Another task force, CTF 117, was established to control Navy riverine forces.) Finally, riverine operations would be conducted with Army and Navy units commanded separately, but the Navy would provide close support through procedures of mutual coordination.' (Major General George S. Eckhardt, US Army, *Vietnam Studies – Command and Control, 1950-1969*, Department of the Army, Washington DC, 1974, p. 78) Rank inequalities and other 'confusions' are well described by Reagan J. Grau in his history thesis entitled *Waging Brown Water Warfare: The Mobile Riverine Force in the Mekong Delta, 1966-1969*, thesis, Texas Tech University, Lubbock TX, August 2006, chapter 4 - MRF Operations.
- 17 For details see Edward J. Marolda, *By Sea, Air and Land: An Illustrated History of the US Navy and the War in Southeast Asia* Naval Historical Center, Washington DC, 1994, Chapter 3 - The Years of Combat, 1965-1968 and his more recent publication *Ready Seapower: A History of the US Seventh Fleet*, Department of the Navy, Washington DC, 2012, pp. 59-64.
- 18 For more detail on Operation *Market Time*, see the Mobile Riverine Force Vietnam Association website <www.pcf45.com/tf115/tf115a.html>, viewed 1 July 2014.

Notes

- 19 James Steffes, *Operation Market Time: The Early Years, 1965-6*, Xlibris Corporation, Bloomington IN, USA, 2009
- 20 Marolda, *By Sea, Air and Land*, chapter 3
- 21 Norman Polmar, *Aircraft Carriers: A History of Carrier Aviation and Its Influence on World Events Vol. II 1946-2006*, Potomac Books, Washington DC, 2008, pp. 236-244
- 22 Naval History Division, Navy Department, *Riverine Warfare: The US Navy's Operations on Inland Waters*, US Government Printing Office, Washington, DC 1969. Jack Shulimson (*US Marines in Vietnam: An Expanding War 1966*, History & Museums Division, Headquarters United States Marine Corps, Washington DC, p. 301) referred to command and control differences between Seventh Fleet Commander (Vice Admiral John Hyland) and COMUSMACV (General William Westmoreland) over plans for a US Navy captain to take charge of Operation *Jackstay's* amphibious force and a US Marine colonel for the landing force, neither under COMUSMACV command. The remedy was to place Rear Admiral Don Wulzen, Commander Task Force (TF-76) in command of Operation 'Jackstay', responsive to MACV.
- 23 Operational Archives Branch, Naval Historical Center, *Commander Naval Forces Vietnam (COMNAVFOR) Monthly Summaries 1966-1971*, part of Vietnam Command Files, Naval Historical Center, Washington, DC, 2007, viewed 1 July 2014 <www.history.navy.mil/branches/org10-8.htm>.
- 24 Mobile Riverine Force Association, *Task Force 115*, Conover, NC USA, viewed 1 July 2014, <www.mrfa.org/tf115a.htm>
- 25 Mobile Riverine Force Association, *Task Force 116*, Conover, NC USA, viewed 1 July 2014, <www.mrfa.org/tf116.htm>
- 26 For more PBR details, see Don Blankenship, *PBRs*, Rivervet website, viewed 1 July 2014 <www.rivervet.com/pbrs.htm>
- 27 'Friendly air support for the Navy patrolling program required night flight operations and quick reaction. Neither were strong points of Army aviation in the 1960's and 70's.' (Tom Phillips, *Scramble Seawolves! Part 1*, Seawolf Association website, viewed 1 July 2014 <www.seawolf.org/stories/scrmb101.asp>. John J Tolson saw it differently: 'To add to the problems brought about by the chronic pilot shortage, the Army in Vietnam was given the additional missions of training US naval aviators in the armed Huey to take over the responsibility for *Market Time* operations. For some time the US Army armed helicopters had been giving fire support to Task Force 116 in their mission of waterway and off-shore surveillance. Now the Navy wanted to train its own pilots and borrow some of the Army's precious armed helicopters to do a Navy mission that no fixed-wing aircraft could do'. (Lieutenant General John J Tolson, US Army, *Vietnam Studies, Airmobility 1961-1971*, Department of the Army, Washington DC, 1973, pp. 110-111). HAL-3 (*Sea Wolves*) history referred to the challenges to Army helicopter crews, adapting to nighttime riverine flying operations. Army-Navy relations suffered, for example, an ex-Army mechanic admitted that the first UH-1s handed over to the Navy to help create HAL-3 were the worst configured aircraft that they could find (Email from Claude Fourroux USN (Retd) to Seawolf Association, viewed 1 July 2014 <www.seawolf.org/mailcall.asp>). Tom Phillips also noted: '... they were the oldest helicopters in-country. We didn't see anything newer than the H-1 Bravo until all Army units were flying D and H models or better, and the last B models had been attrited.' (Tom Phillips, *Scramble Seawolves! Part 1*)
- 28 Robert H. Stoner, US Navy (Retd), *The Brown Water Navy in Vietnam, Part III*, Combatant Craft Crewman Association, viewed 1 July 2014 <www.warboats.org/StonerBWN/The%20Brown%20Water%20Navy%20in%20Vietnam_Part%203.htm>
- 29 For more ATC details, see Don Blankenship, *Tango Boat*, Rivervet website, viewed 1 July 2014 <www.rivervet.com/tango.htm>

Dreadful Lady over the Mekong Delta

- 30 For more Monitor details, see Don Blankenship, *Monitor*, Rivervet website, viewed 1 July 2014 <www.rivervet.com/monitor.htm>
- 31 For more Zippo details, see Don Blankenship, *Zippo Boat*, Rivervet website, viewed 1 July 2014 <www.rivervet.com/zippo.htm>
- 32 For more CCB details, see Don Blankenship, *Command Communications Boat*, Rivervet website, viewed 1 July 2014 <www.rivervet.com/ccb.htm>
- 33 For more ASPB details, see Don Blankenship, *Alpha Boat*, Rivervet website, viewed 1 July 2014 <www.rivervet.com/alpha.htm>
- 34 Edward J. Marolda, Water Mine Warfare in South Vietnam, Encyclopedia of the Vietnam War: A Political, Social, and Military History (Spencer C. Tucker, ed) ABC-CLIO, Santa Barbara, CA, 1998, viewed 1 July 2014 <www.history.navy.mil/research/library/online-reading-85>
- 35 USN UDTs and SEALs remained separate entities until after the Vietnam War. Detailed opinions of the differences between UDT and SEAL teams, given in article by Sainsbury, William, 'Was Jesse a SEAL or a UDT guy?' *San Diego Reader*, San Diego CA, 2 December 1999, viewed on 1 July 2014 at <www.cursor.org/stories/seal_or_udt.htm>
- 36 Dockery, Kevin *Navy SEALs: A Complete History from World War II to the Present*, Berkley Books, New York, 2004.
- 37 Dwyer, John B. *Seaborne Deception - The History of US Navy Beach Jumpers*, Praeger Publishers, 1992 viewed 1 July 2014 at <www.beachjumpers.com/History/1960sJBD.htm>
- 38 Lieutenant General John J. Tolson, US Army, *Vietnam Studies, Airmobility 1961-1971*, Department of the Army, 1973, pp. 3-15
- 39 *ibid*, p. 3. See 8th and 57th Transportation Company Light Helicopter histories, respectively at <www.117thahc.org> and <www.145thcab.com/History/NL14HIST.htm> viewed 1 July 2014
- 40 Tolson, *Vietnam Studies, Airmobility*, p. 29
- 41 The Delta Aviation Battalion was formed at Can Tho in July 1963, and in September 1964 became 13th Combat Aviation Battalion. In December 1967, it was assigned to 164th Group to support the three ARVN divisions and other units in the Delta. Moving to Soc Trang in October 1968, it remained there until March 1972. For more information, see <www.1stavnbd.com/13th/13th_Combat_Aviation_Battalion.htm> viewed 1 July 2014.
- 42 Tolson explained that: 'During the build-up in 1965, operations in the Delta received a lesser priority because of the overwhelming need to provide aviation assets to the major (*northern*) US units arriving in country.' (Tolson, *Vietnam Studies, Airmobility*, p. 216)
- 43 Fulton, *Vietnam Studies, Riverine Operations*, pp. 51-88
- 44 *ibid*, pp. 48-50
- 45 *ibid*, pp. 50-51
- 46 *ibid*, p. 68
- 47 *ibid*, p. 93
- 48 John L. McGrath, *Fire for Effect: Field Artillery and Close Air Support in the US Army*, Combat Studies Institute Press, US Army Combined Arms Center, Fort Leavenworth, Kansas, 2001.
- 49 Fulton, *Vietnam Studies, Riverine Operations*, pp. 148-156
- 50 Operation *Speedy Express* was a 9th Division operation in Kien Hoa province, lasting six months from December 1968 to May 1969, when 10 889 enemy were claimed dead, with only 748 weapons recovered.
- 51 'Catkillers' website, viewed 1 July 2014 at <www.catkillers.org>
- 52 The history of the 184th Reconnaissance Airplane Company is contained in the 184th Recon Airplane Company Association website at <www.184rac.com> viewed 1 July 2014.

Notes

- 53 This action caused extensive adverse press coverage after the Senior US Advisor with the 7th ARVN Division, Lieutenant Colonel John Paul Vann, attempted to draw public attention to ARVN leadership problems. His comments were perceived as an accusation of cowardice, a stigma which lasted for a long time. For more on this, see US Department of State, *Foreign Relations of the United States 1961-1963, Volume III, Vietnam, January-August 1963*, Document 1, US Department of State website, viewed on 1 July 2014, at <www.history.state.gov/historicaldocuments/frus1961-63v03/d1>.
- 54 Dr Lewis Sorley noted that the early 1960s 'was a period of American dominance in conduct of the war, with the South Vietnamese basically shoved aside ... American materiel assistance in these early years consisted largely of providing cast-off World War II American weapons, including the heavy and unwieldy (for a Vietnamese) M-1 rifle. Meanwhile the enemy was being provided the AK-47 assault rifle by his Russian and Chinese patrons.' (Dr Lewis Sorley *Reassessing ARVN*, a lecture given at the Vietnam Center, Texas Tech University Lubbock, Texas 17 March 2006, viewed 1 July 2014 <www.generalthieu.com/arvn-sorley-2.htm>). Brigadier General James L Collins, Jr noted that 'In 1964 the enemy had introduced the AK-47, a modern, highly effective automatic rifle. In contrast, the South Vietnam forces were still armed with a variety of World War II weapons ... After 1965 the increasing US build-up slowly pushed Vietnamese armed forces materiel needs into the background.' (Brigadier General James L Collins, Jr US Army Retd, *Vietnam Studies: The Development and Training of the South Vietnamese Army, 1950-1972*, Department of the Army, Washington DC, 1975, p. 101)
- 55 Directorate of Intelligence, Central Intelligence Agency, *Intelligence Memorandum, The South Vietnamese Army Today*, US Central Intelligence Agency, Washington DC, 12 December 1966, viewed 1 July 2014 <www.foia.cia.gov/sites/default/files/document_conversions/89801/DOC_0000196413.pdf>.
- 56 Sorley, *Reassessing ARVN*.
- 57 Collins, *Vietnam Studies: South Vietnamese Army*, Appendix D.
- 58 Gary 'Huck' Ennis, *Cleared Hot: Forward Air Controller Stories from the Vietnam War*, Forward Air Controller Association, Book 1, Lulu, 2008, p. 174
- 59 Colonel David H. Hackworth, US Army, (Retd) & Julie Sherman, *About face: the odyssey of an American warrior*, MacMillan, The Griffin Press, Adelaide, South Australia, 1989, p. 693
- 60 Captain William E Le Gro, US Army, *Vietnam: Cease Fire to Capitulation*, US Army Center of Military History, Washington DC, 1985, Chapter 7 – The Delta Rice War, viewed 1 July 2014 <www.history.army.mil/html/books/090/90-29/CMH_Pub_90-29.pdf>
- 61 David WP Elliott, *The Vietnamese War: Revolution and Social Change in the Mekong 1930-1975*, M E Sharpe Inc, Armonk NY, 2003, p. 420
- 62 *ibid*, pp. 420 and 430
- 63 Sir Robert Thompson, *Peace Is Not At Hand*, David McKay, New York, 1974, p. 58
- 64 Edward J. Marolda, *The Navy of the Republic of Vietnam*, US Naval History and Heritage Command website, reproduced from Spencer C Tucker (ed) *Encyclopedia of the Vietnam War: A Political, Social, and Military History*, ABC-CLIO, Santa Barbara CA, 1998, viewed 1 July 2014, <<http://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/n/the-navy-of-the-republic-of-vietnam.html>>

Dreadful Lady over the Mekong Delta

- 65 Edward J Marolda noted that ‘The generally good performance of the Vietnamese Navy during the allied sweep into Cambodia motivated the transfer of significant operational responsibilities to the Vietnamese. The barrier along the Cambodian border was turned over to the Vietnamese Navy in March 1970, which renamed the operation *Tran Hung Dao I*. In May, *Giant Slingshot* and *Sea Tiger* became *Tran Hung Dao II* and *Tran Hung Dao VII*.’ (Edward J Marolda, *By Sea, Air and Land: An Illustrated History of the US Navy and the War in Southeast Asia*, Navy Historical Center, Department of the Navy, Washington DC, 1994, Chap 4 – Winding Down The War, 1968-1973, viewed 1 July 2014 www.history.navy.mil/SeAirLand/chap4.htm)
- 66 Edward J. Marolda, *The Navy of the Republic of Vietnam*,
- 67 Edward J. Marolda, *The Navy of the Republic of Vietnam*, Fulton, *Vietnam Studies, Riverine Operations*, p. 11
- 68 Edward J. Marolda, *The Navy of the Republic of Vietnam*,
- 69 *ibid*
- 70 Commander Thong Ba Le, RVN Navy, *Organizations and Progressive Activities of the Republic of Vietnam Navy*, Mobile Riverine Force Association website, nd, viewed 1 July 2014 <www.mrfa.org/VNN.ThongLe.htm>
- 71 *ibid*
- 72 *ibid*
- 73 Lieutenant Commander Eugene F. Paluso, USN, *Operation SEALORDS: A Study in the Effectiveness of the Allied Naval Campaign of Interdiction*; Master of Military Studies paper, USMC Command and Staff College, Quantico VA, 2002, p. 57, viewed 1 July 2014 <www.dtic.mil/dtic/tr/fulltext/u2/a401163.pdf>
- 74 Thong Ba Le, *Republic of Vietnam Navy*
- 75 *ibid*
- 76 *ibid*
- 77 Colonel Victor J. Croizat USMC, ‘Vietnamese naval forces: origin of the species’ in *The Marines in Vietnam 1954-1973, An Anthology and Annotated Bibliography*, History and Museums Division, Headquarters US Marine Corps, Washington DC, 1974, pp. 3–12
- 78 Lieutenant Colonel Archie J Clapp, USMC (Retd), ‘Shu-fly diary’, in *The Marines in Vietnam 1954-1973, An Anthology and Annotated Bibliography*, History and Museums Division, Headquarters US Marine Corps, Washington DC, 1974 and David H. Hugel ‘Shuffly: the marine corps beachhead in Vietnam, part II: the mission goes into high gear’ in *Leatherneck – Magazine of the Marines*, Volume 95 issue 5, May 2012, p. 43, viewed 1 July 2014 <www.mca-marines.org/leatherneck/2012/05/shuffly-marine-corps-beachhead-vietnam-part-ii-mission-goes-high-gear>
- 79 For more information, see the unofficial Operation *Starlite* website, viewed 1 July 2014 <www.operationstarlite.com>
- 80 Naval History Division, US Navy, *Riverine warfare: the US Navy’s operations on inland waters*, US Government Printing Office, Washington, DC, 1969 and US Navy Naval History and Heritage Command, *US Naval Operations Vietnam Highlights April 1966, Amphibious Operations*, Department of the Navy, Washington DC, 5 Jun 14, viewed 1 July 2014 <www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/v/vietnam-war/highlights/highlights-april-1966.html#amphibious_operations>
- 81 Naval History Division, US Navy, *Riverine warfare: the US Navy’s operations on inland waters*, US Government Printing Office, Washington, DC, 1969

Notes

- 82 Donald J. Mrozek, *Air Power and the Ground War in Vietnam: Ideas and Actions*, Air University Press, Maxwell Air Force Base, Alabama, January 1988, p. 82, viewed 1 July 2014 at <www.aupress.maxwell.af.mil/bookinfo.asp?bid=67>. As a result of the failure of the Marine Air Division to communicate with the US Army's 1st Air Cavalry during the siege of Khe Sanh, COMUSMACV (Westmoreland) finally acceded to USAF General Momyer's request to institute a single Tactical Air Control System across Vietnam.
- 83 Eugene N. Tulich, USCG, *The United States Coast Guard in South East Asia During the Vietnam Conflict*, USCG History Monograph Program, US Department of Homeland Security, nd, viewed 1 July 2014 <http://www.uscg.mil/history/articles/h_tulichvietnam.asp>
- 84 Mobile Riverine Force Association, *Task Force 115*,
- 85 Tulich, *The United States Coast Guard*
- 86 *ibid*
- 87 *ibid*
- 88 Bear, James T., *VNAF Improvement and Modernization Program*, Directorate, Tactical Evaluation, CHECO Division, Headquarters Pacific Air Force, Hickham Air Force Base, Hawaii, 5 February 1970, chapter 2, viewed 1 July 2014 at <www.vietnam.ttu.edu/virtualarchive/items.php?item=F031100100762>
- 89 Fairfax, Dennis *Royal Australian Navy in Vietnam*, Department of Defence, AGPS, Canberra, 1980, p. 129+
- 90 More information on 135th AHC and RANHV is available on websites <www.135ahc.net> and <www.navy.gov.au/history/squadron-histories/ran-helicopter-flight-vietnam-history> viewed 1 July 2014
- 91 Grey, Jeffrey *Up Top: The Royal Australian Navy and Southeast Asian conflicts, 1955–1972* Allen & Unwin, St. Leonards, NSW, 1998, p. 185
- 92 *ibid*, pp. 198-9. Activities off Phu Quoc Island also included five air spotted missions. Australian Army jungle warfare experts from the Australian Army Training Team Vietnam served with and led many *Mike Force* teams in Vietnam.
- 93 *ibid*, p. 220. During this tour of duty as CO HMAS *Hobart*, Commander Swan had similar problems to RAN and RAAF personnel, respectively serving with the US Army's 135th Aviation Helicopter Company and No 2 Squadron, RAAF, in being required to observe Australian national requirements to avoid combat in Cambodia.
- 94 *ibid*, p. 220
- 95 *ibid*, p. 221
- 96 *ibid*, p. 222
- 97 Blue, RS *United and Undaunted: The History of the Clearance Diving Branch of the RAN*, Naval Historical Society, Sydney, 1976. Also Grey, *Up Top*, Fairfax, *Royal Australian Navy in Vietnam*, pp. 103–127 and John Perryman & Brett Mitchell, *Australia's Navy in Vietnam*, Topmill, Sydney, 2007, pp. 58–83
- 98 'Operation Marauder: Allied Offensive in the Mekong Delta', *Vietnam* magazine, February 1999, viewed 1 July 2014 at <www.historynet.com/operation-marauder-allied-offensive-in-the-mekong-delta.htm>. See also The First Battalion Association, *Vietnam 1965-1966*, viewed 1 July 2014, <www.firstbattalionassociation1rar.org.au/info.php?id=24>
- 99 Ham, Paul *Vietnam: The Australian War*, Harper Collins Publishers, Sydney, 2007, p. 59
- 100 *ibid*, pp. 60-62
- 101 Pribbenow, Merle L. 'North Vietnam's Master Plan' *Vietnam*, August 1999, viewed 1 July 2014, <www.historynet.com/north-vietnams-master-plan.htm>
- 102 Ham, *Vietnam: The Australian War*, pp. 64-66

Dreadful Lady over the Mekong Delta

- 103 Naval History Division, US Navy, *Riverine warfare: the US Navy's operations on inland waters*, US Government Printing Office, Washington, DC, 1969, viewed 1 July 2014 at <www.history.navy.mil/library/online/riverine.htm> In regard to the Ca Mau peninsula, Zumwalt stated (On Watch, p. 39) 'The US command had regarded the peninsula as so irremediably enemy country that it had evacuated as many inhabitants as possible and then bombed it with B-52s.'
- 104 Ham, *Vietnam: The Australian War*, p. 70
- 105 See www.vietnam-war.commemoration.gov.au/royal-australian-navy/clearance-divers.php and also Ca Mau Peninsula references at www.brownwater-navy.com/vietnam/Seaft02.htm as at 1 July 2014
- 106 Ham, *Vietnam: The Australian War*, pp. 77-78
- 107 Colonel William E Le Gro, *Vietnam from Cease-fire to Capitulation*, US Army Center of Military History, 1981, p. 28-30

CHAPTER 3 NOTES

- 108 Squadron Leader Travis Hallen, *Flawed Doctrine: The Problem with Centralised Control and Decentralised Execution*, The Sir Richard Williams Foundation, 2012, p. 9, viewed 1 July 2014 at <www.williamsfoundation.org.au/Papers-and-articles>. Grau noted 'Occasionally, the joint command structure of the MRF (Mobile Riverine Force) caused some frustration, particularly for the (US) Navy.' (Reagan J Grau *Waging Brown Water Warfare: the mobile riverine force in the Mekong 1966-1969*, thesis, Texas Tech University, Lubbock TX, August 2006, p. 102)
- 109 Reagan J Grau *Waging Brown Water Warfare: the mobile riverine force in the Mekong 1966-1969*, thesis, Texas Tech University, Lubbock TX, August 2006, p. 113
- 110 Major General William B. Fulton, US Army, *Vietnam studies, riverine operations*, Department of the Army, Washington DC, 1973, pp. 72-73, and Grau, *Waging Brown Water Warfare*, pp. 110-111
- 111 Fulton, *Vietnam Studies, Riverine Operations*, pp. 140-145; and Grau, *Waging Brown Water Warfare*, p. 116
- 112 Fulton, *Vietnam Studies, Riverine Operations*, pp. 77-79.
- 113 Fulton, *Vietnam Studies, Riverine Operations*, pp. 74-76, and Grau, *Waging Brown Water Warfare*, pp. 74-79.
- 114 Fulton, *Vietnam Studies, Riverine Operations*, pp. 89-95.
- 115 Fulton, *Vietnam Studies, Riverine Operations*, pp. 148-150; and Grau, *Waging Brown Water Warfare*, pp. 141-143
- 116 Grau, *Waging Brown Water Warfare*, p. 147
- 117 Denis Warner, *Not With Guns Alone – How Hanoi Won The War*, Hutchinson of Australia, 1977, p. 152
- 118 John Sperry, *The Old Reliables*, Mobile Riverine Force Association website, viewed 1 July 2014 at <www.mrfa2.org/9th_div_troops.htm>
- 119 Fulton, *Vietnam Studies, Riverine Operations*, pp. 165-166
- 120 Elmo R. Zumwalt Jr, *On Watch – A Memoir*, Quadrangle, The New York Times Book Co., New York, New York, 1976, p. 38
- 121 Naval History Division, US Navy, *Riverine warfare: the US Navy's operations on inland waters*, US Government Printing Office, Washington, DC, 1969, viewed 1 July 2014 at <www.history.navy.mil/library/online/riverine.htm>
- 122 Naval History Division, *Riverine warfare*. 'VC Lake' was also a notably visible targeting reference point for *Maggie* crews bombing in IV Corps.
- 123 Zumwalt, *On Watch*, pp. 36-40; Grau, *Waging Brown Water Warfare*, pp. 144-145
- 124 Grau, *Waging Brown Water Warfare*, p. 157

Notes

- 125 Captain Thomas W. Glickman USN (Retired), River Patrol Force (TF-116), 8 November 1967 - 3 November 1968, The Gamewardens Association website, 14 July 2008, viewed 1 July 2014 at <www.tf116.org/pdf/Memories-TomGlickman.pdf>; Lieutenant Commander William C. McQuilkin, USN, *Operation SEALORDS: A Front in a Frontless War, An Analysis of the Brown-Water Navy in Vietnam*, thesis, US Army Command and General Staff College, Fort Leavenworth, Kansas, 1997, p. 20 (viewed 1 July 2014 as Accession Number ADA331787 at <www.dtic.mil>); Eugene F. Paluso, *Operation SEALORDS: A Study in the Effectiveness of the Allied Naval Campaign of Interdiction* a thesis, USMC Command and Staff College, Quantico, VA, 2001, pp. 23-24
- 126 Eugene F. Paluso, *Operation SEALORDS: A Study in the Effectiveness of the Allied Naval Campaign of Interdiction* a thesis, USMC Command and Staff College, Quantico, VA, 2001, p. 31
- 127 *ibid*, p. 36
- 128 Edward J. Marolda, *By Sea, Air and Land: An Illustrated History of the US Navy and the War in Southeast Asia* Naval Historical Center, Washington DC, 1994
- 129 Paluso, *Operation SEALORDS*, pp. 35-40
- 130 *ibid*, p. 40
- 131 Marolda, *By Sea, Air and Land*.
- 132 Lieutenant Commander Andrew R. Walton USN, *The History of the Airborne Forward Air Controller in Vietnam*, thesis, US Army Command and Staff College, Fort Leavenworth, Kansas 2004, p. 44 (viewed 1 July 2014 as Accession No ADA429021 at <www.dtic.mil>)
- 133 Paluso, *Operation SEALORDS*, p. 45
- 134 *ibid*, p. 51
- 135 Zumwalt, *On Watch*, p. 36, also Grau, *Waging Brown Water Warfare*, pp. 144-145
- 136 Zumwalt, *On Watch*, p. 40
- 137 GMCM (SW) Robert H Stoner, USN (Retd), *SEAL/MST Operations From Sea Float/Solid Anchor In 1970*, viewed 1 July 2014 at <www.mrfa.org/Seafloat.SolidAnchor.htm>
- 138 Paluso, *Operation SEALORDS*, pp. 54-55
- 139 Professor R. Blake Dunnivant, 'Battle for the Mekong', in Andrew Wiest (ed), *Rolling Thunder in a Gentle Land: The Vietnam War Revisited*, Osprey Publishing, Oxford UK, 2006, p. 250
- 140 Zumwalt, *On Watch*, pp. 40-42, 47
- 141 Paluso, *Operation SEALORDS*, p. 61
- 142 Warner, *Not With Guns Alone*, p. 54
- 143 Fulton, *Vietnam Studies, Riverine Operations*, pp. 178-9
- 144 McQuilkin, *Operation SEALORDS*, pp. 57-58
- 145 Robert L. Tonsetic, *Forsaken Warriors: The Story of an American Advisor with the South Vietnamese Rangers and Airborne*, Casemate, 2009 pp. 138-9; also Gen Cao Van Vien et al, *The US Advisor, Indochina Monographs*, US Army Center of Military History, Washington, DC, 1980, p. 175
- 146 *Commander US Naval Forces Vietnam Monthly History Summary*, November 1970, p. 7, viewed 27 Apr 16 at <<http://www.vietnam.ttu.edu/virtualarchive/items.php?item=168300011194>>.
- 147 PCF-87 was in the last batch of Swift boats transferred to the Vietnam Navy, when USN Coastal Division 13 was disestablished on 1 December 1970. Swift Boat Sailors Association website, viewed 1 July 2014 at <www.swiftboats.net/PCFlistingFiles/PCF80-89.htm>
- 148 Michael Charlton & Anthony Moncrieff, *Many Reasons Why: The American Involvement in Vietnam*, Scolar Press, 1978, p. 159, also *Milwaukee Journal*, 29 July 1973.
- 149 Professor R. Blake Dunnivant, 'Battle for the Mekong', Chapter 12 of *Rolling Thunder in a Gentle Land*, Osprey Publishing, Oxford UK, 2006, p 255.

CHAPTER 4 NOTES

- 150 Naval History Division, US Navy, *Riverine warfare: the US Navy's operations on inland waters*, US Government Printing Office, Washington, DC, 1969, viewed 1 July 2014 at <www.history.navy.mil/library/online/riverine.htm>
- 151 Colonel Dennis M Drew, USAF, 'Two Decades in the Air Power Wilderness: Do We Know Where We Are?' *Air University Review*, Air University Press, Maxwell AFB, Ala. September-October 1986, viewed 1 July 2014 at www.airpower.maxwell.af.mil/airchronicles/aureview/1986/sep-oct/drew.html and Colonel Dennis M Drew, USAF, *Rolling Thunder 1965: Anatomy of a Failure* (AU-ARI-CP-86-3), Air University Press, Maxwell AFB, Ala, 1986
- 152 Squadron Leader Travis Hallen, *Flawed Doctrine: The Problem with Centralised Control and Decentralised Execution*, The Sir Richard Williams Foundation, 2012, p. 9
- 153 John T. Correll, *The Air Force in the Vietnam War*, The Air Force Association, Aerospace Education Foundation, Arlington, Va, 2004, pp. 6 and 8
- 154 USAF fighter squadrons were moved around South Vietnam as the situation demanded, and in the 1969 timeframe, there were 18 tactical fighter squadrons, including No 2 Squadron, in-country. The Seventh Air Force South Vietnam-based fighter squadron order of battle was as follows:

Base (Wing)	Squadron	Aircraft	Callsign
Phan Rang (35th TFW)	2SQN RAAF	Canberra Mk 20	<i>Magpie</i>
	612 TFS	F-100C/D	<i>Tide</i>
	614 TFS	F-100D/F	<i>Devil</i>
	615 TFS	F-100D/F	<i>Blade</i>
Bien Hoa (3th TFW)	90 TFS	F-100D	<i>Dice</i>
	510 TFS	F-100D	<i>Buzzard</i>
	531 TFS	F-100D	<i>Ramrod</i>
Cam Ranh Bay (12th TFW)	557 TFS	F-4C	<i>Sharkbait</i>
	558 TFS	F-4C	<i>Hammer</i>
	559 TFS	F-4C	<i>Phantom</i>
Tuy Hoa (31st TFW)	308 TFS	F-100D	<i>Saber</i>
	309 TFS	F-100D	<i>Dusty</i>
	355 TFS	F-100D	<i>Icon</i>
	416 TFS	F-100D	<i>Elect</i>
Phu Cat (31th/37th TFW)	389 TFS	F-4D	<i>Buckshot</i>
	480 TFS	F-4D	<i>Cobra</i>
Da Nang (366th TFW)	421 TFS	F-4C/E	<i>Gunfighter</i>
	390 TFS	F-4C	<i>Manual</i>

In addition, after a short combat evaluation (Operation *Combat Dragon*) of converted T-37 Dragonfly dual-seat training aircraft, conducted in country from August to December 1967, USAF A-37 Dragonfly squadrons flew ground attack missions as part of Seventh Air Force tactical air effort until they were handed over to the VNAF in October 1970. Operating from Bien Hoa, these A-37 'special operations' squadrons were the 90th and 604th, then 8th Squadron after its B-57B Canberra bombers were taken out of action in 1969. Source A-37 Association's website, viewed 1 July 2014 at <www.A-37.org>. These units were supplemented, from mid-1968 to mid-1969, by four USAF Air National Guard F-100 fighter squadrons—at Phan Rang with 35th TFW came 120th TFS ('Colorado Cougars') from Denver, callsign *Bobcat*; at Tuy Hoa with 31st TFW were 136th TFS ('Rockey's Raiders') from Niagara Falls, New York, callsign *Fuzzy*

Notes

- and 188th TFS ('Enchilada Squadron') from Albuquerque, New Mexico, callsign *Taco*; and at Phu Cat with 37th TFW, 174th TFS from Sioux City, Iowa, callsign *Bat*. See Air National Guard Heritage website, viewed 1 July 2014 at <www.ang.af.mil/history/heritage.asp> and Major Joseph B. Speed USAF, *Forgotten Heroes: US ANG Fighter Squadrons in Vietnam*, research report, Air Command and Staff College, Air University, Maxwell AFB, Ala, 2006. The USAF also used AC-47 Dakota (*Spooky*) and AC-119 Flying Boxcar (*Shadow*) Special Operations Squadrons in ground attack roles.
- 155 George Odgers, *Mission Vietnam: Royal Australian Air Force Operations 1964-1972*, Australian Government Publishing Service, Canberra ACT, 1974, p. 48
- 156 At any one time, No 2 Squadron had eight operational Canberra Mk 20s on line at Phan Rang, while two were undergoing intermediate (250 hours) D servicing at Transport Support Flight, RAAF Butterworth, with two back in Australia at No 3 Aircraft Depot, RAAF Base, Amberley, undergoing major E servicing, conducted every 1250 hours flying time.
- 157 The JAGOS combined the MAC Command Control System, Army Air Ground System (AAGS) and Air Force Tactical Air Control System (TAS) (7AFP55-1, 20 March 1968). Colonel John Schlight, Air Force History and Museums Program in *The United States Air Force in South East Asia: The War in South Vietnam - The Years of the Offensive 1965-1969*, (pp. 136-137) stated: 'For one thing, the Air Force had no clear-cut objective of its own to measure results in Vietnam. Its role, along with the other air elements of the other services, was to support ground operations. Air power was viewed, outside the Air Force, as but one of several types of supportive fire power at the call of the ground commanders. While the Army and Air Force chiefs had agreed on this ancillary position for air power in the spring of 1965, MACV further codified it in mid-1966 (MACV Directive 95-11, 21 Jun 1966, The Joint Air-Ground Operations System) by directing that all air strikes in South Vietnam be reported as close air support missions. Although this decision faithfully reflected the MACV position that all of South Vietnam was part of the battlefield, it made it difficult for the Air Force to measure the results of what it considered its own contribution to the war.' In *Fire for Effect: Field Artillery and Close Air Support in the US Army*, John L McGrath noted (p. 117) that in the context of achieving the right balance of CAS force elements: 'Unlike Korea, in Vietnam, the (US) Army employed extensive artillery assets. In 1969, the Army deployed 61 artillery battalions to support 51 infantry battalions.' There were more US Army artillery assets by ratio deployed in South Vietnam than in previous conflicts.
- 158 Major Philip D. Caine, *IV DASC Operations, 1965-1969*, CHECO Division, Tactical Evaluation Directorate, HQPACAF, September 1969, p. 8
- 159 *ibid*, p. 3
- 160 *ibid*, p. 8
- 161 *ibid*, Appendices I-IX
- 162 Group Captain PW Helmore, DFC, AFC 'Air Operations in Vietnam: 1', lecture given at Royal United Services Institute, London UK on 2 November 1966, *RUSI Journal*, Volume 112, Issue 645, 1967 pp. 16-31
- 163 FAC squadron histories at Forward Air Controllers Association website, viewed 1 July 2014 at <www.fac-assoc.org> and LCDR Andrew R. Walton, USN, 'The History of the Airborne Forward Air Controller in Vietnam', Master of Military Art and Science, Military History thesis, US Army Command and General Staff College, Fort Leavenworth, Ka, 2004
- 164 19th TASS history in Charlie Pocock (ed), *Cleared Hot: Forward Air Controller Stories from the Vietnam War*, Forward Air Controllers Association, Book 1, 2008, pp. 76-77
- 165 22nd TASS history in *Cleared Hot*, Book 1, pp. 330-331
- 166 *Jade* FACs history in *Cleared Hot*, Book 1 (2008) & Book 2 (2009)
- 167 RAAF FAC history in *Cleared Hot*, Book 1, p. 114

Dreadful Lady over the Mekong Delta

- 168 Wing Commander Powell's relevance to the USAF's recognition of No 2 Squadron's operational capabilities has been recorded in these references—the official history of Australia's involvement in South-East Asian Conflict 1948-1975 covering the air side, Dr Chris Coulthard-Clark, *The RAAF in Vietnam: Australian Air Involvement in the Vietnam War 1962-1975*, Allen & Unwin, St. Leonards, 1995, pp. 263-266; James T Bear, *The RAAF in SEA: Special Report*, Directorate, Tactical Evaluation, CHECO Division, Headquarters Pacific Air Force, Hickham AFB, Hawaii, 1970, pp. 19-20; Wing Commander John Bennett, *Highest Traditions – The History of No 2 Squadron RAAF*, AGPS, Canberra, 1995, pp. 53 and 288; Odgers *Mission Vietnam; Commanding Officer No 2 Squadron's Report*, June 1967 and *No 2 Squadron Unit History Sheet (Form A.51)* June 1967. The latter noted that two Canberras were tasked for this Close Air Support demonstration, however A84-230, piloted by Flight Lieutenant Barry Squires, with navigator bomb-aimer Flight Lieutenant Charlie Reif, was forced to return to base when a tail fell off one bomb suspended in the bomb bay, after the bomb bay door was opened for the drop. Canberra A84-235 dropped eight 500 lb bombs over a stick length of 800 metres on a suspected enemy area, covering 40 per cent of the target.
- 169 Caine, *IV DASC Operations*, 1969, pp. 15-19. How No 2 Squadron and the VNAF resolved language difficulties was described in Bear, *The RAAF in SEA*, pp. 22-25
- 170 Caine, *IV DASC Operations*, 1969, p. 13
- 171 John Bennett, who flew as a navigator/bomb-aimer with No 2 Squadron at the time, noted this successful 'rappot' (Bennett, *Highest Traditions* p. 322). Bear, *RAAF in SEA* also recorded (p 24) that VNAF FACs were encouraged to enter the 'FAC exchange program' and VNAF FAC visits to No 2 Squadron at Phan Rang began in April 1970 and soon afterwards the RAAF reported that their efficiency had improved markedly (COMRAAFV Reports 1970).
- 172 The USAF's 'FAC University' was disbanded in late 1969, presumably as the Vietnamization program for VNAF FACs took over. While 'FAC University' was at Phan Rang, No 2 Squadron executives took the opportunity to address the students on the capabilities of the Canberra Mk 20 bomber. USAF FAC Steve Laurence (*Walt 72*), stationed at Phan Rang in 1968-69, noted (*Cleared Hot*, Book 1, p 306) that: 'It was a good program and saved a lot of lives.' Wing Commander Peter Larard RAAF attended it twice, converting in November 1968 onto the OV-10 Bronco to become a *Sidewinder* FAC and again later learning to fly the Cessna O-2 to become ALO at 1st ATF as a *Jade* FAC. (*Cleared Hot*, Book 1, pp 133 and 138).
- 173 In *Cleared Hot*, several RAAF FACs recorded their experiences with speaking 'Strine'. For example, Graham Neil (*Issue 21*) gave an amusing anecdote in Book 2 (p 142) in explaining why: 'All Australian and New Zealand FACs experienced difficulty in making themselves understood with Americans or Vietnamese unfamiliar with the Antipodean accent.' Chris Hudnott (*Issue 27*), in *Cleared Hot* Book 1, p 169, recorded: 'After a few weeks of responding to "Say again FAC", I developed my own special AmericanOZed accent, which went a long way to solving the problem.' Arthur Sibthorpe (*Tamale 15*, working with the US 9th Division) also recounted in *Cleared Hot* Book 2 (p 129) an amusing, but potentially dangerous incident, when an American fighter pilot under his direction found himself over hostile Cambodian territory rather than in South Vietnam, when he thought Arthur had said 80 instead of 18 nautical miles from a pre-determined rendezvous. Huck Ennis (*Cleared Hot* Book 1, p 175) had language troubles with the Vietnamese, when a VNAF A-37 lead said to him: 'Speak slowly please, I am not American you know', to which he replied 'That's alright, mate, neither am I!'
- 174 As Bear noted in *VNAF Improvement and Modernization Program*, (p 23): 'The Vietnamese language has a limited vocabulary for the technology of aviation.' As Vietnamization grew, USAF English language training programs for Vietnamese service personnel became overloaded.

Notes

- 175 *Radio and aircrew intercom transmissions No 2 (Bomber) Squadron Royal Australian Air Force (RAAF), South Vietnam, 1969-1970*, Australian War Memorial Audio Collection (S00693), viewed 1 July 2014 at <www.awm.gov/collection/S00693>. Specific missions recorded were:
- Part 1 - 18 August 1969, *Daytime Close Air Support Mission*, Mekong Delta Region - IV Corps, A84-247, *Magpie 71*, Squadron Leader Ivan Grove (pilot) and Flight Lieutenant Bob Howe (navigator/bomb-aimer).
 - Part 2 - 30 September 1969, *Combat Skyspot High Altitude Night-time Ground-controlled Interdiction Bombing Mission*, Demilitarised Zone [DMZ] - I Corps, A84-232, *Magpie 81*, Squadron Leader Ivan Grove (pilot), Flight Lieutenant Bob Howe (navigator/bomb-aimer), Squadron Leader Arthur Barnes (observer)
 - Part 3 - 5 October 1969, *Daytime Visual Close Air Support Mission - Landing Zone (LZ) Preparation Mekong Delta Region - IV Corps*, A84-232, *Magpie 11*, Squadron Leader Ivan Grove (pilot), Flight Lieutenant Bob Howe (navigator/bomb-aimer). Also in formation were A84-237, *Magpie 21*, Flying Officer Peter Nuske (pilot), Flying Officer Lloyd Brown (navigator/bomb-aimer); A84-234, *Magpie 31*, Squadron Leader Arthur Barnes (pilot), Flying Officer Bob Molony (navigator/bomb-aimer); and A84-240, *Magpie 41*, Squadron Leader Brian Sweeney (pilot), Flight Lieutenant Al Pearson (navigator/bomb-aimer).
 - Part 4 - 24 December 1969, *Daytime Visual Interdiction Mission - Pre-strike Preparation Mekong Delta Region - IV Corps*, fragged leader, A84-238, *Magpie 71*, Squadron Leader Ivan Grove (pilot), Pilot Officer Peter Growder (navigator/bomb-aimer), number two, A84-241, *Magpie 81*, Flying Officer Peter Nuske (pilot), Flight Lieutenant Bob Howe (navigator/bomb-aimer), (recorded by *Magpie 81*).
 - Part 5 - 18 September 1969, *Daytime Close Air Support Mission*, Mekong Delta Region - IV Corps A84-236, *Magpie 21*, Pilot Officer Peter Nuske (pilot), Flight Lieutenant Bob Howe (navigator/bomb-aimer), and *Magpie 31*, Pilot Officer Dick Allchin (pilot), Flying Officer John Bushell (navigator/bomb-aimer).
 - Part 6 - 27 April 1970, *Daytime Visual Interdiction Bombing Mission*, Tiger Mountains, A Shau Valley, I Corps, A84-237, *Magpie 91*, Pilot Officer Barry Carpenter (pilot), Flight Lieutenant Bob Howe (navigator/bomb-aimer)
 - Part 7 - 4 May 1970, *Formation Daylight Visual Close Air Support Bombing Mission*, Long Hai Hills near Vung Tau, III Corps, formation leader - A84-241, *Magpie 51*, pilot Squadron Leader Brian Sweeney, navigator/bomb-aimer Pilot Officer Greg Weekes; Others: A84-235, *Magpie 52*, pilot Pilot Officer Mick Birks, navigator/bomb-aimer Pilot Officer Al Curr; A84-237, *Magpie 53*, Flying Officer Mike Herbert, navigator/bomb-aimer Pilot Officer Bob Cuttriss; A84-246, *Magpie 61*, pilot Squadron Leader Arthur Barnes, navigator/bomb-aimer Pilot Officer Ross Hardcastle; *Magpie 62*, A84-240, pilot Pilot Officer Adrian Slootjes, navigator/bomb-aimer Flight Lieutenant Bob Howe; *Magpie 63*, A84-248, pilot Pilot Officer Harry Bradford, navigator/bomb-aimer Pilot Officer Des Hyde (recorded by *Magpie 62*)
 - Part 8 - 21 February 1970, *Day Visual Interdiction Bombing Mission*, north-east of Saigon, III Corps, A84-240, *Magpie 61*, pilot Flying Officer Bob Sivyver, Flight Lieutenant Bob Howe navigator/bomb-aimer.
 - Part 9 - 2 September 1969, *Nighttime Visual Interdiction Bombing Mission (Night Owl)*, south-east of Saigon, III Corps, A84-235, *Magpie 81*, Squadron Leader Ivan Grove pilot and Flight Lieutenant Bob Howe navigator/bomb-aimer.

Dreadful Lady over the Mekong Delta

- 176 Pictured at Point Cook on 9 February 1990, were, from left to right, the author, Group Captain Frank Lonie (Retd), who encouraged the gift and arranged the ceremony, Air Commodore Ken Blakers, Air Officer Commanding Training Command, who accepted the tapes on behalf of the RAAF Museum, and Air Vice-Marshal Alan Reed, Air Officer Commanding Logistics Command, who served with the USAF as a Squadron Leader on an exchange posting in Vietnam, flying operational missions on the RF-4C Phantom with the 12th Tactical Reconnaissance Squadron, at Tan Son Nhut. See also article in *RAAF News*, April 1990.
- 177 Garry Cooper and Robert Hillier, *Sock it to 'em Baby: Forward Air Controller in Vietnam*, Allen & Unwin, Crows Nest NSW, 2006 p 60. Another RAAF FAC, Dick Kellaway, (*Sidewinder 34 and Nile 05*) told (*Cleared Hot*, Book 2, pp 104-5) of the dangers of getting fixated on the target in an O-1 while trying to achieve high accuracy. The closer he got to the target, the less the gravity drop allowance and the higher the target needed to be sighted in the plexiglass windshield. To get the target that high above the typical release picture meant bunting to lower the nose, which increased the angle of dive the closer he got to the ground, putting the aircraft into less than 1-G flight, causing the fired smoke rocket to over-shoot, despite the higher target position on the plexiglass.
- 178 Dave Robson (RAAF FAC, *Jade 07*, 1969-70) *Cleared Hot*, Book 1, p 163
- 179 *Cleared Hot*, Book 1, p 174
- 180 Conservative FAC distance measurements could add also confusion to the bombing picture for *Magpie* crews, especially when targets were hard to detect on the final run-in, as evidenced in a IV Corps bombing mission recorded by the author on 18 August 1969 (Australian War Memorial Audio Collection, item S00693, part 1).
- 181 Caine, *IV DASC*, p 3
- 182 Bear, *VNAF*, p 44
- 183 Caine, *IV DASC*, pp. 15-17
- 184 Bear, *VNAF*, pp. 45-46
- 185 On 7 October 1969, *Eagle 24* flew in the front seat of the O-1 Bird Dog with Major Allen USAF (*David 71*) in the rear seat, directing Canberra A84-247, *Magpie 51*, piloted by Squadron Leader Ivan Grove, navigator/bomb-aimer Flight Lieutenant Bob Howe. The target was a VC base camp near *VC Lake*, and one stick of six M.117 750 lb bombs was dropped with a 90 m undershoot due to mis-setting ground speed in a Fixed Sight Head (FSH) drop. BDA given was three KBA estimated, five structures destroyed, two structures damaged, five bunkers destroyed, three bunkers damaged and one secondary explosion.
- 186 On 11 October 1969, *Eagle 29* flew in the front seat of the O-1 Bird Dog with Lloyd (*David 32*) in the rear seat, directing Canberra A84-240, *Magpie 51*, piloted by Flying Officer Bob Sivyer, navigator/bomb-aimer Flight Lieutenant Bob Howe. The target was a VC base camp near Soc Trang, and two sticks of three M.117 750 lb bombs were dropped with good accuracy. BDA given was four KBA estimated, eight structures destroyed, three structures damaged, five bunkers destroyed, three bunkers damaged. The attack was observed by *David 12* flying a second O-1 Bird Dog with No 2 Squadron RAAF navigator/bomb-aimer John Bushell in the rear seat as an observer.
- 187 Caine, *IV DASC*, p 18
- 188 *No 2 Squadron Unit History Sheet*, 23 April 1970.
- 189 The author experienced this phenomenon several times at the outset of VNAF FAC direction. Bear, *VNAF*, page 49, noted that VNAF FACs suffered from only having a 4-rocket configuration on their O-1A model Bird Dogs, and the newer O-1Es and O-1Gs, which they were receiving from the USAF, in 1969 were being delivered without wing racks for the smoke rockets. Four rockets were cited by Bear as being sufficient for one or maybe two pairs of fighters. On at least one occasion (29 April 1970) the author dropped six 750 lb bombs in a IV Corps mission

Notes

- solely on the basis of geographical target description as the VNAF FAC had run out of smoke rockets. A week earlier, with pilot Pilot Officer Adrian Slootjes, in A84-241, a stick of six bombs was dropped, rather than in several runs, as the FAC only had one smoke left.
- 190 Bear, VNAF, p 43
- 191 Caine, *IV DASC*, p 79. Cooper, *Sock it to 'em Baby*, pp 187-188 described the angst of 9th Division FACs experiencing delays in requesting air strikes on VC mortar positions threatening Dong Tam and how he had the gall to enter General Ewell's office unannounced to press the point. General Ewell personally investigated the situation and reported back that 'TACAIR and artillery had been requested on the area many times but approval never came... and no-one had thought to query why... The normal procedure was to send the request to Saigon. Saigon would in turn obtain a clearance from the province chief. Only then could the strikes be launched. The province chief was supposed to be warning civilians of the pending strike but, of course, this was tantamount to warning the enemy. In fact, it was widely thought that the province chiefs were 'double dipping'. That is, receiving payment from the United States for bombing his territory and being paid again by the enemy for letting them know what was coming. In this case, the province chief had been dead for six months. Little wonder the approvals weren't coming through.' This incident would have fitted in well with the bizarre scenarios depicted in Joseph Heller's novel, *Catch 22*.
- 192 Caine, *IV DASC*, p 30.
- 193 Rules of Engagement (ROEs) for all military air operations in South East Asia (SEA) were promulgated by the US Joint Chiefs of Staff (JCS) in the form of messages, called Air Operating Authorities, sent to the Commander-in-Chief Pacific (CINCPAC), who then issued Basic Operations Orders (BOOs) for air operations in SEA. ROEs applicable to No 2 Squadron were promulgated on 20 June 1966, with revisions from then on. Seventh Air Force updated them as South Vietnam Air Operations Orders in 7AFR55-49, dated 14 November 1968. This material was distributed to operating squadrons via Seventh Air Force Operations Order 71-17 supplements. The ROEs were an integral part of newly arrived aircrew training. A CHECO Report *US Rules of Engagement in the Vietnam War, November 1969 to September 1972*, by Captain Paul W Elder and Captain Peter J Melly, contained in *US Senate Congressional Record S3011-S3018*, dated 18 March 1985, noted that: 'besides their own ROE training, the strike crews most important safeguard against violations of the ROE was communication with their FAC controllers... Even so, strike pilots were to abort the mission rather than chance a violation of the ROE, regardless of the FAC's instructions'. The ROEs stated that close air support missions that involve strikes on populated hamlets (defined as a cluster of houses) or villages always had to be controlled by a FAC and could be made without warning if deemed necessary and executed in conjunction with an immediate ground operation, however US-GVN-RVNAF approval was required first. Otherwise, inhabitants had to be warned by either leaflets or loud-speakers before the attack, and had to be given sufficient time to leave the area.
- 194 John 'Wang' Miller quoted in Ken Marks, *Remembrances: 2 Squadron RAAF Vietnam 1967-1971*, Westrae Cottage Publishing, Katoomba NSW 2010, p 335.
- 195 Gary 'Huck' Ennis, *Cleared Hot*, Book 1, p 174.
- 196 Email correspondence between Peter Murphy and author dated 10 May 2013.

CHAPTER 5 NOTES

- 197 Bear's *The RAAF in SEA*, which included an interview with a former 35th TFW commander familiar with No 2 Squadron's operations, who was then running the TACC, commented favourably on the Mk 20 Canberra's suitability for IV Corps missions. The Report observed (p 18) that, although it had a World War II bomb sight: 'All that was needed were accurate flying by the pilot and accurate tracking of the target by the navigator. It was therefore ideal for daytime strikes on flat country, especially where the targets lay in a straight line, such as tree lines, canals and bunkers. Under target conditions like these, with a long loiter time and the possibility of using evasive action before coming into range of the target, the RAAF Canberra could accomplish in one pass what other (dive bombing) strike aircraft required up to 6 passes to achieve, at the same time taking fewer hits from ground fire.' James T Bear, *The RAAF in SEA: Special Report*, Directorate, Tactical Evaluation, CHECO Division, Headquarters Pacific Air Force, Hickham AFB, Hawaii, 1970.
- 198 According to Stewart Wilson, *Lincoln, Canberra & F-111 in Australian Service*, Aerospace Publications, Canberra, 1989, p 88, the official designation was 'Canberra Mk 20' not 'B Mk 20' or 'B.20' as was often used, possibly to fit in with standard UK nomenclature of respective RAF Canberra variants, or in Vietnam to distinguish it from the US-built B-57 Canberra. Forty eight Mk 20s were built at Avalon, VIC by Government Aircraft Factory and delivered to the RAAF from 1953 until 1958. Aircraft A84-201 to A84-227 didn't fly with No 2 Squadron in Vietnam, and were fitted with two Rolls-Royce Avon RA.3 Mk 1 engines rated at 6,500lb thrust at 7,800 rpm at sea level. Canberra Mk 20 aircraft A84-228 to A84-248, all of which flew in South Vietnam except for -229, -239 and -243, were fitted with the more powerful Avon RA.7 Mk 109 engine, rated at 7,500lb thrust at 7,950 rpm at sea level.
- 199 *No 2 Squadron Unit History Sheet*, 3 March 70, sheet 3, and also confirmed by logbook. The shortest Canberra bombing sortie occurred on 17 December 1968, lasting 45 minutes, in Canberra A84-244, *Magpie 21*, flown by Pilot Officer Terry Farquharson, navigator/bomb-aimer Pilot Officer Paul Goodwin on a visual bombing mission (*No 2 Squadron UHS*, sheet 17).
- 200 Bear, *RAAF in SEA*, p. 24
- 201 *No 2 Squadron UHSs*, 1967 to 1971.
- 202 Air Vice-Marshal Graham Neil (Retd), discussion with author, June 2012.
- 203 *No 2 Squadron UHSs*, February-April 1970.
- 204 *No 2 Squadron Commanding Officer's Report*, March 1968, by Wing Commander David Evans, paragraph 10.
- 205 *Radio and aircrew intercom transmissions No 2 (Bomber) Squadron Royal Australian Air Force (RAAF), South Vietnam, 1969-1970*, Australian War Memorial Audio Collection (item S00693), viewed 1 July 2014 at <www.awm.gov/collection/S00693>
- 206 Bear, *RAAF in SEA* noted: 'For the first six months after their arrival in 1967, the RAAF B-57s did not fly a single day mission under FAC control. Not only did this policy prevent the pilots from realizing their potential, but it also stifled morale, because the MSQ night missions gave them little BDA feedback.' Then-Wing Commander Evans, No 2 Squadron Commanding Officer in 1968, was quoted as pressing Headquarters RAAF Vietnam to seek from Seventh Air Force all daylight attack: '... It was not that the night sorties were necessarily ineffective, but rather that results were not always known, or made known to the Squadron'. (Wing Commander John Bennett, *Highest Traditions—The History of No 2 Squadron*, RAAF, AGPS, Canberra, ACT, 1995, p.303)
- 207 Dr Alan Stephens, *The Royal Australian Air Force, The Australian Centenary History of Defence*, Volume II, Oxford University Press, South Melbourne, 2001, p. 273

Notes

- 208 Air Chief Marshal Sir Neville McNamara (Retd), *The Quiet Man: The Autobiography of Air Chief Marshal Sir Neville McNamara*, Air Power Development Centre, Canberra, 2005, p. 150
- 209 Bob Sivyer, email to author, 30 July 2013
- 210 The types of World War II–vintage bombs used by No 2 Squadron in South Vietnam have been cited in the following references.
- Bennett in *Highest Traditions*, note 26, p. 295 mentioned 1000 lb Mk 1 bombs,
 - Air Commodore J.F. (Ginty) Lush, *Commander RAAF Vietnam Report*, January 1968, paragraphs 2, 3 and 6 referred to 1000 lb Mk 2 and 4 general purpose (GP) bombs with either Mk 13 or Mk 37 tails (with Mk 65 fuzes)
 - *No 2 Squadron Commanding Officer's Report*, March 1968, paragraph 7 cited 1000 lb medium capacity (MC) Mk 11 bombs.
 - *Canberra Mk 20 Flight Manual*, (AAP 966, 1st Edition), Armaments section, listed the following bomb options: 500 lb medium capacity (MC) – Mk 4, Mk 8, Mk 9, Mk 10 and Mk 13; 1000 lb general purpose - Mk 1, Mk 2, Mk3, Mk4 and 1000 lb medium capacity – Mk 7, Mk 10, Mk 11, Mk 11*, Mk 12, as well as noting that the Canberra Mk 20 bomb bay could only carry four Mk 7 1000 pounders on stations 2 to 5, while six of the others could be carried either on stations 2 to 5 or 1, 3 and 6.
 - Details of bombs were contained in US Navy Naval Ordnance Systems Command, NAVORD OP 1665, *British Explosive Ordnance*, 10 June 1946. It covered general purpose 500 lb Mks IV, V and VI and GP 1000 lb bombs Mks I to IV, as well as medium capacity 500 lb bombs (Mks I-V being obsolescent in 1946, with Mks VI to XII still in service) and Mks I and II medium capacity 1000 lb bombs, together with a variety of fuzes and tail pistols.
- 211 Wing Commander Lance Halvorson, former No 2 Squadron navigator/bomb-aimer, address to Gathering of Eagles forum, RAAF Staff College, Australian Defence College, Canberra, 11 June 2010.
- 212 Twenty seven thousand bombs were reworked by armament teams at No 1 Central Reserve, Kingswood over 1967-68, including modifying the lugs of old stocks of World War II bombs, from the British standard of one per bomb to the US standard of two and packing Series 100 tails for 1000 lb bombs (Bennett, *Highest Traditions*, p. 297).
- 213 *No 2 Squadron Commanding Officer's Report*, June 1967, page 2, paragraph 4a noted that the use of AVRO triple carriers had been suspended and an Aircraft Research and Development Unit team had come from Australia to Phan Rang, trying to resolve the problem. The AVRO triple carriers were still being tested in July.
- 214 Bennett, *Highest Traditions*, p. 295. Other instances of unpreparedness were cited by Wing Commander Rolf Aronsen in *No 2 Squadron Commanding Officer's Report*, April 1967, paragraphs 8 and 9, respectively. He noted that No 2 Squadron, having already begun bombing operations from Phan Rang, was (a) unsure about the best location in the Canberra for (SST-181, *Music Box*) transponders, which were initially placed in the cockpit close to the pilot, and resulted in difficulty meeting US ground-based *Combat Proof* radar bombing communications and control requirements, and (b) was in the process of acquiring temporary wing-tip bomb hoists, which they obviously didn't have when they first arrived. *No 2 Squadron Commanding Officer's Report*, August 1967, paragraph 4c further reported that the transponders had been repositioned in the tail in the unused 'Orange Putter' bay (*No 2 Squadron UHS*, 19 June 1967), and in his next monthly report, Wing Commander Aronsen noted in paragraph 10, that they 'were now functioning satisfactorily'. *Orange Putter* was a World War II tail warning radar, fitted to Mosquito bombers, but not to RAAF Canberras, although the compartment was installed. It had taken over four months to shake down the positioning of this piece of aircraft equipment that was vital to ensuring effective *Combat Proof/Combat Skyspot* radar-directed bomb drops, the predominant role for No 2 Squadron from the outset.

Dreadful Lady over the Mekong Delta

- 215 *No 2 Squadron UHS*, 26 June 1967, sheet 24 recorded that a bomb tail fell off in the bomb bay, and *No 2 Squadron Commanding Officer's Report*, May 1967, paragraph 4 reported the corkscrewing 1000 lb bomb.
- 216 *No 2 Squadron UHS*, 19 July 1967, sheet 18 recorded that the bomb bay slipstream had dislodged an electrical plug from No 1 carrier, which meant that the 12/24-way panel controlling the bomb release mechanism didn't work, and five of the eight bombs remained in the bomb bay. On 19 August 1967, the *UHS* noted that one bomb in a stick of four had undershot the aim point by 300–400 metres. Two remedies were applied in an attempt to rectify the problem, namely, changing the minimum time interval between bombs from 0.12 to 0.18 seconds and adding stabilising fins to No 25 tails attached to the 500 lb bombs. However, over the next week, more unusual bomb behaviour occurred (see *No 2 Squadron Operational Diary* for 20, 21, 22, 24 and 26 August) when carrying bomb loads of either eight 500 lb bombs or six 1000 lb medium capacity Mk1 bombs. On 24 August 1967, the time interval between bombs was beefed up to 0.3 seconds from 0.18.
- 217 Having recorded the day before that bombs were dropped inside the bomb bay and one bomb fell a few seconds after the bomb bay was opened, without operator intervention, from the AVRO triple carrier, *No 2 Squadron UHS*, 19 June 1967, sheet 18, reported that the changeover to AVRO standard carriers on multi-adaptors in the Canberra bomb bay took place on that day.
- 218 *Commander RAAF Vietnam Report*, January 1968, paragraphs 2 a(ii) and 6. *No 2 Squadron UHS*, 19 August 1967, also mentioned problems with No 25 tails on 500 lb bombs, requiring stabilising fins to be fitted to them, after one bomb fell 300–400 metres short of the rest.
- 219 *No 2 Squadron Commanding Officer's Report*, 20 May 1967, reported 'The aircraft carried 6 x 500 lb Mk 4 bombs from the 23rd April to the 9th May, then 6 x 1000 lb Mk 1 bombs until 14th May, and now 8 x 500 lb Mk 4 internally and 2 x 500 lb Mk 13 bombs on wing tip carriers'.
- 220 *No 2 Squadron Commanding Officer's Report*, June 1967, paragraph 4b noted 'WingTip Carriers. Our A76 of 30th May requested that the wing tip carriers be cleared for loading with 1,000lb bombs to avoid eventual reduction to 4 x 1,000lb internally when the use of the long bomb tails becomes unavoidable. In the meantime the Squadron will use the 500lb bombs for as long as stocks permit, but is anxious to know whether or not the clearance for 1,000lb bombs on the wingtips is likely to be given.' Such clearance was never given, so No 1000 lb bombs were hung from the Canberra Mk 20 wingtips.
- 221 Incoming No. 2 Squadron Commanding Officer, Wing Commander David Evans, took to Phan Rang with him a copy of the financial agreement between the RAAF and USAF, detailing how the Australian Government was 'paying for everything; our rations, our fuel, and bombs that we needed to acquire from the USAF'. Evans, *Down to Earth*, p. 147
- 222 Wilson, *Lincoln, Canberra & F-111*, pp. 112 (photos) and 116 (script). Also Dr Chris Coulthard-Clark, *The RAAF in Vietnam: Australian Air Involvement in the Vietnam War 1962-1975*, Allen & Unwin, St. Leonards, NSW, 1995, p 197. According to *Wikipedia* (viewed 1 July 2014) the M.117 bomb length was between 2.06 and 2.16 m (81–85 inches) long, with a 408 mm (16 inch) diameter. With its Mk 13 extended tail, the British 1000 lb general purpose Mk I bomb at 2.23 m (88 inches) long was the longest. Former No 2 Squadron armourer, Evan 'Grassy' Hopper, in his email to the author of 30 December 2013, recalled that when the old triple carrier bomb racks were disposed of, multiple adapters were made and two were attached to each bomb beam by the existing bomb unit within the beam. Then two MA-4A bomb carriers (incorporating fuzing solenoids) were installed in the adapters to carry the bombs. The M.117 bombs were loaded by hydraulic jack, pushed under the left rear of the bomb bay, with the bomb sitting on a set of rollers. The front right bomb was loaded first, then the front left, rear right and left rear. This was because the inspection window, used to check positive locking in the MA-4A rack, was on the left side, facing forward. He concluded that there was not much room left when all four were loaded.

Notes

- 223 *No 2 Squadron UHS*, 31 March 1968, recorded that six out of the seven missions conducted that day were *Combat Skyspots*, including one previously fraggged as a visual day bombing. The seventh aircraft, A84-238, was flown by Wing Commander David Evans and Squadron Leader Mark Robin on their 2 hour 30 minutes visual bombing mission, departing Phan Rang at 1000, returning at 1230. Six M.117 750 lb bombs were dropped.
- 224 *No 2 Squadron UHS*, 1, 2 and 3 April 1968, recorded that 18 x 750 lb bombs were expended in an initial trial, with a set of six then being dropped on each of these three days.
- 225 *No 2 Squadron Commanding Officer's Report*, May 1968, paragraph 7.
- 226 Daily *No 2 Squadron UHSs* reported a second trial, with a larger number (258) dropped in June 1968 (eight sorties on 13 June, seven sorties each on 14 and 15 June, five sorties on 16 June, eight sorties on 18 June, seven sorties on 19 June and finally one sortie 20 June, each sortie dropping six bombs). For this duration, No 2 Squadron Canberra crews generally flew four night *Combat Skyspot* and three day visual missions, using six M.117 750 lb bombs, with four in the bomb bay and one on each wing-tip. Probably, maybe one, or more, day bombing missions were armed with four 1000 lb bombs in the bomb bay and two 500 lb bombs on the wing-tips.
- 227 No 2 Squadron UHSs, from 21 June 1968 to 10 August 1968 inclusive
- 228 Recorded in *No 2 Squadron UHS*, 11 August 1968 as: 'Today saw the changeover to 750 lb M117 bombs'. The squadron began with three sorties, followed on 12 August with all eight sorties dropping them. From then on, until the final bombing day on 31 May 1971, with two notable exceptions, namely the use of 1000 lb bombs on two different periods in 1969 and 1970, the *Magpies* generally dropped 48 M.117 bombs per day, flying one or two night *Combat Skyspot* sorties daily and six or seven day visual bombing sorties.
- 229 *Commander RAAF Vietnam Report*, August 1968, sub-sub-paragraph 1a(3).
- 230 The author recalled that No 2 Squadron armourers were concerned about the weight and balance of some batches of M.117 bombs delivered to Phan Rang. On a bombing mission with Pilot Officer Barry Carpenter (A84-235, 1 May 1970), striking a IV Corps VC base area under the direction of VNAF FAC *Ohio* flying an O-1 Bird Dog, one M.117 bomb, out of a single stick of six dropped, fell 300 metres short of the remaining five. It was believed to be of suspect weight.
- 231 *No 2 Squadron Commanding Officer's Report*, December 1968, paragraph 2 (Annex G to Commander RAAFV Report, dated 10 January 1969). Moving to the single-fuzing option was seen to facilitate Canberra aircrews and the FACs choosing bomb fuzing appropriate to the target being struck.
- 232 *No 2 Squadron Commanding Officer's Report*, December 1968, paragraph 2.
- 233 *No 2 Squadron UHSs*, 19 November 1969 to 7 January 1970, and 1 April 1970 to 13 May 1970.
- 234 *Wikipedia* contained a number of historical notes on relevant British/RAF bombing systems. For example, an article on the Stabilized Automatic Bomb Sight, or SABS, included reference to the 1939 origins of the Mk XIV bombsight used in World War II bombers from 1942 and post-war in RAF Canberras, as well as some discussion as to the merits of either system. Viewed 1 July 2014 at < https://en.wikipedia.org/wiki/Stabilized_Automatic_Bomb_Sight>
- 235 *No 2 Squadron UHS*, February 1967, A.50 sheet 127, sub-paragraph j(ii) requested Department of Air's concurrence with discontinuing the peacetime system in favour of a wartime one. Permission to change over was presumably given, as it was not in operation when the author was serving with No 2 Squadron, from May 1969 to May 1970.
- 236 Of course, this was nowhere near the critical situation experienced by navigator/bomb-aimer, Yossarian, in Joseph Heller's novel *Catch 22*, when he took his bombing formation around again to re-attack the target, leading his colleagues through heavy flak from anti-aircraft guns.
- 237 Ken Marks, *Remembrances: 2 Squadron RAAF Vietnam 1967-1971*, Westrae Cottage Publishing, Katoomba NSW, 2010, p. 334

Dreadful Lady over the Mekong Delta

238 *No 2 Squadron Bombaimers Guide*, October 1969, p. 9

239 Conventional FAC wisdom (as indicated by 504 Tactical Air Support Group Manual 55-2, 5-10, and *Cleared Hot*, Book 2, p. 151) was that 1500 ft above ground level was a relatively safe altitude for protection against small arms ground fire, and FACs firing smoke rockets were recommended to pull out from their dive by that altitude. The highest known altitude at which a No 2 Squadron Canberra was reported to have received a hit from small arms fire was at 5000 ft, when, on 12 March 1969, A84-228, flown by Pilot Officer Al Blyth, with navigator/bomb-aimer Pilot Officer John Wilkinson, was struck. *No 2 Squadron UHS* recorded that while attacking a target in IV Corps, the aircraft 'sustained battle damage ... [consisting] ... of ... two rounds inboard and outboard of the engine on the port wing'. Compiled from the author's records and *No 2 Squadron UHS*, other bullet hits on Canberras included:

- A84-228, 12 June 1968, pilot Squadron Leader Ron Crump, navigator/bomb-aimer Flight Lieutenant Geoff Cramer, 0.30-cal bullet, Category 1 damage to left aileron, hit at 1800 ft while pulling up after low level bomb release;
- A84-232, 25 November 1968, pilot Pilot Officer John Ross, 7.62-mm bullet, which shattered the Canberra's plexi-glass nose cone and wounded bomb-aimer Pilot Officer John Reis, hit at 1500 ft pulling up;
- A84-233, 11 December 1968, pilot Wing Commander John Whitehead, navigator/bomb-aimer Squadron Leader Bruce Hunt, 0.30-cal bullet, Category 1 hole in left wing, hit at 3000 ft;
- A84-231, 31 July 1969, pilot Pilot Officer Shane Welch, navigator/bomb-aimer Flight Lieutenant Alan Pearson, 7.62-mm bullet, Category 1 damage to port engine, hit at 3000 ;
- A84-247, 26 August 1969, pilot Flight Lieutenant Merv Lewis, navigator/bomb-aimer Flying Officer Bob Molony, small arms fire, damage to battery hatch, hit at 1000 ft pulling up;
- A84-234, 13 December 1969, pilot Flying Officer Rick O'Ferrall, navigator/bomb-aimer Flying Officer Bob Molony, unknown weapon/height, Category 1 damage under nose;
- A84-244, 4 January 1970, pilot Squadron Leader Brian Sweeney, navigator/bomb-aimer Squadron Leader Frank Lonie, 7.62-mm bullet, damaged tailplane, hit at 1200 ft pulling up;
- A84-240, 19 February 1970, pilot Pilot Officer Rick O'Ferrall, navigator/bomb-aimer Flying Officer Bob Molony, small arms fire, Category 1 damage to battery compartment, unknown weapon/height;
- A84-240, 9 May 1970, pilot Pilot Officer Mick Birks, navigator/bomb-aimer Pilot Officer Al Cur, possible 7.62-mm bullet, damaged right aileron, unknown height/time.

240 The author, as No 2 Squadron Bombing Leader in 1969-70, produced *No 2 Squadron RAAF Bombaimer's Guide* in October 1969, which stated in paragraph 6, the squadron's bomb release policy at the time, namely: 'Minimum height above ground for bomb release is 1,200', with a mandatory pull-up to 2,000'. These limits were understood to have been derived from trials of the M.117 750 lb bomb carried out at the Woomera test range in South Australia by ARDU. The source document was possibly that mentioned in Wing Commander Jack Boast's *No 2 Squadron Commanding Officers Report*, March 1970, which referred to a Department of Supply Weapons Research Establishment Technical Note SAD 215 entitled *Self-Damage Probabilities for a Canberra aircraft dropping sticks of M-117 750lb bombs*. In paragraph 3 of this monthly report, Wing Commander Boast questioned the document's validity, as the squadron had just raised to 2400 ft the minimum height above target without a pull-up escape manoeuvre, as a result of two incidents, in the one week, when Canberra aircraft received shrapnel hits from exploding M.117 750 lb bombs. The first was on 11 March 1970 (flown by Pilot Officer Barry Carpenter, with the author as bomb-aimer), and the second occurred on 16 March 1970, when A84-240, piloted by Squadron Leader Ivan Grove, with bomb-aimer Pilot Officer Ross Hardcastle, was

Notes

- hit in the wheel well, while level-bombing at 2000 ft above the target. In CHECO Report *RAAF in SEA*, p. 26, James T. Bear quoted from a '1970 Monthly Historical Report by Headquarters RAAF Vietnam', stating that the M.117 750 lb bomb was 'much more streamlined than Australian 500-pounders, reached the ground sooner, where it exploded both closer to the escaping aircraft and with greater velocity'.
- 241 A year before, when No 2 Squadron was still using left-over World War II bombs, Commanding Officer, Wing Commander Evans, had stressed that 'For certain targets, troops in combat and enemy installations, often along the banks of a river, it was essential to minimise errors. In these cases crews should bomb from 1000 feet' (Evans, *Down to Earth*, p. 149).
- 242 In *Highest Traditions* p. 319, Wing Commander John Bennett, also a former No 2 Squadron navigator/bomb-aimer, noted 'The fragment punctured the port integral tank, and lodged in the upper skin of the mainplane. The nitrogen purging system prevented what may have been a devastating fire'. Some aircrew even dared to fly below 1000 ft to bomb, with the inevitable result. Canberra A84-236 on 10 August 1969, with pilot Pilot Officer John Kennedy, navigator/bomb-aimer Flight Lieutenant Nev Duus, was hit, with the latter quoted (slightly differently in both *Highest Traditions*, pp 313-4 and *Magpie Strike*, p 27) as saying that on reaching the target area, a bunker system in IV Corps, the cloud base was found to be down to 1000 feet above ground level. 'We were forbidden to bomb below 1,000 ft above ground level, but 2 Squadron had a reputation for not bringing any bombs home. As a result we decided to bomb from 800 ft AGL. We dropped the bomb and through the perspex window I watched it fall. I saw it explode, then almost immediately the window disintegrated. We thought we'd been hit by ground fire'.
- 243 Because the USAF used JP-4 (AVTUR) fuel as its primary jet fuel from 1951 to 1995, RAAF Canberras, which had previously used lower flammability AV2 kerosene, were modified to take into account the more volatile and highly flammable fuel. Fumes could be ignited by an electrical spark even though the JP-4 fuel, a blend of 50 per cent kerosene and 50 per cent gasoline, would not ignite if a burning match was dropped into it. It had a lower flash point than kerosene and evaporated easily. The Canberra Mk 20 was originally fitted with nitrogen-purging systems in its fuselage tanks, but they were inactive in peacetime, and when No 2 Squadron was alerted for war service in South Vietnam, valves were replaced and nitrogen bottles were fitted, and carried, in both fuselage and integral wing tanks (Coulthard-Clark, *The RAAF in Vietnam*, p 186). Integral fuel tanks were compartments formed by the airframe structure itself, with the ribs acting as baffles to reduce fuel surge.
- 244 A photo contained in the 1969 Year Book (*2 Squadron Vietnam*, p 17), produced by the author while serving at Phan Rang, showed the bomb fragment measuring 3 inches by 2.5 inches, which shattered Canberra A84-236's perspex nose, fortunately missing bomb-aimer Flight Lieutenant Nev Duus. Two years later, *No 2 Sqn Commanding Officer's Report*, February 1971, paragraph 8 recorded that: 'One Squadron aircraft received Cat 2 damage when a rear suspension lug of a Mk 117 bomb penetrated the cockpit of the aircraft immediately after bomb impact. The aircraft was flying straight and level, 270 KIAS, 2,000 feet AGL at the time of the strike'. Air Commodore Graham Dyke (Retd), former Executive Officer of No 2 Squadron 1968-9, advised that he recalled being informed that some of the exploding parts impacting aircraft were considered by Armament Section to have originated from the detonating nose fuze of the M.117 bomb. (Advised at the author's presentation to the Australian Aviation Club on 'No 2 Squadron and Riverine Operations', given at the National Press Club, Canberra, on 27 September 2012.)
- 245 Evans, *Down to Earth*, p 149
- 246 Former Canberra navigator/bomb-aimer Bob Bruce, email correspondence with author, 2 April 2013.

Dreadful Lady over the Mekong Delta

- 247 An example of anecdotal evidence was contained in an article by Flight Lieutenant Dave Robson RAAF, who served as FAC *Jade 07* in 1969-70. In *Cleared Hot*, Book 1, pp 163-4, he reported on a RAAF Canberra strike on the Long Hai Mountains, where the crew 'dropped the full load through a break in the clouds, and the six bombs straddled the target perfectly.' In such weather conditions, where already the Canberra had been diverted from its pre-planned target, due to a low cloud base, which, in Robson's opinion: 'prevented a safe level pass as the bomber would have picked up fragmentation from its own bombs', it would have been most unlikely that the bombing crew would have been able to return home with photographic evidence to confirm the FAC's accuracy observations. In *Mission Vietnam*, p 54, Odgers reported that Lieutenant Colonel J. Madden, USAF, when interviewed, told him that: '... they are as accurate as hell'. Coulthard-Clark, RAAF in *Vietnam*, p 215, suggested that: 'Despite its doubters at the time the unit was sent to Vietnam, the Canberra had proved itself to be one of the most accurate bombing aircraft available in that theatre.' A more sanguine observation was made by Sergeant Matthew Butler, Chief of Air Force Fellow 2006, who stated in *Effects-Based Targeting: The Future of Targeting for the Royal Australian Air Force*, (Air Power Studies Centre, Canberra 2008, pp 123-4), that: 'Although the bombing invariably had an effect, such accuracy was not good enough to cause sufficient damage to typical targets such as supply dumps, base camps, bunker complexes, fortifications and assembly areas. USAF fighter-bombers employing dive techniques during daylight were achieving considerable greater accuracy.'
- 248 Unknowingly repeating a technical inaccuracy contained in Bear's CHECO Report *The RAAF in SEA*, p 22, George Odgers, *Mission Vietnam*, p 76, reported that: 'The Canberra gave the best results in the delta because of the region's flatness and the fact that the altitude of the target, which was always just a few feet above sea level, could be fed in to the bombsight with precision'. In fact, the target height correction was actually applied by the pilot to his altimeter, and double checked for accuracy with the navigator/bomb-aimer, so that the Canberra bomber could be flown at the precise, pre-calculated, altitude above target.
- 249 Leading Aircraftman Steve Eather, RAAF, *Magpie Strike: 2 Squadron in the Republic of Vietnam, 1967-1971*, Australian Government Publishing Service, Brunswick Victoria, 1979 p. 11
- 250 Determined by the author from (a) data collected as Bombing Leader until leaving Vietnam in May 1970, and (b) from respective *No 2 Sqn Commanding Officers' Reports*, May 1970 to May 1971.
- 251 The F-24 camera was the standard camera used by No 2 Squadron to record its bombing results until the F-52 was fitted in December 1968; thereafter they shared the burden. *No 2 Sqn Commanding Officer's Report*, December 1968, paragraph 8, noted: 'Early this month F-52 cameras with 10 inch lens were fitted to the aircraft in order to provide improved bomb strike photos for accuracy assessment, and also to use the better quality photographs for BDA. Tilted back 9°, mounted 90° to the normal position so that the major axis of the camera film is aligned along the longitudinal axis of the aircraft. It is limited, can't be used for early morning sorties because of loss of light through the filter register glass. In this respect the F-24 is superior. There has been difficulty with [F-52] cameras in determining BDA despite their superior quality'. Both camera types were of World War II-vintage, used by RAF photo-reconnaissance Mosquitoes and others. Both had roller-blind, focal-plane shutter mechanisms, with rolls of film controlled by a gearbox. The F-24, with its 5-inch lens, produced a 5 in by 5 in print from a 250-exposure capacity, 5 in-wide film roll contained in the film magazine. The F-52, with its 10 in lens, produced an 8.5 in by 7 in print from a 500-exposure film roll. Neither camera was used for BDA assessment by No 2 Squadron, as it was virtually impossible to interpret any significant target damage details from the printed photos.
- 252 *No 2 Squadron RAAF Bombaimer's Guide*, October 1969, p. 10

Notes

- 253 These were typically large, bound, foolscap-size, lined-paged books, in common use with the RAAF at the time, and were of important historical relevance in view of their detail and their single source nature.
- 254 The author, as Bombing Leader, welcomed challenges to his determinations, as this made it fair to all competing crews keen to be seen as the best.
- 255 Evans, *Down to Earth*, p. 149
- 256 Respective *No 2 Sqn Commanding Officers' Reports*, covering No 2 Squadron's tour of duty in South Vietnam, showed serviceability rates mostly ranging between 97 per cent and 99 per cent. For one brief period, the level sank down to 74.3 per cent, due to the need to replace cracked tailplanes in 1969 under Canberra STI 322, when six of the eight aircraft became unserviceable. Using a special jig made locally, No 2 Squadron ground crews performed brilliantly in replacing the new tails at the rate of one per 12 working hours (*No 2 Sqn Commanding Officer's Report*, September 1969, Technical Matters, paragraph 27).
- 257 No 1 (Bomber) Operational Conversion Unit [1(B)OCU] at RAAF Base Amberley, Queensland, prepared newcomers and refreshed previous Canberra pilots and navigator/bomb-aimers for operational service in South East Asia. Because many of the early Vietnam-based pioneers were posted from No 2 Squadron, Phan Rang, to be ready for planned F-111C project work and training, OCU staff relied on informal feedback from the field, in lieu of having experienced wartime crews to train up the new recruits, at least until 1969-1970. Upon returning to Australia after his FAC tour in Vietnam, Wing Commander Tony Powell lectured OCU staff and students on his experiences on 1 April 1968, however, as in most pre-war situations, it was difficult to replicate the South Vietnam scenario back in Australia at the time. The best that could be hoped for was that the new crews were as familiar with the Canberra jet bomber as they could be, given a three-month conversion training program. Operational Mk 20 Canberras returned regularly for major overhauls to No 3 Aircraft Depot, also located at RAAF Base Amberley, where, after depot level maintenance was carried out, they would be flight checked by OCU aircrew, or a lucky *Magpie* ferry crew, who were able to spend a few days at home with their family, before they headed back to Phan Rang. Flight trials, following operational modifications undertaken in Australia on the Mk 20 Canberras, e.g. to the Mk XIV bombsight, would also be undertaken by staff aircrew of 1(B)OCU.
- 258 Evans, *Down to Earth*, p. 148
- 259 Bear, RAAF in SEA, p. 18, in an interview with Colonel Galligan, USAF, former Commander 35th TFW at Phan Rang, and then Deputy Commander Seventh USAF TACC, who stated: 'I can't speak highly enough of their outstanding professionalism, across the board. I only wish that all USAF units could do as well' (p 17). The following table, showed general guidance for ground commanders on commonly accepted estimates of combat delivery accuracies for low drag bombs. Range Error Probable (REP) was defined as half the range distance between two points, equidistant from the target, that contained 50 per cent of the impact points. Deflection Error Probable (DEP) was half the lateral distance between two points, equidistant from the target, that contained 50 per cent of the impact points. Circular Error Probable (CEP) was equal to the radius of a circle around the target which contained half the impact points. Metric distances have been inserted by the author.

Dreadful Lady over the Mekong Delta

BOMB TYPE	Aircraft	Dive Angle	AGL-Feet	Knots True Airspeed	REP Feet/ Metres	DEP Feet/ Metres	CEP Feet/ Metres
MK82, M.117	All Jet	45°	4500	500	200/61	140/42.7	300/91.4
MK82, M.117	A-1	30°	2500	450	160/48.8	90/27.4	220/67
MK82, M.117	A-1	30°	2000	325	110/33.5	70/21.3	160/48.8

From the same source, low drag bombs were generally assumed to be delivered from a 20°– 60° dive angle, although the US reference noted that level deliveries between 500 ft and 2000 ft above ground level were possible for 750 lb and smaller bombs, but optical sighting system limitations degraded the accuracy of such deliveries. Twenty degree dive deliveries were cited to require a ceiling of about 4000 ft and a visibility of about three miles, however, deliveries could be made with a ceiling of 2000 ft. (United States Military Assistance Command Vietnam, *Vietnam Lessons Learned No 77: Fire Support Coordination in the Republic of Vietnam*, 20 May 1970, Appendix 2 'Fire Support Coordination, General Air Munitions Delivery', viewed 1 July 2014 at <<http://cgsc.contentdm.oclc.org/cdm/singleitem/collection/p4013coll11/id/1690/rec/1>> .

- 260 Garry Cooper & Robert Hillier, *Sock it to 'em Baby: Forward Air Controller in Vietnam*, Allen & Unwin, Crows Nest NSW, 2006, p. 69. Flight Lieutenant Cooper's observations might have helped dispel any suggestion that No 2 Squadron could claim an average bombing CEP of 20 metres.
- 261 *ibid*, pp. 69 and 91
- 262 Official RAAF Vietnam and No 2 Squadron Reports cited numerous instances of adverse monsoonal weather effects. For example, Wing Commander Evans, in his *No 2 Squadron Commanding Officer's Report*, March 1968, paragraph 10 noted that: 'Weather conditions throughout South Vietnam have been extremely poor during the month. Generally daylight visibility has rarely exceeded 3 miles in thick haze which has made visual bombing difficult ...'. And this was in the dry season. In September 1968, he reported that the transition between monsoons resulted in an increase in bombing runs made from 1000 ft due to adverse cloud conditions. By October 1968, TACC had cancelled a number of missions due to bad weather in the wet season (*No 2 Squadron Commanding Officer's Report*, dated 14 November 1968).
- 263 While serving at Phan Rang, the author obtained a sample of USAF F-4 bombing accuracy data for missions conducted in South Vietnam. In February 1970, accuracies for Cam Ranh Bay-based F-4Cs were:
- 557th Tactical Fighter Squadron—69.78m CEP from 114 missions,
 - 558 TFS—65.32m CEP from 109 missions and
 - 559 TFS—69.29m CEP with 114 missions.

In addition, the author (in A84-241, *Magpie 71*, pilot Squadron Leader Ivan Grove), on 9 July 1969, conducted a mission near Tay Ninh in III Corps, attacking a VC base camp on the side of a mountain, dropping all six M.117 750 lb bombs in a salvo from 3000 ft, hoping that the target altitude was correct, which it was. BDA was six bunkers destroyed and two cave/tunnel entrances uncovered, better than the BDA given collectively to two USAF F-4C Phantoms that had bombed the same target minutes before, dropping ten M.117s between them. Flying Officer Gary ('Huck') Ennis, RAAF FAC in 1969, observed in *Cleared Hot*, Book 1, p. 174, that although it was the latest in technology, compared with the F-100, A-1, A-37 and F-5, the F-4 Phantom to be 'the most inaccurate of all'.

Notes

- 264 A change from the usual routine occurred with a pair of Canberras tasked to support a Swift Boat operation in IV Corps on 19 September 1969, involved the author in A84-241 with pilot Squadron Leader Ivan Grove, as *Magpie 11*, and 'holding hands' with *Magpie 21*, A84-235, pilot Pilot Officer John Kennedy, and navigator/bomb-aimer Flying Officer Dave Palmer. Both aircraft were directed by the USAF's 22nd TASS FAC (*David 75*), to each drop a stick of six M.117 750 lb bombs along the canal target. The difference this time was that, instead of attacking the target in line astern, one behind the other, as was normal practice, the two Mk 20 Canberras were directed to fly on reciprocal headings along the same canal, aiming at the same target, fortunately not at the same time and height of course. *Magpie 11*'s BDA was two estimated enemy 'killed by air', four structures destroyed, four structures damaged, four bunkers destroyed, one sampan destroyed and one sampan damaged, while *Magpie 21* achieved a similar result.
- 265 USAF Strategic Air Command B-52 'kill boxes' were 1 km by 3 km (Robert O Harder, *Flying From The Black Hole: The B-52 Navigator-Bombardiers of Vietnam*, United States Naval Institute, Naval Institute Press, Annapolis, Ma, 2009, p. 110). B-52 *Arc Light* strikes in South Vietnam normally required a 10 km by 10 km clearance around them.
- 266 An ex-1st Cavalry TACP operator, Radio Operator Maintainer and Driver (ROMAD), has stated that: 'US sky-spot missions were notorious for target misses (hundreds of metres). The Australian Canberra's were the best'. Refer to Bobby W. Mack, Master Sergeant USAF (Retd), 'Some Personal ROMAD Recollections' by), viewed 1 July 2014 at <www.romad.com/romad.com/history/bmack.htm>. USAF *Tactical Fighter Weapons Center Bulletin*, No 8, 28 October 1966, noted that MSQ-77 accuracy was a CEP of 300 to 400 feet in South Vietnam for ranges up to 50–60 nm. (Also in *Installation of MSQ-77 in Northern Laos*, Memorandum for Secretary of Defense, Earle C. Wheeler, Chairman, Joint Chiefs of Staff, Washington, DC, 25 April 1967, viewed 1 July 2014 at <www.dod.mil/pubs/foi/International_security_affairs/vietnam_and_southeast_asiaDocuments/668.pdf>
- 267 When No 2 Squadron was having problems in 1967 with unusually behaving 500 lb and 1000 lb bombs, the minimum time between them was set back, on the 12/24-way control system, to 0.3 seconds. By 1969, assured by the reliability of the US M.117 750 lb bombs and carriers, the squadron brought forward the shortest allowable time between bombs to 0.18 seconds for normal operation (*No 2 Squadron Bombaimer's Guide*, October 1969, paragraph 6).
- 268 Commander Task Group 117.2, *CTG117.2 Combat After Action Report 15-16 September 1967*, 22 September 1967, viewed 1 July 2014 at <www.mrfa.org/ctg117.htm>. Fulton provided a first-hand account of this battle in Major General William B Fulton, *Vietnam Studies, Riverine Operations 1966-1969*, Department of the Army, Washington DC, 1973, pp. 128-134. *Mobile Riverine Force (MRF) Summary Report*, September 1967 (viewed 1 July 2014 at <www.rivervet.com/summ0967.htm>) also covered the battle and referred to Task Group 117.2 which 'was ambushed along a two and one-half kilometre stretch of the Rach Ba Rai.' Three US Navy personnel were killed in action and 72 were wounded
- 269 *No 2 Squadron UHS*, 13 June 1967, sheet 13, with late BDA information obtained from DASC Intelligence Summaries, referred to Flying Officers Wally Walters (pilot) and Lance Halvorson's (navigator/bomb-aimer) coverage, but no date or mission details were given. *No 2 Squadron UHS*, 15 July 1967, recorded two missions flown on 5 July 1967, with 50/50 coverage achieved by Flying Officers Ron Biddell (pilot) and Bob Waring (navigator/bomb-aimer) in A84-230, departed Phan Rang 0025 hours 6 July, landed 0145, after a night *Combat Proof* mission (*No 2 Squadron UHS*, 5 July 1967). The 100/100 mission flown by Flying Officers Wally Walters and Lance Halvorson was in Canberra A84-246, also a night *Combat Proof* sortie, take off 2020, landed 2155.

Dreadful Lady over the Mekong Delta

- 270 *No 2 Squadron UHS*, 7 October 1967, reported A84-240, pilot Flight Lieutenant Brian Frost, with navigator/bomb-aimer Squadron Leader Tom Wright, and A84-228, piloted by Pilot Officer Trevor Noblet, with navigator/bomb-aimer Flight Lieutenant Jim Hanigan, departing at 0640, bombing individually on the same target, returning at 0815, with 75% of bombs on target, 30% of target area covered. *No 2 Squadron UHS*, 25 October 1967, had Wing Commander Vin Hill (pilot) and Squadron Leader Tom Wright (navigator/bomb-aimer) in A84-240, paired with Wing Commander Bill Hughes (pilot) and Flight Lieutenant Ash Clarke (navigator/bomb-aimer) in A84-237, on their shared CAS mission, each dropping six x 1000 pounders with a collective BDA of 60% on target, 30% covered and two bunkers destroyed, six damaged and 50m of trench destroyed. *No 2 Squadron UHS*, 30 October 1967, recorded Wing Commander Rolf Aronsen (pilot) and Flight Lieutenant Peter Grindon-Ekins (navigator/bomb-aimer) in A84-235, paired with Flying Officer Al Page (pilot) and Flying Officer Alan Lockett (navigator/bomb-aimer) in A84-242, conducting a shared FAC-controlled day visual bombing mission with the 1st ATF, both dropping 6 x 1000lbbers. Reported BDA was 100% of bombs on target, 25% of the target area covered, with five bunkers destroyed, five damaged and ten uncovered.
- 271 *No 2 Squadron UHS*, 16 May 1970. Canberra A84-231 was later lost on 3 November 1970 when Pilot Officer Mike Herbert (pilot) and Flying Officer Bob Carver (navigator/bomb-aimer) failed to return from their night *Combat Skyspot* mission in II Corps.
- 272 *No 2 Squadron UHS*, 15 February 1970. In terms of further exemplifying widespread target complexes, the best three BDAs that the author achieved in this context as bomb-aimer were as follows.
- On 15 June 1969, *Magpie 61*, A84-233, pilot Squadron Leader Ivan Grove attacked a 35-bunker complex in III Corps with one 30 ft by 3 ft bamboo bridge. Flying three passes with two M.117 750 lb bombs each, we achieved two direct hits. BDA provided to FAC *Rash 27*, by two low flying helicopters, was 24 bunkers destroyed, four damaged and one bridge destroyed.
 - On 4 October 1969, *Magpie 51*, A84-228, again with Squadron Leader Ivan Grove, on a divert from an originally fragged mission, attacked a IV Corps active VC base camp, a known 0.30-cal site, dropping two sticks of three M.117s each. BDA was ten structures destroyed, seven structures damaged, two bunkers destroyed, two bunkers damaged, four sampans destroyed and two sampans damaged.
 - On 23 May 1969, *Magpie 81*, A84-236, pilot Squadron Leader Ivan Grove, passenger Wing Commander Jack Boast, night *Combat Skyspot* mission against a IV Corps VC machine shop, VC company and bunkers, dropped a single stick of six M.117 750 lb bombs from 15 000 ft altitude. BDA was eight structures destroyed, seven structures damaged and six bunkers destroyed.
- 273 Details of some No 2 Squadron bombing missions were contained in US National Archives and Records Administration electronic data records, namely *Combat Air Activity (CACTA)* and *South-East Asia Database (SEADAB)* reports, viewed 1 July 2014 at <www.aad.archives.gov/aad/series-list.jsp?cat=WR28> . The former covered the timeframe from 1965 to 1970 and the latter, from 1970 to 1975. They were drawn from US post-mission intelligence report forms filled out by bomber crews immediately upon returning to base, and which were on-forwarded to Headquarters Seventh Air Force. National Archives noted that they 'reflect the prolific use of computers by the military establishment in carrying out operations during the Vietnam War. Under the auspices of Secretary of Defense Robert McNamara, the military implemented an extensive data collection effort intended to improve the conduct of the conflict. The raw data documented details of casualties, military operations, military logistics, pacification programs, and other aspects of the war. With the data in electronic form, analysts performed statistical

- and quantitative analysis to assess and influence the direction of the conflict. After the conflict ended in the 1970's, various Department of Defense organizations, including the Office of the Secretary of Defense, the Joint Chiefs of Staff, and the Joint Commands, transferred the raw data files to the National Archives'. Data specific to South Vietnam Air Military Operations and Activities was found in *Record Group 218: Records of the US Joint Chiefs of Staff and CACTA files (10/1965 - 12/1970: Description Identifier: 634496)*, which contained 32 data files in ASCII Translated, with NIPS version available. Technical documentation covered 160 pages and this series contained data on air combat missions flown in South East Asia by US and allied forces during the first part of the Vietnam War. Unfortunately (as at 1 July 2014) these CACTA files included only two months of data (January and February 1970), so only a very small snapshot (2 out of 45 months of Canberra operations from April 1967 to December 1970 or 4.4 per cent) of No 2 Squadron's tactical bombing campaign in South Vietnam could be identified quantitatively. Even then, there were gaps and duplication, which made proper interpretation very challenging, requiring careful and knowledgeable extrapolation to obtain quality information. The SEADAB files contained records about air sorties flown in South East Asia, 1/1970 - 6/1975 (Description Identifier: 602566) and included 23 ASCII Translated data files (NIPS version also available), of 118 technical documentation pages of files with records on air combat missions flown in South East Asia by US and allied forces during the last part of the Vietnam War. There was no sign of any No 2 Squadron air strikes in this set of documents. Having perused these sources in detail, this author concluded that it would be extremely difficult to extract meaningful data of any substance from these databases, which covered the full five year spectrum of bombing operations in South Vietnam undertaken by No 2 Squadron, RAAF.
- 274 At the time of writing, two researchers at the Australian Centre for the Study of Armed Conflict and Society, at the University of New South Wales/Australian Defence Force Academy, Canberra—Dr Bob Hall and Mr Derrill de Heer—were examining extensive data from the 1st Australian Task Force's days in Phuoc Tuy Province. They were attempting to analyse the relative effectiveness of weapons used in land operations in that region during the Vietnam War. Although an inherently complex task, it seemed to represent a possible vehicle for comparing airborne weapons effectiveness as well.
- 275 The command-and-control relationship between No 2 Squadron and the USAF's Seventh Air Force in South Vietnam has received scant attention from historians in the public domain. RAAF operational units have since served as integral components of USAF forces at war, and, presumably, appropriate lessons learnt were passed on internally. Certainly, any analysis of the problems confronting early RAAF Vietnam commanders, such as Air Commodores Dowling and Lush, would have made interesting reading, as would knowing about the experiences of a dedicated bomber pilot serving in that appointment—Air Commodore 'Spud' Spurgeon.
- 276 As Deputy Commander Australian Forces Vietnam, the RAAF incumbent could end up commanding the Australian Task Force in the event of the commander being unable to exercise his duties. This was anathema to the Australian Army, which strongly resisted suggestions that the COMAFV position be rotated, on the basis, according to some RAAF leaders, that the experience was so valuable for the training of senior officers. Air Commodore, later Air Chief Marshal, Sir Neville McNamara, couldn't see the logic of his RAAF superiors, as it seemed quite natural to him that the Army should remain holders of this appointment. With 8000 Army troops and less than 800 RAAF personnel in Vietnam, and only No 9 Squadron serving as direct part of the Australian national presence operating in support of the First Australian Task Force, it made little sense to have a RAAF officer as COMAFV. (Sir Neville McNamara, Air Chief Marshal, *The Quiet Man: The Autobiography of ACM Sir Neville McNamara*, Air Power Development Centre, Canberra, ACT, 2005, pp. 143-144).

Dreadful Lady over the Mekong Delta

- 277 The closest the RAAF got to this arrangement was the initial posting of the RAAF's first FAC, Wing Commander Vance Drummond, to TACG's Strike Operations Branch, which seemed like the appropriate place to post a Canberra-qualified person.
- 278 Coulthard-Clark, *The RAAF in Vietnam*, p. 26
- 279 In *Possums and Bird Dogs: Australian Army Aviation's 161 Reconnaissance Flight in South Vietnam*, by Peter Nolan (Allan & Unwin, Crows Nest, 2006), density altitude was considered important enough to get a specific indexed reference. On page 22, Nolan noted: "In high 'density altitude' conditions, the key performance factors of engine power, propeller or rotor thrust performance and lift generated are all adversely affected". He then cited several incidents of unwary Australian Army pilots suffering accidents as a result of under-estimating its impact. For example, a Cessna 180 crashed on take-off when overloaded (p. 140) and a Sioux helicopter narrowly missed hitting treetops (p. 151). He also praised the Pilatus Porter, noting: 'The Porter's payload under the density altitude conditions experienced in the hotter months in Vietnam ... was double that of the Cessna 180 and four times that of the Sioux.' (p. 155).
- 280 Robert Mason, author of *Chickenhawk*, (Corgi Books, London, UK, 1984) who flew US Army UH-1 Iroquois missions in South Vietnam, noted on page 110, that the Huey 'slick' normally carried eight fully equipped troopers but: 'How much the ship could carry depended on the density altitude, which varied with the temperature and humidity and altitude. The hotter or higher—and therefore thinner—the air was, the less we could carry. The limit was calculated daily.'
- 281 US aircraft were generally fitted with altimeters based on the imperial measurement system, where atmospheric pressure was measured in inches of mercury. However local Phan Rang control tower operators had been briefed that RAAF Canberras used the metric system, so upon taxiing out for operational missions, *Magpie* crews would be given the local pressure setting in both inches and millibars. Elsewhere in South Vietnam, Australian aircrew had to convert pressure readings given in inches. Setting altimeters precisely was very important. For example, in order to minimise the risk of potential mid-air collisions, it was aircrew practice globally, including over South Vietnam in wartime, for all aircraft flying above certain altitudes (usually 10 000 feet, at the same level when oxygen flows were checked) to set the standard barometric pressure of 29.92 inches of mercury, equivalent to 1013.2 millibars, on all aircraft altimeters. In RAAF Canberras, both pilot and navigator instrument panels had altimeters, and it was standard practice for the aircrew to crosscheck with each other, when changing from local base barometric pressure to the in-flight standard, and back again.
- 282 QNH was radio code for the measured barometric pressure at an airfield, a term left over from World War II which, in an era relying on Morse code communications, saw extensive use of the 'Q Code' to help reduce unwanted radio chatter. Only a few of the vast set of Q codes saw use in the Vietnam War, another being QSY, which meant changing radio frequency, e.g. 'QSY FAC' meant 'I'm changing over to the FAC's operating frequency'.
- 283 *No 2 Squadron Commanding Officer's Report*, December 1969, paragraph 2 (Operational Aspects, Bombing Accuracy).
- 284 *No 2 Squadron Commanding Officer's Report*, August 1969, paragraph 6
- 285 Bear's *The RAAF in SEA*, p. 19 commented on USAF B-57B and RAAF Mk 20 Canberras, noting that: 'Neither version was versatile enough to be used to any extent for the support of troops in contact, except when nothing else could be diverted to the troops' area', his source being Commander RAAF Vietnam Reports. RAAF FAC Garry Cooper agreed, stating: 'Due to their shortcomings in this type of conflict, I did not like using them in contacts close to friendly troops'. (Cooper, *Sock it to 'em Baby*, p. 69). Of his 260 operational missions, the author flew less than 10 per cent in close proximity to friendly troops, whereas Wing Commander Peter Larard (RAAF FAC in III Corps, 1968-9) reported that 25 per cent of his missions were 'troops in contact'. If

Notes

- both percentages were assumed roughly typical of the population, then No 2 Squadron's rate was below par. In his CHECO report on VNAF, Bear noted that the ARVN asked for TACAIR support, only when it had made contact with the enemy, not before (James T Bear, *VNAF Improvement and Modernization Program*, Directorate Tactical Evaluation, CHECO Division, Headquarters Pacific Air Force, Hickham Air Force Base, Hawaii, 1970). If so, most missions flown by No 2 Squadron in direct support of ARVN troops-in-contact would have been in-flight diversions from normally fraggged missions.
- 286 Colonel David Hackworth, US Army (Retd) stated: 'In the Delta the VC generally hid all day to avoid our air surveillance and ground operations.' (Colonel David H Hackworth, US Army (Retd) & Julie Sherman, *About Face: The Odyssey of an American Warrior*, MacMillan, The Griffin Press, Adelaide, SA, 1989) James Bear noted that 10 per cent of all USAF (TACAIR) sorties (in South Vietnam) had been at night, roughly similar to No 2 Squadron from 1969 onwards, flying one daily out eight or nine fraggged missions (Bear, *VNAF*, p. 47).
- 287 The author only flew on one *Night Owl* mission and 15 *Combat Skyspot* missions in a one-year tour of duty, with none of these known to be close to troops-in-contact. The *Night Owl* mission was against a VC base camp in III Corps with pilot Squadron Leader Ivan Grove flying A84-235 (callsign *Magpie 91*) on 2 September 1969. A recording of this mission can be heard at Australian War Memorial Audio Collection (item S00693), viewed 1 July 2014 at <www.awm.gov/collection/S00693> .
- 288 No 2 Squadron pilots, flying without the aid of an autopilot, at altitudes between 15 000 ft and 30 000 ft, often 50–100 km away from the ASRT site, were frequently directed (vocally) by USAF and USMC ground radar controllers, familiar with *Magpie* pilots' abilities, to 'alter heading by ½ a degree' on *Skyspot* bombing runs. Eather in *Magpie Strike*, p. 13 noted: 'After three months constant night bombing, in which the crews became extremely proficient at instrument flying ... Combat Skyspot corrections could be as little as 20 feet in altitude and ½ a degree in direction – a few crews even recorded ¼ degree corrections.'
- 289 Evans, *Down to Earth*, pp. 151–152.
- 290 Coulthard-Clark quoted Colonel WC Plott, USAF, Director of Training, PACAF, who stated: 'Despite similar external appearances, the aircraft flown by the two air forces were fundamentally different types with a wide variance in internal construction and performance... Essentially, the B-57 performs like a fighter-bomber in an air-to-ground role and is capable of delivering a wide variety of munitions utilizing the several fighter-bomber tactics. On the other hand, the Canberra carries considerably fewer types of munitions.' (Coulthard-Clark, *The RAAF in Vietnam*, p. 95)
- 291 Bennett, *Highest Traditions*, pp. 302-303
- 292 Bear, *RAAF in SEA*, p. 16.
- 293 Cooper, *Sock it to 'em Baby*, p. 69
- 294 *ibid*, p. 147
- 295 The US Navy acknowledged that TACAIR close air support helped its interdiction work, e.g. during *Operation Jackstay*: 'Close air support was especially helpful. Bombing and strafing either side of the river ... prevented the Viet Cong from bringing up heavy weapons or concentrating small arms fire' (Naval History Division, *Riverine Warfare*, p. 43).
- 296 Cooper, *Sock it to 'em Baby*, p. 69, noted: 'If there was any urgency to get bombs on target, we would always send the Canberra high to hold while we used up any dive-bombing fighters we had available.' Author's examples included
- allowing VNAF A-1 Skyraiders to bomb first on a known enemy location in IV Corps on 3 December 1969 (Pilot Officer Dick Allchin pilot, A84-235, *Magpie 21*);
 - waiting for USAF F-4 Phantom to bomb first on 6 December 1969 against an active base camp close to friendly troops in III Corps (Pilot Officer Dick Allchin pilot, A84-228, *Magpie 71*) and

Dreadful Lady over the Mekong Delta

- waiting for multiple VNAF A-37 strikes before attacking a VC base camp along a IV Corps canal on 21 January 1970 (Pilot Officer Barry Carpenter pilot, *Magpie* 11, A84-228).
- 297 *No 2 Squadron UHS*, 14 September 1968: 'One target in II Corps was attacked by a formation of three aircraft. The aircraft were forced to change from their normal straight and level attack method and dive bomb owing to heavy cloud build up in the area'. As early as February 1968, Wing Commander Evans, in his *No 2 Squadron Commanding Officer's Report* dated 8 March 1968, had even suggested that dive bombing training be given to Canberra crews undergoing conversion at 1(B)OCU, Amberley. The author, who underwent No 27 Canberra conversion course at that time, and then stayed on staff as an instructor, until posted to No 2 Squadron, Phan Rang, didn't recall any effort to include this suggestion as part of the training syllabus.
- 298 Alan Stephens noted: 'In Malaysia, where No 2 Squadron had been part of the Commonwealth Strategic Reserve, crews had specialised in low-level visual bombing, with navigators using the World War II-vintage T-4 bombsight in the Canberra's perspex nose. Despite the T-4's advanced years an excellent squadron average of fifty metres circular error probable (CEP) had been achieved'. (Alan Stephens, *The Australian Centenary History of Defence, Volume II, The Royal Australian Air Force*, Oxford University Press, South Melbourne, VIC 2001, p. 273) The bombsight was actually the Mk XIV, and the computer that provided inputs to it was the T-4. The low-level bombing training came in when simulating potential hostilities with Indonesia.
- 299 Marks, *Remembrances*, p. 35
- 300 John Bennett quoted this author as saying: 'The Canberra was an old bird, and I recall one example where makers of our doppler navigation radars were amazed at the serviceability that 2 Squadron was getting from this obsolete equipment.' (Bennett, *Highest Traditions*, p. 320)
- 301 Bob Bruce, email correspondence with author, 19 Mar 2013
- 302 *No 2 Squadron Commanding Officer's Report*, January 1970, *Air Aspects*, paragraph 3

CHAPTER 6 NOTES

- 303 USAF Strategic Air Command's AN/MSQ-77 and US Marine Corps' AN/TPQ-10 ground-based radar systems were basically bomb scoring devices in reverse, where the weapon release point was calculated for the appropriate type of ordnance, target height and location, aircraft height and speed. No 2 Squadron's first bombing missions in South Vietnam and IV Corps began on 23 April 1967. For the first four days, two daylight *Combat Proof* (later called *Combat Skyspot*) strikes were conducted daily in IV Corps. Thereafter, two late night sorties were flown each day over IV Corps, with some slight variation on the theme for a month (*No 2 Squadron Unit History Sheets*, 23 April 1967 to 26 May 1967). Although ground-based radar operators could detect returning echoes from aircraft (skin paints), results were inconsistent, so special (SST-181, X-band) transponders (code-named *Music Box*) had to be fitted to the Mk 20 Canberras to guarantee proper detection. In addition, on-board IFF (Identification Friend or Foe) systems were fitted to ensure that the ground-based radar was illuminating the correct bombing aircraft. According to several sources, the TPQ-10 was mainly used in the close air support role, with a circular error probable (CEP) of 50 metres, and the MSQ-77 was primarily used for harassment and interdiction, and only in emergencies for close air support, with a greater CEP. Seventy five per cent of B-52 *Arc Light* harassment and interdiction bombing missions were conducted as *Combat Skyspot* missions. The Strategic Air Command's Air Support Radar Team (ASRT) at Dong Ha, using the MSQ-77 (callsign *Milky*) directed the ill-fated *Combat Skyspot* mission of A84-231 (pilot Flying Officer Mike Herbert and navigator/bomb-aimer Pilot Officer Bob Carver) on the night of 3 November 1970. A *Combat Skyspot* mission similar to A84-231s, conducted with USMC Dong Ha ASRT, flown on 30 September 1969 in Canberra A84-232, was

Notes

- recorded by the author and can be heard at Australian War Memorial Audio Collection (item S00693), viewed 1 July 2014 at <www.awm.gov/collection/S00693>.
- 304 Collated from data contained in Ken Marks, *Remembrances: 2 Squadron RAAF Vietnam 1967-1971*, Bennetts Printing, Katoomba, 2010.
- 305 In this book, the terms 'mission' and 'sortie' are used inter-changeably, although there have been other interpretations. For instance, in analysing Vietnam bombing statistics from data contained in US archives, authors Matthew Adam Kocher, Thomas B. Pepinsky and Stathis N. Kalyvas have referred in 'Aerial Bombing and Counterinsurgency in the Vietnam War' (*American Journal of Political Science*, Midwest Political Science Association, 2011, p. 6) to a sortie, in South Vietnam, as being a 'composite event that typically included multiple aircraft and weapons'. They also asserted (Note 10, same reference), based on their statistical analysis: 'that over 83% of the bombing sorties involved more than one aircraft, while the mean number of weapons dropped per sortie was about 14.' Wing Commander John Downing's *No 2 Squadron Commanding Officer's Report*, February 1971, (Operational Aspects, paragraph 6, Areas of Operation and Targets) noted that, during that month, No 2 Squadron flew 244 effective sorties against 231 targets, i.e. several aircraft, each flying one sortie, bombed the same target, either separately, or in formation. Conversely, the following month saw 259 sorties conducted against 263 targets (March 1971, paragraph 5), i.e. several aircraft, each on their one sortie, bombed more than one target. On most days, eight Canberras departed Phan Rang bombed up, each having been allocated a unique four-figure mission number (usually in the 5000s) by the USAF's Seventh Air Force TACC, so there were eight Canberra Mk 20 missions flown per day, and in sequence, starting with *Magpie 11*, finishing with *Magpie 81*, irrespective of aircraft identification number or crew composition. Unless bombs hung up and would not drop, or were not dropped due to a lack of target, each *Magpie* sortie armed with eight M.117 750 lb bombs, would drop eight bombs. Bombs dropped comprised 28.3 per cent 500 lb, 61.3 per cent 750 lb and 10.4 per cent 1000 lb, spread across 63 per cent visual bombing missions and 37 per cent radar-controlled *Combat Skyspot* missions (Data from No 2 Squadron *Unit History Sheets*).
- 306 *No 2 Squadron Commanding Officer's Report* for May 1971 (Operational Aspects, paragraph 3, Weapons), noted: 'During operations in South Vietnam, 76,277 bombs were dropped for a total tonnage of 26,625 [short] tons'. Dr Chris Coulthard-Clark (page 215) and Wing Commander John Bennett (pages 330-1), in their respective histories, cited the total number of bombs dropped as 76 389. The difference can be attributed to the number of bombs jettisoned out to sea over a designated spot, when crews were unable to release them over the target.
- 307 Combat Air Activity (CACTA) data provided dates, TACC-fragged mission number, *Magpie* mission number (from *Magpie 11* to either *Magpie 81* or *Magpie 91*, depending on number of daily missions) and target location in UTM coordinates, while *No 2 Squadron UHSs* contained aircraft number and name of crew, normally listed in order of *Magpie* mission number/callsign. Thus information from the two databases could be blended together to provide better information.
- 308 Data contained in Marks, *Remembrances*, p. 152
- 309 Pocock, Charlie (ed), *Cleared Hot: Forward Air Controller Stories from the Vietnam War*, Book 1, Forward Air Controllers Association, 2008, p. 167. As shown in the brown strip on the author's in-flight TACAN-based navigation map, shown in chapter 5, Map 5-1, a 10 nautical mile limit had been established to prevent No 2 Squadron aircrews bombing in error over Cambodia. They were informed that Australia was officially representing the United States in diplomatic relations with President Sihanouk, and an agreement had been reached where Australians would not engage in operations across the Cambodian border. Dr Chris Coulthard-Clark noted: 'HQRAAFV had originally prohibited operations closer than ten kilometres from the border, although this had later become ten nautical miles, apparently through some inadvertent change of the unit of measurement during correspondence. Attempts to correct this anomaly had been

Dreadful Lady over the Mekong Delta

unsuccessful, on account of the key role of Australia's diplomatic representation in Cambodia (which included protecting US interests in the absence of an American Embassy). The result was that no Australian FACs were then deployed in any provinces adjoining the border.' (Dr Chris Coulthard-Clark, *The RAAF in Vietnam: Australian Air Involvement in the Vietnam War 1962-1975*, Allen & Unwin, St. Leonards, NSW, 1995, p. 281) Again on page 286, Coulthard-Clark noted that then-Squadron Leader Alan Reed RAAF, flying RF-4Cs on exchange duty with the USAF from Tan Son Nhut, was similarly restricted.

310 Pocock, *Cleared Hot*, Book 1, p. 143.

311 Dennis Fairfax, *Royal Australian Navy in Vietnam*, Australian Government Publishing Service, Canberra ACT, 1980, p. 148

312 Lieutenant Commander Eugene F Paluso, USN, 'Operation SEALORDS: A Study in the Effectiveness of the Allied Naval Campaign of Interdiction' Master of Military Studies paper, USMC Command and Staff College, Quantico, Va, 2002, p. 40

313 Air Commodore Graham Dyke (Retd) discussion with author, 27 September 2012.

314 Coulthard-Clark, *RAAF in Vietnam*, p. 215. In *The War in the Air 1914-1994* (3rd RAAF Air Power Conference Proceedings), Dr Coulthard-Clark suggested (p. 177) that: 'using American statistics, the RAAF's Canberra bombers had the best BDA record of any of the allied squadrons in South East Asia', although the author has not yet seen any hard data to corroborate this. There could have been two possible sources of such a claim. The first was in James Bear (in *The RAAF in SEA: Special Report*, Directorate, Tactical Evaluation, CHECO Division, Headquarters Pacific Air Force, Hickham Air Force Base, Hawaii 1970, p. 16) which, in turn, was borrowed from the USAF's Airman Magazine, June 1970, which stated: 'The squadron's accumulated total bomb-damage record as of mid-1970 that was not only the highest in the USAF's 35th Tactical Fighter Wing, to which it was attached for operational control, but was in fact the highest of any unit in SEA, without having lost an aircraft or having a single airman wounded or lost in action. This was, in large part, owing to the different bombing techniques and equipment used by the RAAF Canberra...'. Whether or not this was hyperbole intended to motivate USAF squadrons to perform better was unknown. The second source was Colonel Frank L Gailer Jr, USAF, former commander of 35th Tactical Fighter Wing, Phan Rang, and who knew the *Magpies* well. He was quoted in the September 1969 edition of the US Army's I Field Force monthly magazine, *Typhoon*, as exclaiming: 'And their battle damage assessment is the best of any operational unit in Southeast Asia'. Whether or not this was a gracious base commander, reflecting exaggerated pride in his one, unique, Aussie tactical fighter squadron, or a factually-based statement, was unknown.

315 Pocock, *Cleared Hot*, Book 2, p. 76

316 These figures were from data collected by the author at the time. Coulthard-Clark, *The RAAF in Vietnam*, p. 195, quoted from then-Flight Lieutenant Gary Beck's 1968 booklet (*No 2 Squadron Royal Australian Air Force, Vietnam*): 'By the start of 1969 it was recorded that although 2 Squadron accounted for approximately 6 per cent of the missions flown by the 35th TFW, it was achieving some 16 per cent of BDA credited to the wing.' Coulthard-Clark added (note 45, page 379) that: 'Other figures cited suggest that while 2 Sqn was flying only about 5 per cent of 35th TFW missions it was continuously accounting for 16-20 per cent of BDA; see CO's Report, 2 Sqn, September 1968...'

317 Data collected by the author while serving at Phan Rang. Annex B to *No 2 Squadron Commanding Officer's Report*, December 1968, also contained a listing of BDA for that month, when six bombing squadrons were based at Phan Rang, namely two US Air National Guard fighter squadrons (120th TFS and 352nd TFS), two regular USAF fighter squadrons (614th and 615th TFS) and two Canberra squadrons, the 8th TBS, USAF and No 2 Squadron, RAAF. The count for this one month in 1968 exceeded the three months total from November 1969 to January

Notes

- 1970 in nearly all BDA categories, indicating a higher operational tempo in the earlier period. No 2 Squadron's contribution of the lower BDA numbers in 1969-70 well exceeded the 1968 percentages, no doubt reflecting the predominance of IV Corps missions during the latter period.
- 318 Coulthard-Clark, *The RAAF in Vietnam*, pp. 197 and 379, quoted from *Commander RAAF Vietnam Report*, July 1969, and Bear's CHECO Report, *RAAF in SEA*, 30 September 1970, noted that, in 1969: '... the Australians were attributed with the best record based on BDA of any operational unit in Southeast Asia, having been credited with nearly 59 per cent of the whole of the 35th Wing's results in July'.
- 319 Coulthard-Clark, *The RAAF in Vietnam*, p. 196
- 320 Sergeant Mat Butler, RAAF, *Effects-Based Targeting: The Future of Targeting for the Royal Australian Air Force*, Air Power Development Centre, Canberra, ACT, 2008, p. 124
- 321 *ibid*, p. 195
- 322 For the sake of future historians looking at the bombing performance of No 2 Squadron RAAF in South Vietnam, who may wish to base their conclusions on available recorded evidence, a warning to be careful. Not all official reports were completely correct in this regard, as this author knew from personal experience. In his *No 2 Squadron Commanding Officer's Report*, July 1969, Wing Commander John Whitehead reported that: '50% of all bombs dropped were within 30 metres of the target and 90% were within 80 metres of the target. These are the best results for one month that the squadron has ever been achieved.' At the risk of being pedantic, while not arguing with the latter statement, the claim that 50 per cent of all bombs fell within a certain distance couldn't be accepted literally. Technically speaking, the truth was that only 50 per cent of all bombs, that were able to be assessed and confirmed from aerial photography, had fallen within the specified distances, based on measurements made from photos by the No 2 Squadron Bombing Leader. Nevertheless, despite this anomaly, these specific results, achieved by No 2 Squadron in July 1969, were certainly quite reasonable for 'dumb iron bombs'.
- 323 John Bennett, *Highest Traditions*, p. 311
- 324 More specifically, from collated results for January 1969 to May 1971 inclusive, they were 50 per cent range error—37.9 metres, 90 per cent range error—91.5 m, 50 per cent line error—20.1 m and 90 per cent line error—48.9 m.
- 325 There were several ways of looking at how many photographs were taken as a percentage of the total, none being too precise. One variable was the number of bombs dropped per sortie, and this could vary from six single M.117 bombs to one stick of six, giving six possible photo assessments for the former and only one for the latter mission. Then, as Wing Commander Downing explained (*No 2 Squadron Commanding Officer's Report*, February 1971, Operational Aspects, page 1, paragraph 1, Bombing Accuracy): '... a very high percentage of all sorties were Combat Sky Spot (CSS) missions in Military Region I, mostly at night, so relatively few bombs could be assessed.' Alternate estimates could therefore range widely, for example, taking data from the February 1971 Report, there were 176 'assessable bombs' out of 244 'effective missions' (72 per cent) or out of a total of 1461 bombs dropped for the month, only 8 per cent.
- 326 Dr Chris Coulthard-Clark, 'The Air War in Vietnam: Re-evaluating Failure' in Alan Stephens (ed), *The War in the Air 1914-1994, Proceedings of 3rd RAAF Air Power Conference*, Air Power Studies Centre, Canberra, ACT, 1994, pp. 130-131, stated: 'The effectiveness of such weaponry (ordnance of the dumb or iron variety) in the Vietnam environment, where accuracy had to be within 10 metres to have any effect against some of the bunkers constructed by the opposition, was an acknowledged problem.'

Dreadful Lady over the Mekong Delta

- 327 For example, Wing Commander Downing (*No 2 Squadron Commanding Officer's Report*, February 1971, Operational Aspects, page 1, paragraph 1, Bombing Accuracy) reported bombing accuracy for the month in four dimensions, 50 per cent line and range errors, and 90 per cent line and range errors.
- 328 An example of this was given in *No 2 Squadron UHS*, 12 September 1970, sheet 12, paragraph 3, which noted: 'Best strike for the day was flown by [Pilot Officer Barry] Carpenter/[Pilot Officer Tom] Morrissy, who in assisting ARVN troops in contact with the enemy, recorded the following BDA: 3/2 structures (destroyed/damaged), 5 KBA confirmed. The strike was controlled by a VNAF Forward Air Controller and friendly troops were 300 metres from the target.'
- 329 *Commander RAAF Vietnam Report*, April 1968 (file 2/2/Air (16) dated 13 May 1968) noted in Operational Aspects, No 2 Squadron, paragraph 7, that: 'it is hoped that using the aircraft from alert, where response time is 15 minutes, better use can be achieved with the VT fuses. For one week, only two aircraft were scrambled with VT fuses. In all other cases, TACC requested their removal before launch as targets were not suitable'. COMRAAFV further added that the two scrambled aircraft carrying the VT-fuzed 1000 lb bombs arrived at their targets to find they weren't wanted either. The alert status was changed to one aircraft per day. Wing Commander Evans, in his *No 2 Squadron Commanding Officer's Report* for the following month, stated (paragraph 5): 'TACC agreed to frag one aircraft with VT fuses to IV Corps early in the morning so advantage can be taken of excellent weather at this time. Alert aircraft have been discontinued in the hope that VT-fused bombs may be better employed in IV Corps where the most suitable targets exist for this weapon.' And so ended No 2 Squadron's brief flirtation with VT-fuzed bombs, and alert status in South Vietnam.
- 330 When conducting research for this book, the author found the 5RAR Association's website, containing an article by former Lieutenant Roger Lambert, C Company, who had recorded graphic details of the impact of a *Magpie* strike on 21 September 1969. Canberra A84-236, *Magpie 31*, piloted by Wing Commander John Whitehead, with navigator/bomb-aimer Squadron Leader Bruce Hunt, was diverted from its fragged mission by TACC with an immediate call to help 1st Australian Task Force troops-in-contact in Phuoc Tuy Province. The article, 'Blondes, Bombs & Bunkers', (viewed 1 July 2014 at <www.5rar.asn.au/soldiers/blondes-bombs-bunkers>) stated: 'pity help anyone on the receiving end of a brace of 750 pound bombs, let alone the full complement of six of the things – that's 4,500lb of high explosive and shrapnel delivered with deadly accuracy onto the target.' 44 years after the event, the article's author wanted to identify, and make contact with, the *Magpie* crew who had responded to his call for help. Upon perusing *No 2 Squadron UHS* for 21 September 1969, this author, who coincidentally flew as *Magpie 41* in A84-241 on the same day, determined which crew was most likely to have carried out the troops-in-contact mission, and was fortunately able to put Lieutenant Colonel Lambert (Retd) in touch with Air Commodore Whitehead (Retd).
- 331 Professor R. Blake Dunnivant, 'Battle for the Mekong', Chapter 12 of *Rolling Thunder in a Gentle Land*, Osprey Publishing, Oxford UK, 2006, pp. 234-255
- 332 Elmo R Zumwalt, Jr, *On Watch - A Memoir*, Quadrangle/The New York Times Book Co, New York, NY, 1976, p. 39

CHAPTER 7 NOTES

- 333 Air Marshal David Evans, RAAF (Retd), *Down to Earth*, Air Power Development Centre, Canberra ACT, 2011, p. 272. The standard ten principles were known then by the mnemonic AMOSSCEFCA—Selection and maintenance of the aim, Maintenance of morale, Offensive action, Security, Surprise, Concentration of force, Economy of effort, Flexibility, Cooperation and Aadministration.
- 334 Dr Alan Stephens, *Going Solo: the RAAF 1946-1971*, AGPS Canberra 1995, p. 307. In his address to the 2008 RAAF History Conference, Dr Stephens ('Observations on an Expeditionary War of Choice: The RAAF in Vietnam 1964-1971'), noted: 'Operations conducted by the RAAF's in-country flying squadrons (including No 2 Squadron) were of no consequence whatsoever to the War's ultimate outcome.' In the subsequent panel discussion, he also stated: 'I don't in any way ... excuse the senior political leaders or military leaders who led us into what was, in my opinion, an unmitigated disaster. There is no excuse for political and military leaders who take us into these kinds of things for not knowing what they are doing.' See *Air Expeditionary Operations from World War II until today: Proceedings of the 2008 RAAF History Conference* held in Canberra 1 April 2008, edited by Wing Commander Keith Brent, Air Power Development Centre, Tuggeranong, ACT, 2009, pp. 46 and 58 respectively.

Dreadful Lady over the Mekong Delta

BIBLIOGRAPHY

PUBLICATIONS

- Bear, James T, 1970 *The RAAF in SEA: Special Report*, Directorate, Tactical Evaluation, CHECO Division, Headquarters Pacific Air Force, Hickham Air Force Base, Hawaii
- Bear, James T, 1970 *VNAF Improvement and Modernization Program*, Directorate Tactical Evaluation, CHECO Division, Headquarters Pacific Air Force, Hickham Air Force Base, Hawaii
- Bennett, Wing Commander John, 1995, *Highest Traditions—The History of No 2 Squadron*, RAAF, AGPS, Canberra, ACT
- Blue, R S, 1976 *United and Undaunted: The History of the Clearance Diving Branch of the RAN*, Naval Historical Society of Australia, Sydney NSW
- Brent, Wing Commander Keith (ed), 2009, *Air Expeditionary Operations from World War II until today: Proceedings of the 2008 RAAF History Conference*, Air Power Development Centre, Canberra, ACT
- Butler, Sergeant Mat RAAF, 2008, *Effects-Based Targeting: The Future of Targeting for the Royal Australian Air Force*, Air Power Development Centre, Canberra, ACT
- Caine, Major Philip D, 1969, *IV DASC Operations, 1965-1969*, Directorate Tactical Evaluation, CHECO Division, Headquarters Pacific Air Force, Hickham Air Force Base, Hawaii
- Cao, General Van Vien ARVN et al, 1980, *The US Adviser*, US Army Center of Military History, Washington, DC
- Central Intelligence Agency, Directorate of Intelligence, *The South Vietnamese Army Today*, Intelligence Memorandum OCI 1699/96, 12 December 1966
- Charlton, Michael & Anthony Moncrieff, 1978, *Many Reasons Why: The American Involvement in Vietnam*, Hill and Wang, New York, New York
- Clapp, Lieutenant Archie J Colonel USMC, 'Shu-Fly Diary', *Proceedings*, October 1963, US Naval Institute, Annapolis, Maryland
- Collins, Brigadier General James L, Jr, 1975, *Vietnam Studies, The Development and Training of the South Vietnamese Army 1950-1972*, Department of the Army, Washington DC
- Commander Naval Force Vietnam Operational Analysis Branch, V-5, *An Analysis of Interdiction Barrier Operations and Effectiveness on SEA LORDS operations Tran Hung Dao, Barrier Reef and Giant Slingshot* (Analysis Paper), July 1970
- Cooper, Garry & Robert Hillier, 2006, *Sock it to 'em Baby: Forward Air Controller in Vietnam*, Allen & Unwin, Crows Nest NSW
- Correll, John T, 2004, *The Air Force in the Vietnam War*, Aerospace Education Foundation, Arlington, Virginia
- Coulthard-Clark, Dr Chris, 1995, *The RAAF in Vietnam: Australian Air Involvement in the Vietnam War 1962-1975*, Allen & Unwin, St. Leonards, NSW
- Croizat, Colonel Victor J USMC (Retd), 'Vietnamese Naval Forces: Origin of the Species', *Proceedings*, February 1963, US Naval Institute, Annapolis, Maryland

Dreadful Lady over the Mekong Delta

- Drew, Colonel Dennis M, USAF, 1988, *Insurgency and Counterinsurgency: American Military Dilemmas and Doctrinal Proposals*, Air University Press, Maxwell Air Force Base, Alabama
- Dockery, Kevin, 2004, *Navy SEALs: A Complete History from World War II to the Present*, Berkley Books, New York, New York
- Dunnavent, Professor R. Blake, 2006, 'Battle for the Mekong', Chapter 12 of *Rolling Thunder in a Gentle Land*, Osprey Publishing, Oxford UK
- Eather, Leading Aircraftman Steve, RAAF, 1979, *Magpie Strike: 2 Squadron in the Republic of Vietnam, 1967-1971*, Australian Government Publishing Service, Brunswick VIC
- Eckhardt, Major General George S, US Army, 1974 *Vietnam Studies - Command and Control 1950-1969*, Department of the Army, Washington DC
- Elder, Captain Paul W, USAF and Captain Peter J. Melly, 1973 *US Rules of Engagement in the Vietnam War, November 1969 to September 1972*, CHECO Division, Headquarters Pacific Air Force, Hickham Air Force Base, Hawaii
- Elliott, David W P, 2003, *The Vietnamese War: Revolution and Social Change in the Mekong 1930-1975* M.E. Sharpe Inc, Armonk, New York
- Evans, Air Marshal David RAAF (Retd), 2011, *Down to Earth*, Air Power Development Centre, Canberra ACT
- Evans, Air Marshal David RAAF (Retd), 17 May 1985 'Principles of War', Blamey Oration, reproduced in *Journal of the Royal United Services Institute of Australia*, CPN Publishers, Canberra ACT, 1995
- Fairfax, Dennis 1980, *Royal Australian Navy in Vietnam*, Australian Government Publishing Service, Canberra ACT
- Fenton, Stanley, 2013, *What a Ride*, Xlibris Corporation, Bloomington, Indiana
- Fulton, Major General William B, 1973, *Vietnam Studies, Riverine Operations 1966-1969*, Department of the Army, Washington DC
- Grandin, Bob, 2004, *The Battle for Long Tan: As Told By The Commanders*, Allen & Unwin, Crows Nest, NSW
- Grau, Reagan J 'Waging Brown Water Warfare: The Mobile Riverine Force in the Mekong Delta, 1966-1969' thesis, Texas Tech University, August 2006.
- Grey, Jeffrey 1998, *Up Top: The Royal Australian Navy and Southeast Asian conflicts, 1955-1972*, Allen & Unwin, St Leonards, NSW
- Hackworth, Colonel David H US Army (Retd) & Julie Sherman 1989, *About Face: The Odyssey of an American Warrior*, MacMillan, The Griffin Press, Adelaide, SA
- Hallen, Squadron Leader Travis, 2012, *Flawed Doctrine: The Problem with Centralised Control and Decentralised Execution*, The Sir Richard Williams Foundation, Canberra ACT
- Ham, Paul 2007, *Vietnam: The Australian War*, Harper Collins Publishers, Sydney, NSW
- Harder, Robert O, 2009, *Flying From The Black Hole: The B-52 Navigator-Bombardiers of Vietnam*, United States Naval Institute, Naval Institute Press, Annapolis, Maryland
- Headquarters United States Military Assistance Command Vietnam, *Vietnam Lessons Learned No 69: Khe Sanh: Analysis of Enemy Positions and Evaluation of the Effectiveness of Weapons Systems Against Enemy Fortifications*, Saigon, 10 September 1968
- Headquarters United States Military Assistance Command, Vietnam, *Vietnam Lessons Learned No 77: Fire Support Coordination in the Republic of Vietnam*, Saigon, 20 May 1970

Bibliography

- Helmore, Group Captain PW, 1967, 'Air Operations in Vietnam: 1', lecture given at Royal United Services Institute, London UK on 2 November 1966, *RUSI Journal*, Volume 112, Issue 645
- Horner, Dr David, 2005, *Strategic Command: General Sir John Wilton and Australia's Asian Wars*, Oxford University Press, South Melbourne VIC
- Howe, Flight Lieutenant Bob, 1969, *No 2 Squadron RAAF Bombaimer's Guide*, Royal Australian Air Force
- Hurst, Doug 2008, *The Forgotten Few: 77 RAAF Squadron in Korea*, Allen & Unwin, Crows Nest, NSW
- Keefer, Edward C and Louis J. Smith, 1991, *Foreign Relations of the United States 1961-1963, Volume III, Vietnam, January-August 1963*, US Government Printing Office, Washington DC
- Kocher, Matthew Adam, Thomas B. Pepinsky & Stathis N. Kalyvas 2011, *Aerial Bombing and Counterinsurgency in the Vietnam War*, American Journal of Political Science, Midwest Political Science Association, Bloomington, Indiana
- Lax, Air Commodore Mark, 2010, *From Controversy To Cutting Edge: A History of the F-111 in Australian Service*, Air Power Development Centre, Canberra ACT
- Le Gro, Captain William E, 1985 *Vietnam: Cease Fire to Capitulation*, US Army Center of Military History, Fort McNair, DC
- Littauer, Raphael & Norman Thomas Uphoff 1972, *The Air War in Indochina*, Air War Study Group, Cornell University, Beacon Press, Boston, Massachusetts
- MacBean, Wing Commander John A and Major Arthur S. Hogben, 1990 *Bombs Gone: The development and use of British air-dropped weapons from 1912 to the present day*, Patrick Stephens Limited, Wellingborough, Northamptonshire, UK
- McGrath, John L, 2001, *Fire for Effect: Field Artillery and Close Air Support in the US Army*, Combat Studies Institute Press, US Army Combined Arms Center, Fort Leavenworth, Kansas
- McNamara, Air Chief Marshal Sir Neville, 2005, *The Quiet Man: The Autobiography of ACM Sir Neville McNamara*, Air Power Development Centre, Canberra, ACT
- McQuilkin, Lieutenant Commander William C USN, 1997, 'Operation SEALORDS: A Front in a Frontless War, An Analysis of the Brown-Water Navy in Vietnam', thesis, US Army Command and General Staff College, Fort Leavenworth, Kansas
- Maniloff, Sp5, Howard US Army, 1969, 'Flyboys from down under', *Typhoon* vol III, No 9, September 1969, 5th Public Information Detachment, I Field Force Vietnam
- Marolda, Edward J, 1994, *By Sea, Air and Land: An Illustrated History of the US Navy and the War in Southeast Asia*, Navy Historical Center, Department of the Navy, Washington, DC
- Marolda, Edward J 2012, *Ready Seapower: A History of the US Seventh Fleet*, Naval History and Heritage Command, Department of the Navy, Washington DC
- Mason, Robert, 1984, *Chickenhawk*, Corgi Books, London, UK
- Marks, Ken 2010, *Remembrances: 2 Squadron RAAF Vietnam 1967-1971*, Westrae Cottage Publishing, Katoomba NSW
- Mrozek, Donald J 1990, *The US Air Force after Vietnam: Postwar Challenges and Potential For Responses*, Air University Press, Maxwell Air Force Base, Alabama
- Nolan, Peter, 2006 *Possums and Bird Dogs: Australian Army Aviation's 161 Reconnaissance Flight in South Vietnam*, Allan & Unwin, Crows Nest NSW
- Odgers, George 1974, *Mission Vietnam: Royal Australian Air Force Operations 1964-1972*, Australian Government Publishing Service, Canberra ACT

Dreadful Lady over the Mekong Delta

- Paluso, Lieutenant Commander Eugene F USN, 2002, 'Operation SEALORDS: A Study in the Effectiveness of the Allied Naval Campaign of Interdiction' Master of Military Studies paper, USMC Command and Staff College, Quantico, Virginia
- Perryman, John & Brett Mitchell, 2007 *Australia's Navy in Vietnam*, Topmill, Sydney NSW
- Pocock, Charlie (ed), *Cleared Hot: Forward Air Controller Stories from the Vietnam War*, Forward Air Controllers Association, Book 1 (2008) & Book 2 (2009)
- Polmar, Norman et al, 2007, *Aircraft Carriers: A History of Carrier Aviation and Its Influence on World Events Vol. II 1946-2005*, Potomac Books, Washington DC
- Royal Australian Air Force, Australian Air Publication 917— *Pilots Notes for Canberra Mk 20*, 1st Edition, Melbourne, VIC, 1956
- Royal Australian Air Force, Australian Air Publication 996—*Flight Manual, Canberra Mk 20*, 1st Edition, Melbourne, VIC, 1956
- Royal Australian Air Force, Australian Air Publication 1000—*Fundamentals of Australian Aerospace Power*, Fourth Edition, Aerospace Centre, Canberra ACT, 2002
- Schlight, Colonel John, 1988, *The United States Air Force in South East Asia: The War in South Vietnam - The Years of the Offensive 1965-1969*, Air Force History and Museums Program, Office of Air Force History & GPO, Washington, DC
- Shulimson, Jack, 1982, *US Marines in Vietnam: An Expanding War 1966*, United States Marine Corps History & Museums Division, Washington DC
- Sorley, Dr Lewis, 2006, 'Reassessing ARVN', lecture at Vietnam Center, Texas Tech University, Lubbock, Texas, 17 March 2006
- Speed, Major Joseph B, USAF, 2006, *Forgotten Heroes: US ANG Fighter Squadrons in Vietnam*, Air University, Maxwell Air Force Base, Alabama
- Steffes, James, 2009, *Operation Market Time: The Early Years, 1965-6*, Xlibris Corporation, Bloomington, Indiana
- Stephens, Alan, 1992 *Power Plus Attitude: Ideas, Strategy and Doctrine in the Royal Australian Air Force 1921-1991*, Air Power Studies Centre, Canberra ACT
- Stephens, Alan, 2001, *The Australian Centenary History of Defence – Volume II – The Royal Australian Air Force*, Oxford University Press, South Melbourne, VIC
- Stephens, Alan (ed) 1994, *The War in the Air 1914-1994, Proceedings of 3rd RAAF Air Power Conference*, Canberra, March 1994, Aerospace Centre, Fairbairn ACT
- Thayer, Thomas C 1985, *War Without Fronts: The American Experience in Vietnam*, Westview Press, Boulder, Colorado
- Thompson, Sir Robert 1974, *Peace Is Not At Hand*, David McKay, New York, New York
- Tolson, Lieutenant General John J, US Army, 1973, *Vietnam Studies, Airmobility 1961-1971*, Department of the Army, Washington DC
- Tonsetic, Robert L, 2009, *Forsaken Warriors: The Story of an American Advisor with the South Vietnamese Rangers and Airborne*, Casemate, Havertown, Philadelphia
- Tucker, Spencer C (ed), 2011 *The Encyclopedia of the Vietnam War: A Political, Social and Military History*, ABC-CLIO, LLC, Santa Barbara, California
- US Air Force Tactical Fighter Weapons Center, *Tactical Fighter Weapons Center Bulletin*, No 8, Nellis AFB, Nevada 28 October 1966

Bibliography

- US Department of Defense, *Commander US Naval Forces Vietnam Monthly History Summary*, November 1970
- US Department of the Navy, 1970, *British Explosive Ordnance*, NAVORD OP1665, Change 3, Ordnance Systems Command, Bureau of Ordnance, Washington DC
- US Marine Corps History and Museums Division, 1974, *The Marines in Vietnam 1954-1973, An Anthology and Annotated Bibliography*, Department of the Navy, Washington DC
- Walton, Lieutenant Commander Andrew R, USN, 'The History of the Airborne Forward Air Controller in Vietnam', thesis, US Army Command and Staff College, Fort Leavenworth, Ka, 2004
- Warner, Denis 1977, *Not With Guns Alone - How Hanoi Won The War*, Hutchinson Australia, Melbourne, VIC
- Wiest, Andrew (ed), 2006 *Rolling Thunder in a Gentle Land: The Vietnam War Revisited*, Osprey Publishing, Oxford UK
- Wilson, Stewart, 1989, *Lincoln, Canberra & F-111 in Australian Service*, Aerospace Publications, Canberra ACT
- Zumwalt, Elmo R Jr, 1976, *On Watch - A Memoir*, Quadrangle/The New York Times Book Co, New York, NY

WEBSITES

All websites listed were accessed up to 1 July 2014.

- 1st Aviation Brigade, US Army, Vietnam portal, <http://www.1stavnbd.com>
- 1st Battalion Royal Australian Regiment Association, <http://www.firstbattalionassociation1rar.org.au>
- 5th Battalion, The Royal Australian Regiment Association, www.5rar.asn.au
- 9th Infantry Division, US Army (4th Battalion, 47th Infantry), www.9thinfantrydivision.com
- 15th Field Artillery Regiment, US Army, www.landscaper.net/bigguns.htm
- 103rd Field Battery, RAA. Vietnam, www.103fieldbatteryraa.net
- 135th AHC (EMU), www.135ahc.net
- 145th Combat Aviation Battalion, US Army, www.145thcab.com
- Australian Armourers Association, www.gunnies.com.au
- Australian War Memorial (Magpie mission audio), www.awm.gov/collection/S00693
- B-57 Canberra Association, www.b-57canberra.org
- Combatant Craft Crewman Association, www.warboats.org
- Don Blankenship's Mobile Riverine Force, www.rivervet.com
- Erasmio Riojas' SEAL Two website, www.sealtwo.org
- Forward Air Controllers Association, www.fac-assoc.org
- General Hieu's website, www.generalthieu.com/arvn-sorley-2.htm
- HAL-3 Seawolf Association, www.seawolf.org
- Kent Hawley's Brownwater Navy, Vietnam, www.brownwater-navy.com
- Larry Wasikowski's Coastal Squadron One – Swift Boat Crew Directory, www.swiftboats.net
- Marine Corps Association and Foundation, www.mca-marines.org/leatherneck/2012/04/shuffly-marine-corps-beachhead-vietnam

Dreadful Lady over the Mekong Delta

Mobile Riverine Force Association, www.mrfa.org
Naval Historical Society of Australia, www.navyhistory.org.au
Robert B. Shirley's Patrol Craft Fast, www.pcf45.com
RAAF Air Power Development Centre, Office of Air Force History, www.airpower.airforce.gov.au
RAAF Association, www.raafa.org.au
RAAF Museum, www.airforce.gov.au/raafmuseum
Royal Australian Navy, RAN Helicopter Force Vietnam History, www.navy.gov.au/history/squadron-histories/ran-helicopter-flight-vietnam-history
Royal United Services Institute (UK), www.rusi.org
Royal United Services Institute of Australia, www.rusi.org.au
SEALFIT Fitness Training, www.navyseals.com
SEAL & SWCC Scout Team, www.sealswcc.com
The Gamewardens Association (TF-116), www.tf116.org
USAF Air National Guard, www.ang.af.mil
USAF National Museum, www.nationalmuseum.af.mil
USAF Strategic Air Command, www.afgsc.af.mil
US Joint Terminal Attack Controllers Association, www.romad.com/romad.com/history/bmack.htm
US Coast Guard, www.uscg.mil/history
US Department of State/Office of the Historian, www.history.state.gov
US Marine Corps, www.history.usmc.mil
US Marine Corps Association and Foundation, www.mca-marines.org
US Naval Institute, www.usni.org
US Navy Beach Jumpers Association, www.beachjumpers.com
US Navy Libraries, www.history.navy.mil/wars/vietnam, www.history.navy.mil/docs/vietnam/high66-4.html, www.history.navy.mil/wars/vietnam/minesouthviet.htm
US Vietnam bombing databases (CATCA and SEADAB), www.aad.archives.gov
VAL-4 Black Ponies, www.blackpony.org
Vietnam Centre and Archives, Texas Tech University, Lubbock, Texas – www.vietnam.ttu.edu
Wikipedia, www.wikipedia.org
World History Group website, www.historynet.com/north-vietnams-master-plan.htm

NATIONAL ARCHIVES OF AUSTRALIA

AWM66 28/1/4//1 Department of Defence, *No 2 Squadron (RAAF) Vietnam operational diary* containing RAAF Forms A.51, (Daily) and A.50 (Monthly) from 21 April 1967 to 31 May 1971
NAA A9435, 2; Department of Defence, *Commanding Officer No 2 Squadron Reports*, March 1967 to June 1971
NAA A10779, 15; Department of Defence, *Monthly reports on the activities of RAAF force Vietnam*, 1968 to 1972

INDEX

Page numbers shown in **bold** indicate the subject is contained in an image, caption or table on the page number shown. The letter 'n' denotes the number of the note (footnote or endnote) that contains the subject and is located on the previous page number. For example, '179 (n175)' indicates that the subject is contained in note 175 which is located on page 179. See also Bibliography.

- 0.30-calibre machine gun 17
- 0.50-calibre machine gun 14, 15, 17, 39
- 1 ATF. See also 1st Australian Task Force
- I Corps/Corps Tactical Zone (I CTZ)/ Military Region (MR) **9**, 10, 12, 13, 22, 31, 33-35, 84, 111, 120, 132, 136, **139**, **140**, 179 (n175)
- I Field Force, MACV 198(n314)
 - Typhoon* magazine, September 1969 issue 198(n314)
- 1 RAR. See also 1st Battalion, RAR
- 1st Australian Logistic Support Company 42
- 1st Australian Task Force (1 ATF) 2, 9, 25, 26, 39, 41, 70, 81, 111, 123, 126, 155, 192(n270), 193 (n274), 193(n276), 200 (n330)
 - Air Liaison Officer (ALO)
 - Wing Commander Drummond. See also Drummond
 - Wing Commander Larard. See also Larard
 - Wing Commander Powell. See also Powell
 - Tactical Area of Responsibility (TAOR) 70
- 1st Battalion, 9th Marines, USMC 35
- 1st Battalion, Royal Australian Regiment (1 RAR) 42
- 1st Brigade, 9th Infantry Division, US Army. See also 9th Division
- 1st Cavalry Division (Airmobile)/ 1st Air Cavalry Division, US Army 23, 24, 28, 173(n82)
 - Tactical Air Control Party (TACP). See also Tactical Air Control Party
- 1st Combat Evaluation Group (CAVG), Strategic Air Command, USAF. See also *Combat Proof/Skyspot*
- 1st Division, NVA 30
- 1st Division, US Marine Corps. See also United States Marine Corps
- 1st Infantry Division, US Army 24
- II Corps/Corps Tactical Zone (II CTZ)/ Military Region (MR) **9**, 13, 27, 31, 33, 71, 84, 88, 99, 136, **139**, **140**, 196(n297)
- II Field Force, MACV 67, 168(n16)
 - Commander 168(n15)
- 2nd Air Division, USAF 63, 64, 128
- 2nd Brigade, 9th Infantry Division, US Army. See also 9th Infantry Division
- 2 Squadron, RAAF. See also No 2 Squadron
- 2.75-inch rocket 15, 56
 - white phosphorous ('Willie Pete'). See also smoke marker
- III Corps/Corps Tactical Zone (III CTZ)/ Military Region (MR) **9**, 13, 24-26, 31-33, 36, 39, 42, 47, 54-56, 67, 69, 70, 76, 84, 89, 99, 126, 136, 137, **139**, **140**, 148, 152, 160, 179(n175), 192(n272), 195(n287)

Dreadful Lady over the Mekong Delta

- III Direct Air Support Center (III DASC) 67, 70
- 3 Field Troop, Royal Australian Engineers 42
- 3rd Battalion, 34th Artillery Regiment, US Army. See also 9th Division
- 3rd Battalion, 47th Infantry Regiment, US Army. See also 9th Division
- 3rd Battalion, 60th Infantry Regiment, US Army. See also 9th Division
- 3rd Battalion, Vietnam Marine Corps. See also Vietnam Marine Corps
- 3rd Division, US Marine Corps. See also United States Marine Corps
- IV Corps/Corps Tactical Zone (IV CTZ)/ Military Region (MR) **4, 9**, 10-13, 22, 24, 26-28, **29**, 31-33, 35, 36, 38-42, 44, 46, 47, **50**, 53, 55, 56, 58, 60, 61, 65-67, **68**, 69, 72, 74-76, 78, 81, **82**, 83-85, 87, **88**, 89-91, **92**, 99, 102, 103, 107, 108, 111, 112, **116**, 120-123, **124**, 125, 126, 129-131, 136, **139, 140, 141**, 143, 148-150, **152**, 153, 154, 156, **158**, 160, 163, 165, 166, 167(n13), 168(n16), 179(n175), 180(n189), 182(n197), 185(n230), 192(n272), 195(n296), 196(n303), 199(n317)
- IV Direct Air Support Center (IV DASC) 65, 67, 72, 73, 75, 83, 152
 - USAF staff 75
 - VNAF staff 75, 83, 84
- 4th Battalion, 39th Infantry Regiment, US Army. See also 9th Division
- 4th Battalion, 47th Infantry Regiment, US Army. See also 9th Division
- 4th Battalion, Vietnam Marine Corps. See also Vietnam Marine Corps
- 4.2-inch mortar 46
- 5 RAR. See also 5th Battalion, RAR
- 5-inch/ 54 calibre gun 13
- 5-inch gun 33, 37, **40**
- 5-inch lens. See also camera
- 5-inch Zuni rocket 56
- 5th Battalion, Royal Australian Regiment (5 RAR) 160, 200(n330)
- 5th Battalion, Vietnam Marine Corps. See Vietnam Marine Corps
- 5th Special Forces Group, US Army ('Green Berets') 23, 27, 40
 - A, B Teams 23
 - Mobile Strike (*Mike*) Force 40, 173(n92)
- '7 Sisters/Mountains' (location). See also 'Seven Sisters/Mountains'
- 7th Air Force, USAF. See also Seventh Air Force
- 7th Fleet, US Navy. See also Seventh Fleet
- 7th Infantry Division, ARVN 28, **29**, 30, 34, 36, 39, 40, 44, 46, 47, 69, 83
 - Air Liaison Officer (ALO). See also Air Liaison Officer
 - Area of Operation (AO) 83
 - Senior US advisor
 - Lieutenant Colonel Vann. See also Vann
- 7.62-mm AN/GAU-2 Gatling mini-gun 132
- 7.62-mm AN/SUU-11 Gatling mini-gun pod 56
- 7.62-mm bullet strike 145. See also Canberra Mk 20
- 7.62-mm M-60 machine gun 15, 56
- 8th Aviation Transportation Company, US Army 23
- 8th Tactical Bomb Squadron (TBS), USAF 64
- 9 Squadron, RAAF. See also No 9 Squadron
- 9th Infantry Division, ARVN 28, **29**, 34, 36, 39, 40
 - Air Liaison Officer (ALO). See also Air Liaison Officer
- 9th Infantry Division, Republic of Korea (ROK) Army 70

Index

- 9th Infantry Division, US Army 7, 10, 11, 14, 16 24, **25**, 26-28, 30, 39, 41, 44-47, 55,
61, 67, 72, 74, 83, 134, 140, 178(n173)
 - Air Liaison Officer (ALO). See also Air Liaison Officer
 - Commander 12, 168(n15)
 - Major General Ewell. See also Ewell
 - 1st Brigade **25**, 27
 - 2nd Brigade 14, **25**, 26, 27, 44, 46, 70, 146
 - 3rd/34th Artillery Battalion 46
 - 3rd/60th Infantry Battalion 25
 - Issue* FAC. See also *Issue*
 - 3rd Brigade **25**, 26, 27, 46, 69, 119
 - 3rd/47th Infantry Battalion 25
 - 4th/39th Infantry Battalion 55
 - 4th/47th Infantry Battalion 25
 - Tamale* FAC. See also *Tamale*
- 12/24-way intervalometer. See also Canberra Mk 20
- 12th Tactical Reconnaissance Squadron (TRS), 460th Tactical Reconnaissance Wing,
Tan Son Nhut 180(n176)
- 12.7-mm anti-aircraft gun 43
- 13th Air Force, USAF. See also Thirteenth Air Force
- 13th Combat Aviation Battalion, US Army 24
- 13th Tactical Bomb Squadron (TBS), USAF 64
- 16-mm movie camera. See also camera
- 17th parallel 1, 12, 147
- 18th Infantry Division, ARVN 30
- 19th century 1, 10
- 19th Tactical Air Support Squadron (TASS), USAF 69, 70, 72, 148
 - Detachment, Soc Trang 69
- 20-mm M-39 cannon 132
- 20-mm machine gun 17
 - Mk IV pod 56
- 21st Infantry Division, ARVN 28, **29**, 34, 36, 39, 41, 74
 - 33rd Regiment 41
 - Air Liaison Officer (ALO) 69. See also Air Liaison Officer
 - Tactical Area of Responsibility (TAOR). See also Tactical Area of
Responsibility
- 22nd Tactical Air Support Squadron (TASS), USAF 51, 61, 69, 70, 72, 74, 83, 156,
191(n264)
 - David* FACs. See also Forward Air Controller
 - Headquarters 74
- 25th Infantry Division, ARVN 70
 - Air Liaison Officer (ALO). See also Air Liaison Officer
- 35th Tactical Fighter Wing (TFW), USAF, Phan Rang 64, 132, 156, 198(n314)
 - BDA comparison **157**, 159
 - Commander 128
 - Colonel Gailer. See also Gailer
 - Colonel Galligan. See also Galligan
 - Headquarters 68, 114, 128, 157

Dreadful Lady over the Mekong Delta

- 40-mm cannon 18
- 50-mm camera. See also camera
- 57-mm recoilless rifle. See also rifle
- 57th Aviation Transportation Company, US Army 23, 34
- 62nd Aviation Company, US Army 24
- 70-mm movie camera. See also camera
- 81-mm mortar 14, 18, 46
- 88th Infantry Regiment NVA 44
- 95th Infantry Regiment, NVA 41, 44
 - 95A Infantry Regiment, NVA 44
- 100-ton arms infiltration trawler, NVA **43**
- 101st Airborne Division, US Army 23
- 105 Field Battery, Royal Australian Artillery 42
- 105-mm howitzer 18, 46
- 114th Aviation Company, US Army 24
- 121st Aviation Company, US Army 24
- 126 Naval Sapper Regiment, NVA 44
- 135th Assault Helicopter Company (AHC)/ Experimental Military Unit (EMU), US Army **24**, 39, 47, 61, 147. See also RANHFV
 - 'Huey' helicopter. See also Bell UH-1
- 155-mm self-propelled howitzer 46
- 161 Field Battery, Royal New Zealand Artillery 42
- 161 Independent Reconnaissance Flight, Australian Army (*Possum*) 36, 42, 152, 155
- 164th Combat Aviation Group (CAG), US Army 28
- 173rd Airborne Brigade, US Army 42
- 184th Reconnaissance Airplane Company, US Army (*Non-Stop*) 27
- 188th Infantry Regiment, NVA 44
- 191st Assault Helicopter Company, US Army 55, 61
- 220th Combat (Delta) Aviation Battalion (CAB), US Army (*Catkiller*) 27
- 261st Battalion, VC 44
- 263rd Battalion, VC 44
- 267th Main Force Battalion, VC 42, 44
- 352nd TFS (Tactical Fighter Squadron), USAF (*Yellow Jacket*) **157**
- 500lb bomb. See also bomb, 500lb
- 502nd Battalion, VC 44
- 504th Tactical Air Support Group (TASG) 186(n239)
- 504th Theatre Indoctrination School (TIS), USAF 70, 74
 - FAC University 74, 178(n172)
- 506th Local (Province Mobile) Battalion, VC 42
- 514th Local Force Battalion, VC 44, 46
- 528th Heavy Weapons Company, NVA 44
- 557th TFS (Tactical Fighter Squadron), USAF (*Sharkbait*) 119, 190(n263)
- 558th TFS (Tactical Fighter Squadron), USAF (*Hammer*) 176(n154), 190(n263)
- 559th TFS (Tactical Fighter Squadron), USAF (*Phantom*) 176(n154), 190(n263)
- 612th TFS (Tactical Fighter Squadron), USAF (*Tide*) **157**, 176(n154)
- 614th TFS (Tactical Fighter Squadron), USAF (*Lucky Devil*) **157**, 176(n154)
- 615th TFS (Tactical Fighter Squadron), USAF (*Blade*) **157**, 176(n154)
- 723 Squadron, RAN 39

Index

- 750lb bomb. See also M.117 750lb bomb
- 1000lb bomb. See also bomb, 1000lb
- A-1 Skyraider. See also Douglas A-1
- A-4 Skyhawk. See also Douglas A-4
- A-6 Intruder. See also Grumman A-6
- A-37 Dragonfly. See also Cessna A-37
- AAP 966, Canberra Mk 20 flight manual. See also Canberra Mk 20
- Abrams, General Creighton, US Army 30, 48, 83, 162, 167(n13), 168(n14)
- Accelerated Turnover to Vietnam (ACTOV) program. See also Zumwalt
- Advanced Tactical Support Base (ATSB) *Breezy Cove*. See also Operation *Breezy Cove*
- Advanced Tactical Support Base (ATSB) *Solid Anchor*. See also Operation *Solid Anchor*
- advisors. See also United States advisors
- aerial photography. See also bombing photo/ photography
- agreement, Australia-US military working 146. See also memorandum of understanding
- AH-1G Cobra. See also Bell AH-1G
- aim point. See also bombing, aim point
- aiming box. See also bombing, aiming box
- aiming error. See also bombing error
- air assault operation 24
- air base, South Vietnam. See also Seventh Air Force
- air cavalry 23, 64
- air combat 64
- air interdiction. See also interdiction
- air liaison officer (ALO) 67, 153
 - 1st ATF 70, 178(n172)
 - 9th Division, US Army 72
- ARVN
 - 7th Division 69
 - 9th Division 69
 - 21st Division 69
 - 25th Division 70
- Air Officer Commanding
 - Logistics Command, RAAF. See also Blakers
 - Training Command, RAAF. See also Reed
- Air Operating Authority. See also United States Department of Defense, JCS
- Air Operations Center (AOC) 65
- air strike. See also tactical air strike
- air superiority 90
- Air Support Operations Center (ASOC) 65
- Air Support Radar Team (ASRT). See also *Combat Proof/Skyspot*
- air surveillance 12
- airborne artillery warning. See also Boeing B-52
- aircraft carrier, US Navy. See also Seventh Fleet
- 'Aircraft Carrier' (location). See also rendezvous icons
- Aircraft Research & Development Unit (ARDU), RAAF 96, 97, 133, 183(n213), 186(n240)

Dreadful Lady over the Mekong Delta

aircrew categorisation. See also No 2 Squadron
airfield height 129
airmobile concept, US Army 23, 64
airmobile division 24. See also 1st Cavalry Division
airmobile operation 55
AK-47 assault rifle 171(n54)
Alan FAC. See also Forward Air Controller
Allchin, Pilot Officer Dick, RAAF 81, **144**, 146, 152, 179(n175), 195(n296)
Allen, Major, USAF 83, **93**, **113**, 150, 154, 180(n185)
allied operation 28, 32, 33, 44
Alligator tracked landing vehicle (LVT) 35
ALO. See also air liaison officer (ALO)
altimeter 106, 129, 188(n248), 194(n281)
altitude, bombing. See also bombing altitude
altitude, density. See also density altitude
aluminium 97
Amberley RAAF Base. See also Royal Australian Air Force
ambush 5, 22, 41, 44, 46, 49, 54, 122, 191(n268)
America. See also United States
American Civil War 10
American War of Independence 10
ammi pontoon barge. See also barge
amphibious assault/ operation/ raid 13, 32, 34, 35
Amphibious Assault Ship (LPH), US Navy 34. See also USS *Iwo Jima*, USS *Princeton*
Amphibious Attack Transport (APA), US Navy 35. See also USS *Henrico*
amphibious craft/ ship/ vessel, VNN 31
Amphibious Ready Group (ARG), US Navy. See also United States Navy
Amphibious Task Force (TF-76), US Navy. See also Seventh Fleet
Amphibious Transport Dock (LPD), USMC 35
amphibious troops 10
AN/GAU-2. See also 7.62-mm
AN/MSQ-77 radar, USAF. See also *Combat Proof/Combat Skyspot*
AN/SUU-11. See also 7.62-mm
AN/TPQ-10 radar, USMC. See also *Combat Proof/Combat Skyspot*
Andy FAC. See also Forward Air Controller
ANGLICO. See also United States Marine Corps
An Long 55
An Thoi, Phu Quoc Island 13, 33, 36, 40, 52, 153, 173(n92)
An Xuyen province 41, 57, 145
Anson, Squadron Leader C M ('Avro'), RAAF 108, **109**
anti-communist government 1
AO. See also Area of Operation
AOC. See also Air Operations Center
APA. See also Amphibious Attack Ship
APB. See also Barracks Ship
Ap Bac. See also Battle of Ap Bac
Ap Bac Emulation Drive 44
archives, US. See also United States Government, National Archives

Index

- Arc Light* strike. See also Boeing B-52
area bombing. See also bombing, area
Area of Operation (AO) 12, 65
 III Corps 89
 IV Corps 81
 7th Division, ARVN 83
 Ben Tre 81
 Cambodian border 146
 Sea Float 57
 Task Force, VNN 32
ARG. See also United States Navy
armour 35
Armoured Personnel Carrier (APC) . See also M-113
armoured trimaran. See also SEAL
Armoured Troop Carrier (ATC)
 US Navy 17, 18, 19, 20, 51, 52, 55
 VNN 32,
armourer 54, 94, 95, 97, 100, 101
 No 1 Central Reserve, RAAF 95
 No 2 Squadron, RAAF 95, 100, 101, 185(n230)
 Leading Aircraftman Hopper. See also Hopper
arms factory/ workshop. See also target type
Army of the Republic of Vietnam (ARVN) 2, 9, 10, 16, 23, 24, 26-28, 29, 30, 31, 33,
 34, 36, 39, 40, 44, 46, 47, 55, 67, 69, 72, 74, 83, 134, 195(n285), 200(n328)
 7th Infantry Division. See also 7th Infantry Division, ARVN
 9th Infantry Division. See also 9th Infantry Division, ARVN
 18th Infantry Division. See also 18th Infantry Division, ARVN
 21st Infantry Division. See also 21st Infantry Division, ARVN
 25th Infantry Division. See also 25th Infantry Division, ARVN
 artillery 27
 aviation battalion 44
 general headquarters 32
 Reserve Forces, Marine Corps. See also Vietnam Marine Corps
 Popular Force (PF) 16, 30, 52, 55
 Rangers 26
 Regional Force (RF) 16, 30, 40, 52, 55
Aronsen, Wing Commander R.B. (Rolf), RAAF 97, 183(n214), 184(n220), 192(n270)
artillery 26, 27, 35, 40, 42, 44, 56, 85, 90, 93, 94, 125, 131, 177(n157), 181(n191)
artillery barge. See also barge
artillery, naval. See also naval gunfire support (NGFS)
artillery warning, airborne. See Boeing B-52
ARVN. See also Army of the Republic of Vietnam
A Shau valley 179(n175)
assassination 43
Assault Helicopter Company (AHC), US Army
 135th. See also 135th
 191st. See also 191st

Dreadful Lady over the Mekong Delta

Assault Support Patrol Boat (ASPB)

US Navy 20, 51

VNN 32

ASRT. See also *Combat Proof/ Combat Skyspot*

Attack Carrier Strike Force (TF-77), US Navy. See also Seventh Fleet

ATC. See also armoured troop carrier

atrocities 47

ATSB. See also Advanced Tactical Support Base

attack transport. See also Amphibious Attack Transport

audio recording, bombing. See also Australian War Memorial

Australia 1-3, 39, 40, 42, 47, 61, 64, 70, 74, 91, 95, 111, 112, 118, 123, 126, 128, 134,
139, 146, 147, 154, 156, 159, 164, 166

Australia-US military working agreement. See also agreement

Australian accent. See also language

Australian Army 2, 36, 42, 128, 152, 155

1st ATF. See also 1st Australian Task Force (ATF)

1 RAR. See also 1st Battalion, Royal Australian Regiment

5 RAR. See also 5th Battalion, Royal Australian Regiment

1st Australian Logistic Support Company. See 1st Australian Logistic Support
Company

3 Field Troop, Royal Australian Engineers. See also 3 Field Troop

105 Field Battery. See also 105 Field Battery

161 Independent Reconnaissance Flight. See also 161 Independent Reconnaissance
Flight

aircraft

Cessna 180. See also Cessna 180

Porter. See also Pilatus Porter

Sioux. See also Bell 47G Sioux

pilot 194(n279)

Australian Army Training Team Vietnam (AATTV) 2, 173(n92)

Australian bomb stocks 112

Australian Centre for the Study of Armed Conflict and Society, University of
NSW/ADFA 193(n274)

Dr Hall. See also Hall

Mr de Heer. See also de Heer

Australian Government 39, 97

Department of Air. See also Department of Air

Department of Defence

Chief of the Defence Force (CDF). See also McNamara

Department of Supply. See also Weapons Research Establishment (WRE)

Australian Task Force (ATF). See also 1st Australian Task Force (ATF)

Australian War Memorial (AWM) 76

audio collection S00693, No 2 Squadron bombing tape 76, 90, 179(n175),
180(n180), 195(n287), 197(n303)

autopilot/automatic pilot. See also Canberra Mk 20

Auxiliary Personnel Lighter (APL-26), US Navy 46

Avon Mk 109 engine. See also Canberra Mk 20

Avro 100/1000lb standard carrier 96, 184(n217)

Index

- Avro Lancaster 94, 106
Avro triple carrier 94, 95, 96, 132, 183(n213), 184(n217)
AVTUR. See also Canberra Mk 20 fuel
B-52 Stratofortress. See also Boeing B-52
B-57 Canberra. See also Martin B-57
B-57B Canberra. See also Martin B-57B
Bac Lieu 28, 36
bail out area 143
ballistic error. See also bombing error
Bao Trai 42
barge 59
 ammi pontoon 57
 artillery/ howitzer 46
 fuel 31
 mortar 46
Barnes, Squadron Leader Arthur, RAAF 145, 154, 179(n175)
Barracks Ship, self-propelled (APB), US Navy 17, 46
 See also USS *Benewah* and USS *Colleton*
barrier/blockade 17, 41, 42, 46, 50-58, 162
 coastal 36
 counter-infiltration 12, 57
 interdiction 51, 52, 55, 56, 60
 patrol 51
 SEALORDS. See also Operation SEALORDS
Bart FAC. See also Forward Air Controller
base area/ camp, VC. See also target type
base camp, US Army
 Bearcat. See also Bearcat
 Blackhorse. See also Blackhorse
Basic Operations Order (BOO). See also United States Department of Defense
Bassac River. See also Song Hau Giang
Battle of Ap Bac, first (January 1963) 23, 28, 44
Battle of Ap Bac, second (May 1967) 44, 46
Battle of Ap Bac, third (Tet '68) 47
Battle of Dien Bien Phu 1, 10
Battle of the Bulge 7
BDA. See also bomb damage assessment
beach clearance 21
Beach Jumpers Unit One, US Navy 23, 35, 51
 Duffel Bag team 23, 41
 Team Twelve Detachment Delta 23
 Team Thirteen 23
beach landing 122
beach reconnaissance 21
beachmaster, US Navy 35
Bearcat base camp, US Army 25, 39, 70
Bearcat F-8F. See also Grumman F-8F
beaucoup. See also language, French

Dreadful Lady over the Mekong Delta

- Beck, Flight Lieutenant Gary, RAAF 198(n316)
- Bell 47G Sioux light observation helicopter, Australian Army 155, 194(n279)
- Bell AH-1G Cobra, US Army 68
- Bell UH-1 Iroquois 'Huey' helicopter
- gunship 23, 39, 169(n27)
 - RAAF 2, 128
 - 'slick' 150, 194(n280)
 - US Army 23, 68, 194(n280)
 - US Navy 68
 - VNAF 38
- Bell UH-1B Iroquois 'Huey' helicopter
- US Army 24, 169(n27)
 - US Navy (*Sea Wolf*) 15, **16**, 51, 54, 58, 169(n27)
- Bell UH-1C Iroquois 'Huey' gunship helicopter
- Taipan* 39
 - US Army 39
- Bell UH-1D Iroquois 'Huey' 'slick' helicopter
- Emu* 39
 - US Army 39, 169(n27)
- Bell UH-1H Iroquois 'Huey' 'slick' helicopter
- Emu* 39
 - US Army 15, 39, 169(n27)
- Ben Luc 54, 148
- Ben Tre island 30, 47, 55, 61, 81, 154
- Bennett, Pilot Officer, later Wing Commander John, RAAF 95, 159
- Highest Traditions – The History of No. 2 Squadron, RAAF* 178(n171), 183(n210)
- Biddell, Flying Officer Ron, RAAF 191(n269)
- Bien Hoa 38, 42, 47, **67**, 69, 70, 119, 152, 176(n154)
- Binh Duong province 39
- Binh Thuy 14, 16, 22, 33, 38, 51, 56, 61, **67**, 68-70, 72, 74, 81, 94, 129, **151**, 154, 156
- Bird Dog. See also Cessna O-1
- bird strike. See Canberra Mk 20
- Birks, Pilot Officer Mick, RAAF 179(n175), 186(n239)
- Blackhorse base camp 39
- Black Pony*. See also Light Attack Squadron
- Blakers, Air Commodore Ken, RAAF **77**, 180(n176)
- blockade. See also barrier
- Blyth, Pilot Officer Al, RAAF 186(n239)
- BMP-2 limpet mine. See also mine
- Boast, Wing Commander Jack, RAAF 88, 130, 154, 192(n272)
- body count 27
- body-heat activated sensor. See also sensor
- Boeing B-52 Stratofortress, Strategic Air Command, USAF 63, 90, 92, 121, 132, 174(n103),
- Arc Light* strike 92, 93, 121, 150, 196(n303)
 - airborne artillery warning 93
 - kill box 92, 121, 191(n265)
- Boeing KC-135 tanker, Strategic Air Command, USAF 63, 89

Index

- Boeing-Vertol CH-21 Shawnee, US Army 23
- Boeing-Vertol CH-46 Sea Knight, USMC 35
- Boeing-Vertol CH-47 Chinook
 - US Army 148
 - VNAF 38
- Bolger, Flight Lieutenant Brian, RAAF 153
- bomb
 - 500lb bomb 94, 95, 97, 99, 111, 121, 132, 178(n168), 183(n210), 197(n305)
 - general purpose (GP) 183(n210)
 - medium capacity (MC) **95**, 97, 183(n210)
 - Mk-82 92, 132, 156, **190(n259)**
 - high drag 99
 - low drag ('slick') 99
 - tail 178(n 168)
 - 750lb bomb. See also M.117
 - 1000lb bomb 94, 95, **96**, 97, 99, 108, 111, 118, 121, 133, 153, 183(n210), 192(n270), 197(n305)
 - general purpose (GP) 95, 96, 183(n210)
 - medium capacity (MC) 183(n210)
 - high altitude, high speed (HAHS) bomb 102
 - tail
 - Mk 13 96
 - Mk 37 96
 - series 100 183(n212)
 - variable time (VT)-fuzed 118, 160, 200(n329). See also bomb fuze
- bomb adaptor kit 99, 133, 184(n222)
- bomb-aimer 94, 100, 105-107, 109, 111, 112, **113**, 114, 121, 123, 134-137, 150, 188(n248), 199(n272)
- bomb-aimer's guide. See also No 2 Squadron
- bomb-aimer's helmet ('bone dome') 105
- bomb-aimer's log. See also No 2 Squadron
- bomb arming delay 100
- bomb ballistics 107, 111
- bomb bay. See also Canberra Mk 20
- bomb casing 109
- bomb carrier 94, 184(n216)
 - Avro triple carrier. See also Avro
 - Avro 100/1000lb standard carrier. See also Avro
- bomb, corkscrewing 96
- bomb damage assessment (BDA) 73, **76**, 91, 107, 110, **113**, 119, 123, 125, 126, 143-146, 148-151, 153-156, **157**, 158-160, 163, 165, 180(n185-186), 188(n251), 190(n263-264), 191(n269), 192(n272), 198(n314), 198(n316-317), 199(n318)
 - exaggerated 155
 - skewed 157
- bomb destruction distance 160
- bomb, 'dumb'/ unguided 110, 112, 119, 131, 165, 166, 199(n322), 199(n326)
- bomb filling. See also M.117 750lb bomb
- bomb, folding-fin. See also 1000lb bomb

Dreadful Lady over the Mekong Delta

- bomb fuze/fuzing 95, 99, 109, 111, 114, 128
 - arming vane 97
 - duplicate/double 101
 - instantaneous/delay 99, 101, 108, 114, 133, 153
 - M904 nose 97, 99, 101
 - M905 tail 97, 99, 101
 - nose/tail 100, 101, 106, 133
 - safety pin 97, **98**
 - variable time (VT) 118, 133, 160, 200(n329)
- bomb fuze-tail combination 95, 111, 133
- bomb, hang up 95, 153
- bomb, M.117. See also M.117 750lb bomb
- bomb photo. See also bombing photo/ photography
- bomb rack
 - centre-line 132
 - MA-4A 97, **100, 101**, 184(n222)
 - fuzing unit 101
 - triple carry, under-wing 132
- bomb release button 107
- bomb self-damage. See also Canberra Mk 20 battle damage
- bomb, smart' 111
- bomb spacing 96, 106, 108, **113**, 114, 121, 122, 145, 191(n267)
- bomb suspension lug 109, 128
 - single 95
 - double/ twin 95, 97
- bomb, unexploded (UXB) 96, 101, 107
- bomb, wing-tip mounted 87, 95, 97, 99, **100, 101**, 121, 153
- Bomber Command. See also Royal Air Force
- Bomber* FAC 74, 143
 - Bomber 42* 146
- bomber stream 132
- bombing accuracy 87, 105, 107-112, 114, 115, 118-120, 126, 134, 135, 154, 158-160, 163, 165, 188(n247), 190(n260), 190(n263), 199(n322), 199(n324-7)
 - B-57B Canberra, USAF 118
 - CEP. See also circular error probable
 - F-4, USAF 119
 - F-100, USAF 119
- bombing accuracy assessment 114, 115, 117, 119, 129, 159
 - photographic. See also bombing photo/ photography
 - review 130
 - self-assessment 114, 119
- bombing aim point 81, **104**, 106, 107, **113**, 114
- bombing altitude/ height 80, 105, 108, 111, 113-115, 118, 119, 121, 129-131, 134, 136, 144, 145, 148, 149, 153, 154, 163, 187(n241), 187(n244), 190(n262), 192(n272)
 - safe 108, 186(n239), 186(n240)
- bombing angle 103, 105, 119
- bombing, area 121, 126, 160, 161

Index

- bombing attitude 108, 137
- bombing, audio tape. See also Australian War Memorial
- bombing book*. See also No 2 Squadron
- bombing camera. See also camera
- bombing, CEP. See also circular error probable
- bombing computer, T-1, RAF **135**
- bombing computer, T-4. See also Canberra Mk 20 bombing computer
- bombing corrections 105
- bombing, day visual. See also bombing, visual
- bombing distribution 130, 160, 200(n327)
- bombing, dive 71, 88, 89, 93, 118, 119, 133, 134, 150, 152, 159, 165, 182(n197), 190(n259), 195(n296)
 - Canberra Mk 20 134, 196(n297)
- bombing, dry run 103, 107, 136
- bombing effectiveness 154-162, 199(n326)
- bombing error 110, 137
 - aiming error 110
 - ballistic error 110
 - circular. See also circular error probable (CEP)
 - datum error 111
 - line error 107, 108, 123, 130, 144, 189(n259)
 - 50%, 90% 130, 199(n324), 199(n327)
 - range error 107, 108, 130, 151, 189(n259)
 - 50%, 90% 130, 199(n324), 199(n327)
 - overshoot 107, 113
 - undershoot 107, 126, 129, 130, 144, 150, 151, 185(n230)
- bombing, fixed-sight head (FSH) technique 106, 135, 137, 180(n185)
- bombing, formation 123, 134, 165, 179(n175), 196(n297)
 - line astern/ trail 123, 126, 154
 - night 132
 - pair 123-126
 - trail 123
 - trio 124
 - quartet 124, **125**
- bombing, high altitude 92, 95
- Bombing Leader. See also No 2 Squadron
- bombing, level 81, 87, 88, 91, 92, 102, **104**, 108, 110, 111, 118, 129, 134, 150, 165
 - low level 91, 92, 103, 108, 130, 134-136, 145, 149, 165
 - hazard 108
 - very low level 111, 135, 187(n242)
- bombing mission/ sortie **139, 140**
 - Combat Proof/Combat Skyspot* mission. See also *Combat Proof/Combat Skyspot*
 - divert/ diversion. See also mission diversion
 - pre-strike 133, 140, **141**, 145, 149, 154, 179(n175)
- bombing pattern/ profile 102, 110, 126, 134, 136
 - race-track 72, 80, 102, **104**, 131, 133, 134
- bombing photo/photography assessment 81, 114, 115, **116**, 119, 159, 161, 199(n325)
- bombing, post-mission report. See also intelligence

Dreadful Lady over the Mekong Delta

- bombing pullup 108, 145, 186(n240)
- bombing, restriction (Cambodia) . See also Cambodia
- bombing, self-damage. See Canberra Mk 20 battle damage
- bombing, sighter 111, 126, 137
- bombing speed 103, 105, 106, **113**, 114, **118**, 121, 135-137, 150, 187(n244)
- bombing, stick 108, **113**, 121-123, 144, 145, 149-151, 154, **158**, 165, 178(n168), 180(n186), 181(n189), 185(n230), 188(n247), 192(n272)
 - salvo 145, 190(n263)
- bombing trial, joint USAF/US Army 71
- bombing, visual (VB), day 71, 72, 90, 91, 99, 103, 105, 123, 139, 179(n175), 182(n206), 185(n223), 185(n226)
- bombing, visual, night 131. See also *Night Owl*
- bomb drop, total. See also No 2 Squadron bombing statistics
- bombsight. See also Mk XIV bombsight
- 'bone dome'. See also bomb-aimer's helmet
- BOO. See also United States Government, Pacific Command
- booby trap 7. See also target type
- Bradford, Pilot Officer Harry, RAAF 179(n175)
- bridge. See also target type
- British 10, 31, 43, 51, 95. See also United Kingdom
- British Air Attache, Saigon. See also Helmore
- British Explosive Ordnance, USN NAVORD. See also United States Navy
- Bronco OV-10. See also North American Rockwell OV-10
- Broome, Western Australia 7
- Brown, Flight Lieutenant Lloyd, RAAF 153, 179(175)
- brown-water warfare. See also riverine warfare
- Bruce, Flight Lieutenant Bob, RAAF 135
- Buffalo* FAC. See also Forward Air Controller
- bunker. See also target type
- Bushell, Flying Officer John, RAAF 154, 179(n175), 180(n186)
- Butler, Sergeant Matthew, RAAF 158
- Butterworth RAAF Base. See also Royal Australian Air Force
- C-7 Caribou, USAF. See also De Havilland Canada C-7
- C-47 Dakota, USAF. See also Douglas C-47
- C-123 Provider, USAF. See also Fairchild C-123
- C-130 Hercules, USAF. See also Lockheed C-130
- CACTA (Combat Air Activity) database. See United States Government, National Archives
- cadre meeting, VC. See also target type
- Cai Be 55, province 78
- California 15, 16, 22, 25, 56
- Ca Mau 36, 153, peninsula 4, 22, 23, 41, 48, 53, 55, 57, **58**, 59, 141, **142**, 147, 152, 174(n103)
- Cambodia 1, 32, 33, 50, 53, 54, 57, 60, 148, 164, 178(n173), 197-8(n309)
 - bombing restriction 146, 173(n93), 197(n309)
 - border 4, 12, 27, 30, 32, 41, 42, 51, 52, 56, 70, 74, **78**, 120, **142**, 143, 146, 162, 197(n309)
 - President Sihanouk. See also Sihanouk

Index

- camera 107, 114, 115, 161, 188(n251)
 - 16-mm movie 119
 - 50-mm 119
 - 70-mm movie 119
 - F-24 114, **116**, 119
 - 5-inch lens 114
 - over-lapping images 114, **116**
 - F-52 114, 119
 - 10-inch lens 114, 153
 - film cartridge 114
 - Type 35 control box 107
- Cam Ranh Bay 21, 33, 176(n154), 190(n263)
- Cam Son Secret Zone 26, 44, 46, 47
- canal 4, **6**, 7, 22, 41, 46, 48, 51, 52, 55, 58, 59, 62, **76**, **78**, **79**, **82**, 84, 85, 99, 102, 103, 105, 107, 109, 121-123, 130, 140, 142, 143, 146, 148, 150, **152**, 153, **158**, 162, 165. See also target type
 - Dong Tien 55
 - Eo Lon 61
 - Gang Thanh – Vinh Te 52
 - Kinh Doi 78
 - Lagrange 44, 55, **142**
 - Ong Lon 55
 - Rach Gia – Long Xuyen 52
 - Rach Nui 47
 - Rach Ruong 44
 - Vinh Te 56
- Canberra, A.C. T.
 - Air Force Headquarters 132. See also Royal Australian Air Force
 - Department of Air. See also Department of Air
 - University of NSW/ADFA 193(n274)
- Canberra, B-57 bomber. See also Martin B-57
- Canberra Mk 20 bomber 1-3, 26, 57, 64, 65, **68**, 69, 72, 74, 75, 80, 81, **82**, 84, 85, **87**, 88-90, **91**, 92, 94-87, 99, **100**, **101**, **102**, 103, **104**, 105-8, **109**, 110, 111, 114, 115, 117, 119, 121, **122**, 123, 124, **125**, 126, 128-136, 139, 141, 143, **144**, 146-156, 160, 161, **162**, **163**, 164, 165, 176(n154), 177(n156), 178(n168), 178(n172), 182(n197-8), 182(n206), 183(n214), 184(n220), 185(n226), 185(n231), 186(n239), 186(n240), 187(n243), 188(n247), 188((n248), 189(n257), 191(n264), 191(n266), 193(n273), 194(n281), 194(n285), 195(n290), 196(n297), 196(n300), 197(n305)
 - A84-228 **87**, 145, 186(n239), 192(n270), 192(n272), 195(n296)
 - A84-230 178(n168), 191(n269)
 - A84-231 88, 123, 186(n239), 192(n271)
 - fatal last flight 196(n303)
 - A84-232 144, 150, 179(n175), 186(n239), 196(n303)
 - A84-233 186(n239), 192(n272)
 - A84-234 146, 150, 152, 154, 179(n175), 186(n239)
 - A84-235 72, 148, 150, 178(n168), 179(n175), 185(n230), 191(n264), 192(n270)
 - 195(n287), 195(n296)

Dreadful Lady over the Mekong Delta

- A84-236 77, 144, 151, 153, 154, 160, 179(n175), 187(n242), 187(n244), 192(n272),
200(n330)
- A84-237 150, 151, 154, 179(n175), 192(n270),
- A84-238 108, **109**, 145, 154, 179(n175), 185(n223)
- A84-240 148, 149, 151, 179(n175), 180(n186), 186(n239), 192(n270)
- A84-241 81, 145, 150, 151, 179(n175), 181(n189), 190(n263), 191(n264),
200(n330)
- A84-242 192(n270)
- A84-244 145, 148, 153, 186(n239)
- A82-246 179(n175), 191(n269)
- A84-247 **93**, 149, 150, 154, 179(n175), 180(n185), 186(n239)
- A84-248 123, 152, 179(n175)
- 12/24-way intervalometer 100, 105, 106, 121, 184(n216), 191(n267)
- aborted take-off 151
- air pressurisation 103
- all up weight (AUW) 106, **113**, 129
- altimeter 106, 129, 188(n248), 194(n281)
- autopilot/automatic pilot, absence of 94, 103, 195(n288)
- battle damage
 - bullet strike 145
 - own-bomb 108, 109, 114, 187(n242), 187(n244)
 - summary 186(n239)
- bird strike 151
- bomb-aimer. See also bomb-aimer
- bomb bay 94, **95**, **96**, 97, 99, 107, 114, 121, **122**, 133, 153, 178(n168)
- bomb bay door 105, 106, 107, 178(n168)
- bomb bay turbulence 95, 96, 184(n216)
- bombing accuracy. See also bombing accuracy
- bombing computer T-4 **135**, 136, 196(n298)
- bombing pattern/ profile. See also bombing pattern/ profile
- bombing system 94
- bombing trial. See also bombing trial
- camera. See also camera
- cockpit canopy, fogging up 103
- dive bombing. See also bombing, dive
- ejection seat, Martin-Baker MkIC 105
- endurance 74, 87, 88, 119, 130, 156, 165
- flight manual, AAP 966, 1st Edition 183(n210)
- formation flying **125**, **162**, **163**. See also bombing, formation
- fuel 87, 106, 111
 - AVTUR 187(n243)
 - JP-4 109, 187(n243)
 - tank 87, 96, 109
 - nitrogen purging 109, 187(n243)
- high-low-high mission profile 135
- inter-communication 76, 105, 106
- jump seat 74, 105
- level datum calibration 111

Index

- master arming switch 106, 107
- navigator/ bomb-aimer. See also bomb-aimer
- navigator's compartment 107
- nose, perspex/ plexi-glass 102, 105-107, 136, 187(n242), 187(n244), 196(n298)
- oxygen mask 105
- range 87
- Rolls-Royce Avon Mk 109 engine 87, 108, 114, 145, 151, 182(n198)
- stability 87, 165
- Variable Ratio Gear Box (VRGB) 136, 137
- wander lead 105
- weight and balance 110
- Can Tho 14, 22, 24, 31, 36, 47, 67, 69, **147**
- Caribou. See also De Havilland Canada C-7
- Carpenter, Pilot Officer Barry, RAAF 108, 123, 145, 148, 179(n175), 185(n230),
186(n240), 200(n328)
- Carver, Flying Officer Bob, RAAF 192(n271), 196(n303)
- CAS. See also close air support
- cassette. See also tape, cassette
- Catch-22*. See also Heller
- Catkiller*. See also 220th Combat (Delta) Aviation Battalion
- Cat Lo 33, 36
- cave 42. See also target type
- Cave, Lieutenant Gary, USAF 145
- CBU. See also cluster bomb unit
- CCB. See also Command and Communications boat
- CDT3. See also Royal Australian Navy
- CENTCOM. See also United States Army
- central highlands 9, 71
- Central Intelligence Agency (CIA) 22
- CEP. See also circular error probable
- Cessna 180, Australian Army 194(n279)
- Cessna A-37 Dragonfly **68**, 190(n263)
 - USAF 64, 68, 99, 119, 176(n154)
 - VNAF 38, 66, 68, 119, 150. **151**, 178(n173), 196(n296)
 - Panther* 152
- Cessna A-37B Dragonfly 132
- Cessna O-1 Bird Dog 68-70, **73**, 74, 80, 83, 131, **147**, 180(n177)
 - USAF 72, 83, 144, 145, 149, 150, 152, 180(n185-6)
 - US Army 27, 28, 72
 - VNAF 38, 72, 83, 185(n230)
- Cessna O-1A Bird Dog, VNAF 180(n189)
- Cessna O-1E Bird Dog, VNAF 180(n189)
- Cessna O-1G Bird Dog, USAF **70**, 180(n189)
- Cessna O-2 Super Skymaster, USAF 74, 178(n172)
- Cessna O-2A Super Skymaster, USAF 69
- Cessna O-2B Super Skymaster, USAF 69
- CH-21 Shawnee. See also Boeing-Vertol CH-21
- CH-46 Sea Knight. See also Boeing-Vertol CH-46

Dreadful Lady over the Mekong Delta

CH-47 Chinook. See also Boeing-Vertol CH-47
Charlie Charlie helicopter. See also command and control
Chau Doc 52, 56, province 78
CHECO. See also United States Air Force, Pacific Air Force
Chickasaw. See also Sikorsky H-19
Chief of the Defence Force (CDF). See also McNamara
China/ Chinese 1-3, 30, 33, 42, 49, 62, 171(n54)
chinagraph marker pencil 73, 74, 80, 94, 107, 112, 113
Chinook. See also Boeing-Vertol CH-47
Choctaw. See also Sikorsky H-34 and UH-34
Cholon 47
Christmas 41
Chu Lai 2, 34
Chuong Thien province 61
CINCPAC. See also United States Government, Department of Defense
circular error probable (CEP) 112, 119, 189(n259), 196(n298), 196(n303)
50% & 90% 112, 130, 137, 159, 199(n322), 199(n324)
civil guard, Vietnam 30
civil war. See also American Civil War
civilian casualties 84, 85
clandestine operations 22
Clarke, Flight Lieutenant Ash, RAAF 192(n270)
claymore-type mine. See also mine
clear and hold strategy 30
Clearance Diving Team 3 (CDT3). See also Royal Australian Navy
cleared 'hot' 81
clearing operation. See also mine clearing
climate 6
close air support (CAS) 13, 56, 64, 67, 91, 93, 120, 126, 131, 134, 139, 163,
177(n157), 178(n168), 179(n175), 192(n270), 195(n295)
cluster bomb unit (CBU) 153
coastal barrier. See also barrier
coastal junk force. See also Vietnam Navy
coastal radar. See also radar
coastal surveillance. See also surveillance
coastal surveillance centre 13, 31, 36
Coastal Surveillance Force (CSF)/ TF-115, US Navy 13, 14, 36, 37, 48-53,
Cobra. See also Bell AH-1G Cobra
Cochin China 10
COIN. See also counter-insurgency
Cold War 1, 62, 64, 165
collateral damage 85, 86, 111
collimator, optical. See also Mk IV bombsight
colonial rule 1
Colorado FAC. See also Forward Air Controller
COMAFV. See also Commander Australian Forces Vietnam
combat assault 39
combat aviation battallion/ group. See also 13th and 164th

Index

- Combat Proof/ Combat Skyspot* mission 91, 95, 99, 103, 123, 131-133, 139, 154, 179(n175), 182(n206), 183(n214), 185(n223), 185(n226), 191(n269), 195(n288)
- 1st Combat Evaluation Group (CEVG), Strategic Air Command, USAF
- Detachment OL-26 (*Gap*) 154
- Detachment OL-24 (*Milky*) 196(n303)
- AN/MSQ-77 Bomb Directing Central Radar, USAF 191(n266), 196(n303)
- AN/TPQ-10 Course Directing Radar Central, USMC 196(n303)
- Dong Ha Air Support Radar Team (ASRT), Marine Air Support Squadron Two (MASS-2), USMC 196(n303)
- combat salvage boat 58
- combined operation 28, 32, 33, 35, 41, 44, 46, 50, 52, 53, 55, 68, 140, 147, 150, 163, 165
- Command and Communication Boat (CCB)
- US Navy **19**
- VNN 31, 32
- command and control **11**, 15, 45, 72, 168(n16), 169(n22)
- helicopter (*Charlie Charlie*) 39
- joint 45
- No 2 Squadron. See also No 2 Squadron
- Commander, 35th TFW, USAF. See also 35th TFW
- Commander Amphibious Task Force, US Navy. See also Amphibious Task Force
- Commander, Australian Forces Vietnam (COMAFV) **127**, 193(n276)
- Deputy Commander 128, 193(n276)
- Commander Naval Forces, Vietnam (COMNAVFORV), US Navy 11-13, 23, 36, 37, 48, 51, 53, 60, 83
- Rear Admiral Ward, US Navy. See also Ward
- Vice Admiral Zumwalt, US Navy. See also Zumwalt
- Commander, Ninth Division, US Army. See also Ninth Division
- Commander, RAAF Vietnam (COMRAAFV) 65, 92, 127, 128, 132, 145, 194(n285), 200(n329)
- Air Commodore Dowling. See also Dowling
- Air Commodore Lush. See also Lush
- Air Commodore McNamara. See also McNamara
- Air Commodore Robey. See also Robey
- Air Commodore Spurgeon. See also Spurgeon
- Report 199(n318)
- Commander, Seventh Air Force, USAF. See also Seventh Air Force
- General Momyer. See also Momyer
- Commander, Seventh Fleet, US Navy. See also Seventh Fleet
- Commander, United States Military Assistance Command Vietnam (COMUSMACV)
- 2, 11, 26, 30, 35, 45, 47, 48, 63, 83
- General Abrams. See also Abrams
- General Harkins. See also Harkins
- General Westmoreland. See also Westmoreland
- General Weyand. See also Weyand
- Deputy Commander. See also Abrams
- Commander, Vietnam Armed Forces 45, 63
- Commander, Vietnam Navy. See also Vietnam Navy

Dreadful Lady over the Mekong Delta

- Commander-in-Chief Pacific Fleet, US Navy
 - Admiral Sharp. See also Sharp
- Commander-in-Chief, Pacific Command, US Army
 - General Waters. See also Waters
- Commanding Officer, No 2 Squadron. See also No 2 Squadron
- commando 21
- Commonwealth Strategic Reserve 196(n298)
- communicating distance 76
- communication 19, 41, 75
 - air-to-air 75, 85
 - air-to-ground 75, 77
 - bomb-aimer-to-FAC 106
 - frequency modulation (FM) 75
 - guard emergency channel 90, 93
 - inter-communication. See also Canberra Mk 20
 - language problems 84. See also language
 - morse code 194(n282)
 - Q code 129, 194(n282)
 - special. See also Beach Jumpers
 - ultra high frequency (UHF) 68, 73, 75, **113**
 - very high frequency (VHF) 75
 - voice 77
- communism/communist 1-3, 10, 27, 28, 30, 31, 33, 42, 44, 51, 54, 58-60, 63, 91, 161
- COMNAVFORV. See also Commander Naval Forces
- company, VC. See also target type
- COMRAAFV. See also Commander RAAF Vietnam
- COMUSARPAC. See also United States Army, Pacific
- COMUSMACV. See also Commander US Military Assistance Command Vietnam
- CONARC. See also United States Army
- concussion grenade. See also grenade
- Con Son Island 33
- Consilio et Manu (To Advise and To Strike)* **166**
- containment strategy 2
- Contemporary Historical Examination of Current Operations (CHECO). See also
 - United States Air Force, HQPACAF
- Continental Army Command (CONARC) . See also United States Army
- contraband 33
- Control and Reporting Center (CRC), *Paris* 75, 90
- Control and Reporting Center (CRC), *Portcall* 90
- Control and Reporting Post (CRP), *Paddy* 72, 73, 75, **93**, 107
- control tower 129
- Cooper, Flight Lieutenant Garry, RAAF 118, 119, 134, 181(n191),
194(n285)
 - Sock it to 'em Baby: Forward Air Controller in Vietnam* 118
- Coronado, California 16, 22, 25
- Corps/ Corps Tactical Zones (CTZs) 9, 84. See also numbered Corps I, II, III & IV
- Coulthard-Clark, Dr Chris 155, 158, 197(n309), 198(n314), 198(n316)
- counter-guerrilla warfare, unconventional 22

Index

- counter-insurgency (COIN) aircraft 68
- counter-insurgency warfare 26, 31, 45, 63, 120
- counter-mortar watch 27
- covert operation 27
- Cramer, Flight Lieutenant Geoff, RAAF 136, 186(n239)
- Croizat, Colonel Victor J, USMC 10, 34, 167(n11)
- cruiser-destroyer Task Group (TG70.8), US Navy. See also Seventh Fleet
- Crump, Squadron Leader Ron, RAAF 186(n239)
- curfew 85
- Curr, Pilot Officer Al, RAAF 150, 179(n175), 186(n239)
- currents & tides. See also tidal currents
- cutter (WPB). See also US Coast Guard
- Cuttriss, Pilot Officer Bob, RAAF 179(n175)
- Dalton Mk 4A computer, dead reckoning ('Prayer Wheel') 137
- Da Nang 13, 21, 22, 33, 34, 36, 38, 176(n154)
- Dan Doi River. See also Song Dan Doi
- Darwin, N.T. 6
- DASC. See also Direct Air Support Center
- Dau Tieng 57, 148
- David FAC 74, 84, 85, 126, 143, 144, 145, 152, 153, 156
 - David 12 180(n186)
 - David 32 148, 180(n186)
 - David 42 **73**
 - David 63. See also Cave
 - David 64 145
 - David 65 145
 - David 71. See also Allen
 - David 72 151
 - David 73 149, 150
 - David 75 150, 191(n264)
- DCOMAFV. See also Commander Australian Forces Vietnam
- D-day 23
- de Heer, Derrill, UNSW/ADFA 193(n274)
- Defense Department, US. See also United States Government
- defensive position. See also target type
- De Havilland Canada C-7 Caribou
 - RAAF 2, 128
 - USAF 51, 131
- Delta Aviation Battalion, US Army 24, 170(n41)
- Delta Military Assistance Command (DMAC) 36
- Demilitarized Zone (DMZ) 1, 9, 12, 35, 40, 120, 147, 179(n175)
 - 17th parallel. See also 17th
- density altitude 128, 129, 194(n279-280)
 - correction chart 106, **130**
- Department of Air, Canberra **127**, 164, 185(n235)
- Department of Defence, Australia
 - Chief of the Defence Force (CDF). See also McNamara
- Department of Defense, United States. See also United States Government

Dreadful Lady over the Mekong Delta

- Deputy Commander, AFV. See also Commander, Australian Forces Vietnam
Deputy Commander, USMACV. See also Abrams
Deputy Director, DASC Alpha. See also Direct Air Support Center
DER. See also Radar Picket Escort
destroyer. See also Royal Australian Navy, Seventh Fleet, Vietnam Navy
destroyer escort. See also United States Navy
Di An 39
Diem government 2, 43
Diem, President Ngo Dinh 34, 44
Dien Bien Phu. See also Battle of Dien Bien Phu
dike 7, 54, 121, **141**
Dinassault (Naval Assault Division) 31
Dinh Tuong province 44, 55, 61
direct action mission 22
Direct Air Support Center (DASC) **65, 66, 85**
 III Corps DASC. See also III Corps
 IV Corps DASC. See also IV Corps
 DASC Alpha 71
 Deputy Director. See also Powell
 intelligence summaries 191(n269)
distance estimation/ measurement, FAC 81, 180(n180)
district chief 30
dive bombing. See also bombing, dive
diversion/ divert. See also mission diversion/ divert
Dixie Station 13
DMAC. See also Delta Military Assistance Command
DMZ. See also Demilitarized Zone
Dock Landing Ship (LSD). See also Landing Ship, Dock
'domino effect' 2
Dong Ha ASRT. See also *Combat Proof/Combat Skyspot*
Dong Tam 16, 26, 27, 33, 39, 46, 67, 69, 72, 74, 79, 181(n191)
Dong Tien. See also canal
Doppler principle/ radar. See also *Green Satin*
Douglas A-1 Skyraider, VNAF **38, 66, 68, 152, 190(n263), 195(n296)**
Douglas A-1H Skyraider, US Navy 13
Douglas A-4 Skyhawk, US Navy 13
Douglas C-47 Dakota 131, 148, **151**
Dowling, Air Commodore Jack, RAAF 193(n275)
Down To Earth. See also Evans
Downing, Wing Commander John, RAAF 197(n305), 199(n325), 200(n327)
Dragonfly. See also Cessna A-37
drift. See also wind drift
Drummond, Wing Commander Vance, RAAF 70, 194(n277)
dry season. See also weather
dry run. See also bombing, dry run
Duffel Bag team. See also Beach Jumpers Unit
'dumb' bomb. See also bomb, 'dumb'
Dung island **143**

Index

- Dunnavent, Professor R. Blake 62, 161
 Rolling Thunder in a Gentle Land: The Vietnam War Revisited 161
- Duus, Flight Lieutenant Nev, RAAF 187(n242), 187(n244)
- Dyke, Squadron Leader, later Air Commodore Graham, RAAF 153, 187(n244)
- Eagle FAC
 Eagle 24 83, 150, 180(n185)
 Eagle 29 83, 180(n186)
- effects-based bombing. See bombing effectiveness
- election 42
- Emu*. See also Bell UH-1D and UH-1H
- EMU (Experimental Military Unit). See also 135th Assault Helicopter Company (AHC)
- engineer 35. See also No 2 Squadron
- engineering workshop. See also target type
- Ennis, Flying Officer Gary ('Huck'), RAAF 30, 81, 85, 178(n173), 190(n263)
- EOD. See also Explosive Ordnance Disposal
- Eo Lon canal. See also canal
- Equator 6
- escort patrol vessel, VNN. See also Vietnam Navy
- error. See also bombing error
- European Theatre. See also World War II
- Evans, Wing Commander, later Air Marshal David, RAAF 90, 99, 110, 117, 118, 128,
 132, 133, 158, 164, 182(n206), 184(n221), 185(n223), 187(n241), 190(n262),
 196(n297)
 autobiography, *Down to Earth* 128
- Ewell, Major General Julian, US Army 168(n16), 181(n191)
- Experimental Military Unit (EMU). See also 135th Assault Helicopter Company
- Explosive Ordnance Disposal (EOD) Group, US Navy 41
- F-4 Phantom. See also McDonnell Douglas F-4
- F-5 Freedom Fighter, VNAF. See also Northrop F-5
- F-8F Bearcat, VNAF. See also Grumman F-8F
- F-24 camera. See also camera
- F-52 camera. See also camera
- F-100 Super Sabre, USAF. See also North American F-100
- F-105 Thunderchief, USAF. See also Republic F-105
- F-111, USAF. See also General Dynamics F-111
- F-111C, RAAF. See also General Dynamics F-111C
- FAC. See also Forward Air Controller
- Fairchild C-123 Provider, USAF 51
- Farqharon, Pilot Officer Terry, RAAF 182(n199)
- feet wet* 89, 94, 143
- ferry crossing 33
- Field Force Commander. See also Army of the Republic of Vietnam (ARVN)
- fighter aircraft. See also Seventh Air Force tactical fighter
- fighting position. See also target type
- 'Finger Lake' (location). See also rendezvous icons
- fire base concept 26
- fire support 11

Dreadful Lady over the Mekong Delta

Fire Support Base

Le Loi 26

fire support, naval gunfire. See also naval gunfire support

'first SEALORD' 51

'Fishhook' (location). See also rendezvous icons

fixed sight-head (FSH) bombing technique. See also bombing, fixed sight-head

fixed wing aviation, US Army 27, 131

flame thrower 19. See also Zippo

Fleet Air Arm. See also Royal Australian Navy

flight following radar. See also radar

Florida FAC. See also Forward Air Controller

fog of war 67

formation bombing. See also bombing

fortification. See also target type

Forward Air Control 13, 27, 38, 64, 70, 72-74, 102

Forward Air Control aircraft

Cessna 0-1. See also Cessna O-1

Cessna 0-2. See also Cessna O-2

North American-Rockwell OV-10. See also North American-Rockwell OV-10

Forward Air Control squadron

19th TASS. See also 19th TASS

22nd TASS. See also 22nd TASS

504th TIS. See also 504th TIS

Forward Air Control 'University'. See also 504th TIS

Forward Air Controller (FAC) 27, 51, 56, 67-69, 70-78, 80, 81, 83, 85, 88, 91, 94, 100,

102, 103, 105, 106, 107, 109, 110, 119, 121-123, 129, 131, 134, 136, 147, 150,

151, 153, 155, 156, 163, 165, 192(n270), 194(n282)

RAAF 30, 61, 69, 70, 72, 75, 81, 85, 111, 118, 133, 146, 148, 194(n277), 198(n309)

Flight Lieutenant Cooper. See also Cooper

Flight Lieutenant Hudnott. See also Hudnott

Flight Lieutenant Mitchell. See also Mitchell

Flight Lieutenant Sibthorpe. See also Sibthorpe

Flying Officer Ennis. See also Ennis

Flying Officer Kellaway. See also Kellaway

Flying Officer Robson. See also Robson

Flying Officer Schulz. See also Schultz

Flying Officer Semmler. See also Semmler

Squadron Leader Neil. See also Neil

Wing Commander Drummond. See also Drummond

Wing Commander Larard. See also Larard

Wing Commander Powell, RAAF. See also Powell

US Army 27, 28, 72

USAF 36, 61, 63, 69, 70, 72, 83, 86

19th TASS. See also 19th TASS

22nd TASS. See also 22nd TASS

Alan 74

Andy 74

Bart 74

Index

- Bomber*. See also *Bomber*
- David*. See also *David*
- Issue*. See also *Issue*
- Jade*. See also *Jade*
- Nile* 180(n177)
- Rash 27* 192(n272)
- Sidewinder* 180(n177)
- Slugger* 148
- Tamale*. See also *Tamale*
- Walt 72* 178(n172)
- VNAF 38, 61, 69, 72, 74, 75, 83-86, 178(n171), 180(n189), 200(n328)
 - Buffalo* 84
 - Colorado* 84
 - Eagle*. See also *Eagle*
 - Florida* 84
 - Kansas* 84
 - language difficulties. See also language
 - Mexico* 84
 - Miami* 84
 - observers 83, 84
 - Ohio* 84, 185(n230)
 - Oregon* 84
 - Vietnamization. See also Vietnamization
- fox hole. See also target type
- fragmentary order/ frag 68, 72, 75, 91, 94, 103, 120, 126, 139, 152-154, 160, 179(n175), 185(n223), 192(n272), 200(n329)
- France/ French 1, 10, 24, 28, 31, 34, 37, 43, 46, 75
 - Foreign Legion 10
 - language. See also language
- free fire zone 85
- Free World Force /Free World Air Force 2, 156
- frigate, VNN. See also Vietnam Navy
- frogman. See also Underwater Demolition Team or SEAL
- Frost, Flight Lieutenant Brian, RAAF 192(n270)
- FSH. See also bombing, fixed sight-head
- fuel barge. See also barge
- fuel, Canberra. See also Canberra Mk 20
- fuel storage area. See also target type
- Fulton, Colonel, later Major General William B, US Army 48, 167(n13)
- fuze. See also bomb fuze
- Gailer, Colonel Frank, USAF 198(n314)
- Galligan, Colonel Walter, USAF 189(n259)
- Gang Thanh – Vinh Te canal. See also canal
- Gap* radar station. See also *Combat Proof/Skyspot*
- gasoline 109
- GAU-2 7.62-mm mini-gun. See also AN/GAU-2
- Gavin, Major General James M, US Army 64
- General Dynamics F-111, USAF 119

Dreadful Lady over the Mekong Delta

- General Dynamics F-111C, RAAF 117, 164, 189(n257)
- General Motors 6-71 diesel engine 22
- Geneva accords, 1954 1, 42
- Germany/ German 1, 23
- GI 30
- Giang Thanh - Vinh Te canal system. See also canal
- Giap, General Vo Nguyen, NVA 44
- Gloster Meteor, RAAF 64
- 'Gonads' (location). See rendezvous icons
- Goodwin, Pilot Officer Paul, RAAF 182(n199), 186(n239)
- 'go through dry'. See also bombing, dry run
- Government Aircraft Factory (GAF), Melbourne, Victoria 87, 182(n198)
 - Canberra Mk 20. See also Canberra Mk 20
 - Design and Production departments 97
- Grand canal. See also canal
- 'Green Fleet', Mekong Delta 16
- Green Satin* (Marconi ARI.5851) doppler radar 106, **118**, 134-136, 196(n300)
 - unlocking 106, 135
- grenade 55
 - rocket-propelled ant-tank
 - RPG-2 123
 - RPG-7 123
- grenade, concussion 58, 59
- grenade launcher 15, 18, 21
- grid coordinates. See also Universal Transverse Mercator (UTM)
- Grindon-Ekins, Flight Lieutenant Peter, RAAF 192(n270)
- ground attack 64
- ground fire. See also small-arms fire
- ground speed. See also bombing speed
- Grove, Squadron Leader Ivan, RAAF **89**, 144, 145, 148, 149-151, 153, 154, 179(n175), 180(n185), 186(n240), 191(n264), 192(n272), 195(n287)
- Growder, Pilot Officer Peter, RAAF 150, 154, 179(n175)
- Grumman A-6 Intruder, US Navy 132
- Grumman F-8F Bearcat, VNAF 37
- Guam 92
- guard emergency radio channel/frequency. See also communication
- guerilla 5, 26, 28, 42-44, 63, 131
- guerilla tactic 2, 27, 48
- guerilla warfare 1, 63, 86, 131
- guided munitions 165
- Gulf of Siam/ Thailand **4**, 7, 36, 37, 40, 47, 51, 52, 55, 57, 78, 143, 147, 152, 153
- gun sight 80
- gunboat, patrol (PG)
 - US Navy 58
 - VNN 32
- gunboat, river 59
- gunfire support, airborne 36
- gunfire support, naval. See also naval gunfire support

Index

- gunship, helicopter 15, 27, 39, 41, 46, 55, 68, 131. See also Bell UH-1 H-19. See also Sikorsky H-19
- H-34. See also Sikorsky H-34
- Hackworth, Colonel David H, US Army 7, 10, 30
- HAHS bomb. See also bomb, 1000lb
- HAL-3 US Navy (*Sea Wolf*). See also Helicopter Attack Squadron
- Hall, Dr Bob, University of New South Wales/ ADFA 193(n274)
- Halvorson, Flying Officer, later Wing Commander Lance, RAAF 191(n269)
- Hammond, Flight Lieutenant Brian, RAAF 151
- hang up. See also bomb, hang up
- Hanigan, Flight Lieutenant Jim, RAAF 192(n270)
- Hanoi 1, 47
- harassment and interdiction (H & I) 41
- Hardcastle, Pilot Officer Ross, RAAF 179(n175), 186(n240)
- Harkins, General Paul D, US Army 168(n14)
- Ha Tien 52, 56
- Headquarters 22nd TASS. See also 22nd TASS
- Headquarters 35th Tactical Fighter Wing (TFW). See also 35th TFW
- Headquarters Central Command (CENTCOM). See also United States Army
- headquarters complex. See also target type
- Headquarters Pacific Air Force (HQ PACAF). See also United States Air Force
- Headquarters RAAF. See also Royal Australian Air Force
- Headquarters RAAF Vietnam. See also Royal Australian Air Force
- Headquarters Seventh Air Force, USAF. See also Seventh Air Force
- Headquarters Vietnam Air Force (VNAF). See also Vietnam Air Force
- Heavy SEAL Support Craft (HSSC). See also SEAL Support Craft
- Helicopter Attack Squadron, Light, US Navy, HA(L)-3/ *Sea Wolf* 15, 16, 27, 51, 54, 68, 169(n27)
- Detachment 1 (*Sea Float*) 58
- Helicopter Combat Support Squadron, US Navy, HC-1 15
- helicopter gunship. See also gunship
- helicopter, light utility 131
- helicopter, observation. See also light observation helicopter
- helicopter, scout 28
- Helicopter Transport Squadron Medium, USMC, HMM-163 34
- Helicopter Transport Squadron Medium, USMC, HMM-362 13, 34, 35
- helicopter-borne troop landing 140, 150
- Heller, Joseph, author *Catch-22* 159, 164, 181(n191), 185(n236)
- Helmore, Group Captain P W, RAF 69
- Herbert, Flying Officer Mike, RAAF 179(n175), 192(n271), 196(n303)
- high endurance cutter. See also United States Coast Guard
- Highest Traditions – The History of No. 2 Squadron, RAAF*. See also Bennett
- high-low-high mission profile. See also Canberra Mk 20
- highway #4 5, 30
- Hill, Wing Commander Vin, RAAF 71, 111, 192(n270)
- HMAS *Brisbane* 40, 41
- HMAS *Hobart* 40, 41, 173(n93)
- Commanding Officer. See also Swan

Dreadful Lady over the Mekong Delta

- HMAS *Perth* 40, 41
HMM-163. See also Helicopter Transport Squadron Medium
HMM-362. See also Helicopter Transport Squadron Medium
Ho Chi Minh 1, 44
Ho Chi Minh trail 2, 12, 42, 43, 44, 84, 146
'hold high and dry' 81
Hon Da Bac islet 41
Hong Kong 41
Hon Rai island 41
Hon Tre island 90
 Portcall CRC. See also Control and Reporting Center
hooch (structure). See also target type
Hopper, Leading Aircraftman Evan ('Grassy'), RAAF 98, 184(n222)
hospital ship. See Vietnam Navy
Howe, Flight Lieutenant later Wing Commander Bob, RAAF 1, 70, 71, 74, 76, 77, 81,
 83, 88, 89, 108, 117, 119, 124, 127, 129, 137, 140, 141, 142, 143, 144, 145, 146,
 148-154, 158-160, 179(n175), 180(n180), 180(n185-6), 180(n189), 185(n230), 186(n240),
 187(n244), 191(n264), 192(n272), 194(n285), 195(n287), 196(n297)
howitzer, 105-mm. See also 105mm howitzer
howitzer, self-propelled 155-mm. See also 155mm self-propelled howitzer
HQPACAF. See also United States Air Force
HSSC. See also SEAL support craft
Hudnott, Flight Lieutenant Chris, RAAF 178(n173)
'Huey'. See also Bell UH-1 Iroquois
Hughes, Wing Commander H A ('Bill'), RAAF 192(n270)
humidity, high 103, 128
Hunt, Squadron Leader Bruce, RAAF 160, 186(n239), 200(n330)
hunter-killer patrol, night 39
Hyde, Pilot Officer Des, RAAF 179(n175)
hydrographic reconnaissance 21
Hyland, Vice Admiral John, US Navy 169(n22)
Ia Drang Valley 2
improvisation 101
improvised explosive device (IED). See also target type
indicated air speed (IAS) 103, 105, 113, 136
Indochina 1, 2
Indonesia 196(n298)
Indonesia-Malaya confrontation 135
infantry 7, 10, 17, 42
 ARVN 28, 39, 46. See also 7th, 9th, 18th, 21st and 25th Divisions, ARVN
 Australian Army. See also 1 RAR, 5 RAR
 NVA. See also 88th, 95th, 95A regiments, North Vietnam Army
 US Army 46. See also 1st and 9th Divisions, US Army
 USMC 35
 VC 44, 46
infiltration, enemy 12, 27, 32, 33, 36, 43, 50, 53-55, 57, 60, 62, 139, 143
intelligence 42, 48
intelligence operation, special. See also special intelligence

Index

- intelligence, post-mission report/ summary 68, 107, 110, 114, 123, 157, 192(n273)
- inter-communication. See also Canberra Mk 20
- interdiction 11, 13, 51-53, 55-57, 64, 74, 120, 134, 139, 143, 163, 179(n175)
 - 195(n295)
 - barrier. See also barrier
- inter-service rivalry 11, 167(n13)
- intervalometer. See also Canberra Mk 20
- Intruder. See also Grumman A-6
- Iroquois. See also Bell UH-1
- 'Iron Triangle' (location) 42
- Issue FAC
 - Issue 21, Squadron Leader Neil. See also Neil
 - Issue 23, Flight Lieutenant Mitchell. See also Mitchell
 - Issue 27, Flight Lieutenant Hudnott. See also Hudnott
 - Issue 28, Flying Officer Semmler. See also Semmler
- Jade FAC 152
 - Jade 01, Wing Commander Powell. See also Powell
 - Jade 01, Wing Commander Larard. See also Larard
 - Jade 07, Flying Officer Schulz. See also Schulz
 - Jade 07, Flying Officer Robson. See also Robson
- Japan 1
- JCS. See also United States Government
- Joint Air-Ground Operations System (JAGOS) 64, **65**, 177(n157)
 - MACV Directive 95-11 177(n157)
- joint Australian strike **125**, 126
- Joint Chiefs of Staff (JCS). See also United States Government
- joint command and control. See also command and control
- joint command post 19
- joint force 16, 122
- joint operation 10, 35, 39, 45, 46, 50, 53, 64, 68, 165
- Joint Operations Center (JOC) 64
- joint tactical air operation 64
- joint USAF/US Army bombing trial. See also bombing trial
- Johnson, President Lyndon B 2, 3, 47, 61
- JP-4 jet fuel 109
- junk 12, 13, 31, 32, 36, **37**, 42, 46, 58, 59. See also target type
- jungle 24, 42, 84, 99
- Kansas FAC. See Forward Air Controller
- KBA. See also killed by air
- KC-135. See also Boeing KC-135
- Kellaway, Flying Officer Richard ('Dick'), RAAF 180(n177)
- Kennedy, Pilot Officer John, RAAF 150, 151, 187(n242), 191(n264)
- Kennedy, President John F 2, 44
- kerosene 109
- Khe Sanh 3, 35, 173(n82)
- KIA. See also killed in action
- Kien An **142**
- Kien Giang province 41

Dreadful Lady over the Mekong Delta

- Kien Hoa province 35, 39, 40
- killed by air (KBA) **113**, 148-151, 153-156, **157**, 180(n185-6), 191(n264), 200(n328)
- killed in action (KIA) 36, 41, 46
- Kinh Doi canal. See also canal
- Kit Carson scout 59
- Korea. See also Republic of Korea
- Korean War 63, 64, 97
- Lagrange canal. See also canal
- Lambert, Lieutenant later Lieutenant Colonel Roger, Australian Army 200(n330)
- Lancaster. See also Avro Lancaster
- Landing Craft, Mechanized, LCM-6
 - US Navy 17, 18, 19, 22, 46, 51, 58
 - VNN 31
- Landing Craft, Mechanized, LCM (M) ('Mike'), US Navy 21
- Landing Craft, Mechanized, Monitor
 - US Navy **17**, 18, 19, 59
 - VNN 31, 32
- landing craft, personnel ramp, US Navy 21
- Landing Craft Repair Ship, US Navy. See also USS *Askari*
- landing, helicopter-borne. See also helicopter-borne landing
- Landing Ship, Dock (LSD), US Navy 35
- Landing Ship Medium, VNN 32
- Landing Ship Support Large (LSSL), VNN 58
- Landing Ship Tank (LST)
 - US Navy **16**, 33, 35, 46. See also USS *Garrett County*, USS *Vernon County* and USS *Washoe County*
 - VNN 32, 33
- landing zone preparation (LZ prep) 40, 81, 133, 140, **141**, 149-151, 179(n175)
- language 75, 85
 - Australian accent/ 'strine' 75, 84, 178(n173)
 - combat pidgin English 75
 - English 60, 72, 85
 - English-speaking Vietnamese 61, 83, 84
 - French 75
 - beaucoup 75, **76**
 - TACAIR jargon 84
 - Vietnamese 60, 69, 72, 178(n174)
- Laos 63
- Larard Wing Commander Peter, RAAF 178(n172), 194(n285)
- Laurence, Captain Steve, USAF 178(n172)
- LCM-6. See also Landing Craft, Mechanized
- LCM(M). See also Landing Craft, Mechanized
- Le Loi fire support base (FSB). See also fire support base
- Lewis, Flight Lieutenant Merv, RAAF 151, 153, 154
- light aircraft 129
- Light Attack Squadron, US Navy, VAL-4 (*Black Pony*) 36, 51, 54, **56**
 - detachment alpha, Binh Thuy 56
 - detachment bravo, Vung Tau 56

Index

- Light Helicopter Attack Squadron. See also Helicopter Attack Squadron, Light
- Light Support Craft. See also SEAL support craft
- Light Observation Helicopter (LOH) 107, 153, 155, 192(n272)
- limited war 64
- line error. See also bombing error
- Little Creek, Norfolk, Virginia 22
- littoral warfare 35
- local force. See also Viet Cong
- Lockett, Flying Officer Al, RAAF 192(n270)
- Lockheed C-130 Hercules 131
- Lockheed P-2 Neptune 12
- Lockheed P-3 Orion 12
- log barricade. See also target type
- LOH. See also Light Observation Helicopter
- Long Binh 47
- Long Hai hills/ mountains 41, **125**, 126, 179(n175), 188(n247)
- Long Tau river. See also Song Long Tau
- Long Xuyen 31, 52, 143
- Lonie, Squadron Leader, later Group Captain Frank, RAAF 77, 123, 129, 180(n176),
186(n239)
- loudspeaker broadcast 23
- LSD. See also Landing Ship, Dock
- LSSC. See also SEAL support craft
- LST. See also Landing Ship Tank
- Lush, Air Commodore J F ('Ginty'), RAAF 183(n210), 193(n275)
- LVT. See also Alligator
- LZ preparation. See also landing zone preparation
- M-1 rifle 171(n54)
- M-16 rifle 30
- M-39 20-mm cannon. See also 20mm cannon
- M-60 7.62-mm machine gun. See also 7.62mm machine gun
- M-113 Armoured Personnel Carrier (APC) 44
- M.117 750lb bomb 92, 97, 99, **100**, **101**, 102, 108, 109, 111, 112, 121, **122**, 123, 132,
144, 145, 148-151, 153, 154, 165, 180(n185), 180(n186), 180(n189), 184(n222),
185(n223-4), 185(n226), 185(n228), 185(n230), 186-7(n240), 187(n244),
190(n259), 190(n263-4), 191(n267), 192(n272), 197(n305), 199(n325),
200(n330)
- filling 101
- Tritonal 97
- fragments 108
- fuze. See also bomb fuze
- fuzing wire, inferior 101
- quality assurance (QA), suspect 101
- M904 nose fuze. See also bomb fuze
- M905 tail fuze. See also see bomb fuze
- MA-4A multi-adaptor bomb rack. See also bomb rack
- machine shop. See also target type
- MACV. See also Military Assistance Command Vietnam (MACV)

Dreadful Lady over the Mekong Delta

- Magpie* 68, 71, 74, 75, **76**, **77**, 81, 83-91, 93, 95, 99, 101, 102, 107, 109, **110**, 112, 114, **116**, 118-124, **125**, 126, 129, 131, 133, 136, 137, 139, 141, **142**, **143**, 144, 146-150, 152-154, **155**, 156, 159-161, **162**, **163**, 165, **166**, 176(n154), 189(n257), 194(n281), 195(n288), 197(n307), 200(n330)
- Magpie 11* 148-151, 153, 179(n175), 191(n264)
- Magpie 21* 123, 151-154, 179(n175), 191(n264)
- Magpie 31* **93**, 144, 145, 150-152, 154, 179(n175), 200(n330)
- Magpie 41* 145, 150, 151, 154, 179(n175), 200(n330)
- Magpie 51* 123, 144, 145, 149, 150, 154, 179(n175), 180(n185-6), 192(n272)
- Magpie 52* 179(n175)
- Magpie 53* 179(n175)
- Magpie 61* 150, 179(n175), 192(n272)
- Magpie 62* 179(n175)
- Magpie 63* 179(n175)
- Magpie 71* 145, 148, 150, 154, 179(n175)
- Magpie 81* 145, 146, 148, **152**, 154, 179(n175), 192(n272)
- Magpie 91* 195(n287), 179(n175)
- Malaya/ Malaysia 43, 91, 196(n298)
- Indonesia confrontation 135
- mangrove 5, 24, 46, 78, 147
- Mao Tse Tung 1, 63
- Marconi ARI.5851. See also *Green Satin*
- marker, smoke. See also smoke marker
- Martin B-57 Canberra, VNAF 38
- Martin B-57B Canberra, USAF 64, 65, **68**, 114, 118, 132, 176(n154), 194(n285), 195(n290)
- Martin Baker ejection seat. See also Canberra Mk 20
- master arming switch. See also Canberra Mk 20
- MATSB. See also Mobile Advanced Tactical Support Base
- McDonnell Douglas F-4 Phantom, USAF 64, **68**, 92, 119, 132, 190(n263), 195(n296)
- bombing accuracy 119, 190(n263)
- McDonnell Douglas F-4B, USMC 132
- McDonnell Douglas F-4C, USAF 119, 132, 176(n154), 190(n263)
- McDonnell Douglas F-4D, USAF 176(n154)
- McDonnell Douglas RF-4C, USAF 180(n176), 198(n309)
- McIndoe, Flight Lieutenant Hugh, RAAF 136
- McNamara, Air Commodore, later Air Chief Marshal RAAF, Sir Neville 92, 193(n276)
- McNamara, Robert, US Secretary of Defense 114, 168(n16), 192(n273)
- MDMAF. See also Mekong Delta mobile afloat force
- measure of effectiveness (MOE) 154, 161
- Mekong Delta/ valley 1, 3, **4**, 5, 6, **7**, 9-14, 16, 17, 19, 21-28, **29**, 30-35, 39-44, 46-49, **50**, 51, **52**, 53, 55-57, **58**, 59-63, 65-70, 72, 74, 80, 81, 83, 84, 88, 89, 94, 99, 103, 108, 121, 122, 126, 128-130, 134, 136, 139-141, **142**, 146, 147, 154, 156, 160-166, 170(n41-2), 179(n175), 188(n248)
- Mekong Delta 'Green Fleet'. See also 'Green Fleet'
- Mekong Delta mobile afloat force (MDMAF) concept 25
- Mekong River 4, 10, 18, 33, 35, 57, 79, **101**, 102, 154

Index

- memorandum of understanding, RAAF-USAF 64, **127**
- merchant ship/ vessel 36
- Meteorological Service. See also US Air Force
- Mexico* FAC. See also Forward Air Controller
- Miami* FAC. See also Forward Air Controller
- Michelin rubber plantation 57
- mid-air collision risk 103, 150, 194(n281)
- Mike* force. See also 5th Special Forces Group
- 'Mike' landing craft. See also Landing Craft, Mechanised
- Military Assistance Command Vietnam (MACV) 9, 10, 14, 25, 45, 46, 60, 63, 93, 114, 177(n157)
 - I Field Force. See also I Field Force
 - II Field Force. See also II Field Force
 - MACV Directive 95-11. See also Joint Air-Ground Operations System (JAGOS)
- Military Region (MR) 65. See also respective numbered Corps/MRs (I, II, III & IV)
- Milky* radar station. See also *Combat Proof/Skyspot*
- Miller, Flight Lieutenant, later Wing Commander John ('Wang'), RAAF 85, 105
- mine 32. See also target type
- mine, claymore-type 49
- mine clearing 21, 42, 149
- mine, command detonated 44
- mine counter measure 42
- Mine Division 112, US Navy 21
- mine, Soviet BMP-2 limpet mine 42
- Mine Squadron 11 detachment alpha, US Navy 21
- mine sweeping 12, 20, 21, 31, 32, 36, 51, 55
- Mine Sweeping Boat (MSB), US Navy 21
- mission brief, FAC **73**
- mission brief, navigator bomb-aimer. See also No 2 Squadron
- mission diversion/ divert 72, 84, 89, 160, 188(n247), 192(n272), 195(n285)
- mission duration 88
- Mitchell, Flight Lieutenant Ken, RAAF 146
- Mk IV 20-mm gun pod. See also 20-mm machine gun
- Mk XIV bombsight **102**, 105, 106, 107, 111, **113**, 114, 117, **118**, 126, 136, 182(n197), 185(n234), 188(n248), 189(n257), 196(n298)
 - fixed sight head (FSH). See also bombing, fixed sight head
 - gyro control unit 106
 - optical collimator 106
 - reflector glass 106
 - string alignment 111, 117
- Mk 109 Avon engine. See also Canberra Mk 20
- Mobile Advanced Tactical Support Base (MATSB). See also Operation *Sea Float*
- Mobile Riverine Base (MRB), US Navy 17, 22, 23, 45, 46, **54**
 - USS *Benewah*. See also USS *Benewah*
 - USS *Colleton*. See also USS *Colleton*
- Mobile Riverine Force (MRF)/ Task Force TF-117, US Navy 13, 14, 16, **17**, 20, 21, 26, 27, 32, 41, 44, 46-51, 53, 55, 66, 67, 75
- Mobile Strike Force. See also 5th Special Forces Group

Dreadful Lady over the Mekong Delta

- mobile support team (MST) 59
- Moc Hua 53, 54, 148
- MOE. See also measure of effectiveness
- Molony, Flying Officer Bob, RAAF 151, 154, 179(n175), 186(n239)
- Momyer, General William, USAF 173(n82)
- monitor. See also Landing Craft, Monitor
- monsoon/ monsoonal weather. See also weather
- Morrissy, Pilot Officer Tom, RAAF 200(n328)
- mortar 43, 46, 61
 - 4.2-inch. See also 4.2-inch mortar
 - 81mm. See also 81mm mortar
 - barge. See also barge
- MRB. See also Mobile Riverine Base
- MRF. See also Mobile Riverine Force
- MSB. See also Mine Sweeping Boat
- MSSC. See also SEAL Support Craft
- Murphy, Pilot Officer Peter, RAAF 85
- 'Mushroom' (location). See also rendezvous icons
- Mustang. See also North American P-51
- My Tho 26, 28, 31, 40, 44, 47
- My Tho river 26
- Nam Can mangrove forest 55, **142**, 147
- National Capital Special Zone 32
- National Liberation Front 2, 42, 43, 44
- Naval Air Station North Island, San Diego, US Navy 56
- Naval Air Station, Nowra, NSW, RAN 39
- naval air support 15, **141**
- Naval Forces Vietnam (NAVFORV), US Navy 13, 14, 33, 45, 62, 161
 - Commander (COMNAVFORV). See also Commander
- naval gunfire support (NGFS) 13, 32, 35, 36, 37, 40, 41, 48, 56
- naval support base. See also Vietnam Navy
- NAVFORV. See also Naval Forces Vietnam
- navigation aid/ navaid 112
 - TACAN. See also Tactical Air Navigation
- navigator/ bomb-aimer. See also bomb-aimer
- navigator/ bomb-aimer's log. See also No 2 Squadron
- NAVORD OP 1665. See also United States Navy
- Neak Luong 33
- Neil, Squadron Leader, later Air Vice-Marshal Graham, RAAF 89, 178(n173)
- Neptune. See also Lockheed P-2
- New Zealand Army. See also 161 Field Battery
- NGFS. See also naval gunfire support
- Nha Be 16, 21, 22, 33, 58
- Nha Trang 13, 27, 38, 70, 71
- Nhon Trach 44
- night formation bombing. See also bombing, formation
- Night Owl* bombing mission 131, 195(n287)
- Nile 05* FAC. See also Kellaway

Index

- nipa palm 5, 153
- nitrogen 109
 - purging. See also Canberra Mk 20 fuel tank
- Nixon, President Richard M 3, 27, 61
- No 1 (Bomber) Operational Conversion Unit [No 1(B)OCU] 117, 189(n257), 196(n297)
- No 1 Central Reserve, RAAF 95, 183(n212)
 - armourer. See also armourer
 - Operation Rapid Pack*. See *Operation Rapid Pack*
- No 1 Operational Support Unit (OSU), RAAF 128
- No 2 Squadron, RAAF 1-3, 10, 26, 38, 51, 61, 64, 65, 68, 69, 71, 74-76, 81, 83-86, **87**, 89-91, 94-97, 99, 101-103, **104**, 105, 108-112, **113**, 114-117, **118**, 119, 120, 122, 126, **127**, 128-133, 136, **139**, **140**, 141, **142**, 146, 148, 149, 152-155, 156, **157**, 158-161, 163-165, **166**, 179(n175), 182(n197), 189(n257), 193(n273), 195(n285)
- aircraft serviceability 117, 189(n256)
- aircrew categorization 103, 115
- alert/scramble capability 160
- alert/scramble status 200(n329)
- audio tape. See also Australian War Memorial
- Armament Section 187(n244)
- armourer. See also armourer
- bomb-aimer. See also bomb-aimer
- bomb-aimer's guide 117, **118**, 186(n240)
- bomb-aimer's log 107, 112, **113**, 114
- bombing audio tape. See also Australian War Memorial
- bombing book* 110, 114, 117, 161
- Bombing Leader 81, 108, 114, 115, 117, 158, 159, 199(n322)
- bombing mission/ sortie. See also bombing mission/ sortie
- bombing statistics **139**, **140**, 159, 160, 193(n273), 197(n305-6), 199(n324)
- combat effectiveness 164
- command and control 126, **127**, 193(n275)
- Commanding Officer 74, 88, 90, 110, 117, 118, **127**, 128, 130, 132, 154, 158, 159, 160, 182(n206)
 - Wing Commander Aronsen. See also Aronsen
 - Wing Commander Boast. See also Boast
 - Wing Commander Downing. See also Downing
 - Wing Commander Whitehead. See also Whitehead
- Commanding Officer's Report 130, 158-160, 183(n213-4), 183(n216), 184(n218-220), 185(n231), 187(n244), 188(n251), 189(n256), 190(n264), 196(n297), 197(n306), 198(n317), 199(n322), 199(n325), 200(n327), 200(n329)
- engineer 97
- equipment serviceability 117, 196(n300)
- esprit de corps 159
- Executive Officer 71, 153, 187(n244)
 - Squadron Leader Dyke. See also Dyke
 - Wing Commander Hill. See also Hill

Dreadful Lady over the Mekong Delta

- FAC interchange
 - USAF 74, 85
 - VNAF 74, 84, 178(n171)
- flying accuracy 131, 195(n288)
- formation bombing. See also bombing, formation
- formation flying. See also Canberra Mk 20
- ground crew performance 117
- improvisation, armourer 101
- magazine, 1968 yearbook 198(n316)
- magazine, 1969 yearbook 155, 187(n244)
- maintenance 117
- mission brief 93, 94
- mission record 192-3(n273). See also No 2 Squadron Unit History Sheet
- mission tape. See also Australian War Memorial
- Navigation Leader 123, 129
 - Squadron Leader Lonie. See also Lonie
- navigator/ bomb-aimer. See also bomb-aimer
- Operational Diary 184(n216)
- Operations Officer 114
- Photographic Section 114, 159
- professionalism 117, 131, 156, 189(n259), 191(n266), 195(n288), 198(n314)
- Radio Section 76
- self-damage. See also Canberra Mk 20 battle damage
- Senior Engineering Officer
 - Squadron Leader Anson. See also Anson
- 'top gun' award 159
- Unit History Sheet (Form A.51) 84, 102, 123, 142, 153, 158, 178(n68), 182(n199), 183(n214), 184(n215-7), 185(n223-4), 185(n226), 185(n228), 185(n235), 186(n239), 191(n269), 192(n270-2), 196(n297), 196(n303), 200(n328)
- No 3 Aircraft Depot, RAAF 177(n156), 189(n257)
- No 9 Squadron, RAAF 2, 39, 128
- No 35 Squadron, RAAF 2, 128
- No 77 Squadron, RAAF 64
- Noblet, Pilot Officer Trevor, RAAF 192(n270)
- Non-Stop*. See also 184th Reconnaissance Airplane Company
- North American F-100 Super Sabre 64, 68, 89, 92, 99, 114, 118, 119, 156, 176(n154), 190(n263)
 - bombing accuracy 118
- North American P-51 Mustang, RAAF 64
- North American T-28 Trojan, VNAF 37
- North American Rockwell OV-10 Bronco
 - USAF 74, 148, 178(n172)
 - US Navy, VAL-4 51, 54, 56
- North Vietnam 1-3, 9, 10, 12, 13, 24, 28, 30, 31, 33, 40, 43, 47, 60, 63, 68, 119, 120, 132, 146, 161
- North Vietnam Army (NVA) 2, 27, 30, 33-36, 41, 42, 43, 44, 47, 51, 53, 55, 60, 62, 63, 123, 134, 146
 - 1st Division. See also 1st Division, NVA

Index

- 88th Infantry Regiment. See also 88th Infantry Regiment, NVA
- 95th Regiment. See also 95th Regiment, NVA
- 95A Infantry Regiment. See also 95A Infantry Regiment, NVA
- 126 Naval Sapper Regiment. See also 126 Naval Sapper Regiment, NVA
- 188th Infantry Regiment. See also 188th Infantry Regiment, NVA
- 528th Heavy Weapons Company. See also 528th Heavy Weapons Company, NVA
- Sea Infiltration Group #759 43
- North Vietnam government 61
- North Vietnam Navy
 - Transportation Group #125 12
- Northrop F-5 Freedom Fighter, VNAF 38, 66, **68**, 190(n263)
- notices to airmen (NOTAMs) 94
- Nowra. See also Naval Air Station
- nuclear warfare 10, 63, 64
- Nuske, Pilot Officer Peter, RAAF 153, 179(n175)
- NVA. See also North Vietnam Army
- O-1 Bird Dog. See also Cessna O-1 Bird Dog
- observation post. See also target type
- O'Ferrall, Flying Officer Rick, RAAF 186(n239)
- offshore patrol. See also patrol
- Ohio FAC. See also Forward Air Controller
- Okinawa 92
- 'Old Reliables'. See also 9th Division, US Army
- Ong Doc River. See also Song Ong Doc
- Ong Lon canal. See also canal
- Operation *Arc Light*. See also Boeing B-52
- Operation *Barrier Reef* **52**, 55, **142**
- Operation *Breezy Cove* (ATSB) **52**, **58**, 59, **60**, 61, **142**, 149
- Operation *Chopper* 23
- Operation *Colby* 26
- Operation *Combat Dragon* 176(n154)
- Operation *Coronado* 26, 47
 - Coronado XI* 47
- Operation *Deckhouse* 35
 - Deckhouse IV* 35
 - Deckhouse V* 35, 66
- Operation *Foul Deck* **52**, **142**, 146
- Operation *Game Warden* 14, 15, 22, 51, 56, 62, 161
- Operation *Giant Slingshot* 31, **52**, **53**, 54, 55, 57, 58, **142**, 148
- Operation *Jackstay* 13, 35, 169(n22), 195(n295)
- Operation *Junction City* 26
- Operation *Lockjaw* 34
- Operation *Marauder* 42
- Operation *Market Time* 12, 15, 31, 36, 37, 40, 41, 51, 169(n27)
- Operation *Paddington* 26
- Operation *Palm Beach* 26
- Operation *Rapid Pack* 95, 183(n212)
- Operation *Ready Deck* 57, **142**

Dreadful Lady over the Mekong Delta

Operation *River Raider 1* 45
Operation *Sea Dragon* 12
Operation *Sea Float* (MATSB) 41, **52**, 57, **58**, 59, **60**, 61, **142**, 167(n13)
Operation *SEALORDS* 23, 40, 50, 51, **52**, 53, 55, 56, 57, 60, 61, **142**, 161
Operation *Search Turn* **52**, **142**, 143
Operation *Silver Mace I* 53, **142**, 147
 Silver Mace II 53, 55, **142**
Operation *Solid Anchor* (ATSB) **58**, 59, 61, **142**, 152
Operation *Speedy Express* 27, 170(n50)
Operation *Starlite* 12, 34
Operation *Tran Hung Dao I* 52
 Tran Hung Dao III 57
operational control 11
optical collimator. See also Mk XIV bombsight
Orange Putter tail-warning radar 183(n214)
Oregon FAC. See also Forward Air Controller
Orion. See also Lockheed P-3
OV-10 Bronco. See also North American Rockwell OV-10
P-2 Neptune. See also Lockheed P-2
P-3 Orion. See also Lockheed P-3
PACAF. See also United States Air Force
PACCOM. See also United States Government
PACFLT. See also United States Navy
pacification 51-53, 61, 161
Pacific Air Force (PACAF). See also United States Air Force
Pacific Command (PACCOM). See also United States Government
Pacific Fleet (PACFLT). See also United States Navy
Padgett, Pilot Officer Keith, RAAF 152
paddy. See also rice paddy
Paddy. See also Control and Reporting Post (CRP)
Page, Flying Officer Al, RAAF 192(n270)
pagoda. See also target type
Palmer, Flying Officer David, RAAF 150, 191(n264)
Panther. See also Cessna A-37, VNAF
Paracel islands 33
parachute 107
parachute flare 131
paratrooper 64, 133
Paris. See also Control & Reporting Center
Paris cease-fire accord/ agreement 3, 33
 peace/ reunification negotiation 2, 27, 61, 84
'Parrot's Beak' (location) 30, 42, **53**, 54, 70, 78, **142**, 148
patrol barrier. See also barrier
patrol gunboat (PG). See also gunboat
Patrol Craft Fast (PCF). See also Swift boat
Patrol Division 101, US Navy. See also United States Navy
patrol, offshore 32
PBR. See also River Patrol Boat

Index

- PCF. See also Swift boat
- peace negotiation. See also Paris
- Peanuts* comic strip 79
- Pearson, Flight Lieutenant Alan, RAAF 179(n175), 186(n239)
- perspex/ plexiglass nose. See also Canberra Mk 20
- petrol, oil and lubricant (POL). See also target type
- Phan Rang 64, **67**, 71, 74, 75, 81, 88, **89**, 90, 91, 96, 97, 100, 108-111, 114, 115, 117,
118, 127, 129, 132, 146, 147, 150-156, 160, **163**, 176(n154), 178(n172)
183(n214), 185(n223), 185(n230), 189(n257), 190(n263), 191(n269), 198(n317)
control tower operator 194(n281)
- Phantom. See also McDonnell Douglas F-4
- Philippines 33, 36, 63
- Phnom Penh 32, 33
- photo reconnaissance (PR) 119
aircraft. See also McDonnell Douglas RF-4C
squadron. See also 12th Tactical Reconnaissance Squadron
- photographic assessment. See also bombing, photo/ photography
- Photographic Section. See also No 2 Squadron
- Phu Cuong 57
- Phu Quoc Island. See also An Thoi
- Phuoc Tuy province 9, 25, 26, 36, 41, 70, 81, 111, 123, 155, **162**, 193(n274),
200(n330)
- Phuoc Vinh 80
- Pilatus Porter, Australian Army 194(n279)
- Plain of Reeds 4, 9, 28, 42, 44, 47, 54, 55
- Point Cook, Victoria 70, 76, **77**
- political clearance 84
- political warfare 32
- political will 2, 164
- Popular Forces (PF). See also Army of the Republic of Vietnam
- Portcall*. See also Control and Reporting Center (CRC)
- Porter. See also Pilatus Porter
- Possum*. See also 161 Independent Reconnaissance Flight
- post-mission (intelligence) report/ summary. See also intelligence
- Powell, Wing Commander Tony, RAAF 70, **71**, 178(n168), 189(n257)
Mrs Betty **71**
- 'prayer wheel'. See also Dalton Mk 4A Computer
- precision delivery. See also bombing accuracy
- preparedness, lack of 96, 97
- pressure, atmospheric 129
- pre-strike mission. See also bombing mission
- 'Prick' (location). See also rendezvous icons
- principles of war 164
- propaganda leaflets 23
- province boundary 152
- province chief 30, 72, 85, 152, 181(n191)
- psychological operation/ program/ warfare 23, 32
- PX. See also USAF

Dreadful Lady over the Mekong Delta

- quality assurance (QA). See also M.117
- Quang Ngai 70, province 9
- Qui Nhon 13
- QNH 94, **113**, 129, 194(n282)
- QSY 194(n282)
- RAAF. See also Royal Australian Air Force (RAAF)
- RAAF Academy. See also Royal Australian Air Force (RAAF)
- RAAF Base, Amberley. See also Royal Australian Air Force (RAAF)
- RAAF Base, Butterworth. See also Royal Australian Air Force (RAAF)
- RAAF London. See also Royal Australian Air Force (RAAF)
- RAAF in South-East Asia*. See also USAF, PACAF, CHECO Report
- RAC. See also 184th Reconnaissance Airplane Company
- race-track bombing pattern. See also bombing pattern
- Rach Ba Rai river 122, 191(n268)
- Rach Gia 16, 52, 69, 78, 80, **142**, 143
- Rach Gia river 56
- Rach Gia – Long Xuyen canal system. See also canal
- Rach Kien 47
- Rach Nui canal. See also canal
- Rach Ruong canal. See also canal
- Rach Soi **142**, 143
- radar
 - AN/MSQ-77. See also *Combat Proof/Combat Skyspot*
 - AN/TPQ-10. See also *Combat Proof/Combat Skyspot*
 - bombing, ground-controlled. See also *Combat Proof/Skyspot*
 - coastal 33
 - doppler. See also *Green Satin*
 - early warning 135
 - flight following 72, 75, 90
 - Gap*. See also *Combat Proof/Skyspot*
 - Paddy*. See also Control & Reporting Post (CRP)
 - Portcall*. See also Control and Reporting Center (CRC)
 - surface 21
 - tail-warning. See also *Orange Putter*
 - waterborne. See also Raytheon
 - weather warning 90
- Radar Picket Escort (DER)
 - RAN 33
 - US Navy 12, 33
- radio. See also communication
- radio station, VC. See also target
- RAF. See also Royal Air Force or River Assault Force
- RAG. See also Vietnam Navy
- raid, amphibious 32, 48, 52, 55, 60
- raid, hit and run 22, 51
- RAID. See also Vietnam Navy
- RAN. See also Royal Australian Navy
- range error. See also bombing error

Index

- RANHFV. See also Royal Australian Navy
- RAR. See also 1st Battalion RAR, 5th Battalion RAR
- Rash 27*. See also Forward Air Controller
- Raytheon 1900 radar 15
- recoilless rifle. See also rifle
- Reconnaissance Airplane Company (RAC). See also 184th Reconnaissance Airplane Company
- Reconnaissance Flight, Independent. See also 161 Independent Reconnaissance Flight
- reconnaissance, hydrographic. See also hydrographic reconnaissance
- reconnaissance patrol 22
- reconnaissance, tactical air. See also tactical air reconnaissance
- reconnaissance-in-force operation 46
- Red River Delta 10
- Reed, Air Vice-Marshal Alan, RAAF 77, 180(n176), 198(n309)
- re-education program 3
- refugee 3, 33, 47
- Regional Force (RF). See also Army of the Republic of Vietnam
- Reif, Flight Lieutenant Charlie, RAAF 178(n168)
- Reis, Pilot Officer John, RAAF 186(n239)
- rendezvous coordinates 72, **113**
- rendezvous icons, visual 77
- 'Aircraft Carrier' 78
 - 'Finger Lake' 78
 - 'Fishhook' 78
 - 'Gonads' 80
 - 'Mushroom' 78
 - 'Prick' 80, 145
 - 'Seven Sisters/ Mountains' 30, 60, **78**, 120, 146
 - 'Snoopy's Nose' **79**
 - 'The Testicles' **80**, 149
 - 'Three Sisters' 74, 78, 143, 144, 145
 - 'Toilet Plunger' 78
 - 'VC Lake' 48, 78, 83, 149, 150, 174(n122), 180(n185)
 - 'Wagon Wheel' 78, **79**, 148
 - 'Y Bridge' 78
- re-population/ resettlement 52, 58, 59
- reunification talks. See also Paris
- repair facility 33, 46
- repair ship 32, 46
- Republic F-105 Thunderchief, USAF 119, **120**
- Republic of Korea (ROK) 7, 70, 177(n157)
- Republic of Vietnam. See also Vietnam
- rice paddy 7, **76**, 103
- rifle
- AK-47 assault. See also AK-47
 - M-1. See also M-1
 - M-16. See also M-16
- recoilless 43, 61
- 57-mm 123

Dreadful Lady over the Mekong Delta

- river assault craft. See also Armoured Troop Carrier
- river assault flotilla 10, 11, 14, 16
- River Assault Flotilla One. See also Mobile Riverine Force
- River Assault Group (RAG). See also Vietnam Navy
- River Assault Interdiction Division (RAID). See also Vietnam Navy
- river assault operation 32
- River Assault Squadron Nine (RAS-9), US Navy 46
- River Interdiction Division (RID). See also Vietnam Navy
- river minesweeping. See also minesweeping
- river patrol 11
- River Patrol Boat (PBR)
 - US Navy 14, **15**, 22, 23, 33, 51-56, 59
 - VNN 32, 59
- river patrol craft (RPC) 31
- River Patrol Force (RPF)/ Task Force TF-116, US Navy 13-15, 21, 22, 49, 50, 51, 53, 55, 168(n16)
- River Patrol Group (RPG). See also Vietnam Navy
- River Transport Escort Group. See also Vietnam Navy
- River Transport Group. See also Vietnam Navy
- Riverine Assault Craft. See also armoured troop carriers (ATCs)
- Riverine Assault Force (RAF), US Navy 51
- riverine operation/ warfare 1, 3, 10-12, 16, 24, 25, 35, 40, 44, 48, 62, 63, 68, 72, 87, 131, 139-141, **142**, 143, 147, 163, 165, 166, 167(n13), 168(n16)
- road. See also target type
- Robey, Air Commodore Keith, RAAF 145
- Robin, Squadron Leader Mark, RAAF 99, 185(n223)
- Robson, Flying Officer Dave, RAAF 81, 111, 188(n247)
- rocket 133
 - 2.75-inch. See also 2.75-inch rocket
 - 5-inch Zuni. See also 5-inch Zuni rocket
- rocket and mortar position. See also target type
- rocket pod 15, 56
- rocket-propelled grenade launcher. See also grenade
- ROE. See also rules of engagement
- Rolling Thunder in a Gentle Land: The Vietnam War Revisited*. See also Dunnavent
- Rolls-Royce Avon Mk 109 engine. See also Canberra Mk 20
- ROK. See also Republic of Korea
- Ross, Pilot Officer John, RAAF 186(n239)
- Route Pack One* 63
- Royal Air Force (RAF) 69, 102, 135
 - Bomber Command 94
 - Canberra bomber 102
 - Mk XIV bombsight. See also Mk XIV bombsight
 - Mosquito photo-reconnaissance aircraft 188(n251)
 - officer. See also Helmore
 - T-1 bombing computer. See also bombing computer
 - V bomber 102

Index

- Royal Australian Air Force (RAAF) 1-3, 51, 57, 61, 64, 65, **68**, 72, 74, 75, 85, 87, 89, 91, 92, 94, 97, **102**, 103, 108, 109, 111, 115, 117, 118, 121, 123, 126, **127**, 128, 130, 132, 133, 137, 139, 140, 146, 148, 155, **157**, 158, 164, 166, 180(n173), 180(n177), 182(n197), 183(n214), 187(n243), 190(n263), 193(n273), 193(n275-6), 194(n277), 194(n281), 194(n285), 198(n309), 198(n314), 198(n317), 201(n334)
- Academy, Point Cook, Victoria 70
- aircraft
- G-7 Caribou. See also De Havilland Canada C-7
 - Canberra. See also Canberra Mk 20
 - F-111C. See also General Dynamics F-111C
 - Meteor. See also Gloster Meteor
 - Mustang. See also North American P-51
 - UH-1 ('Huey') Iroquois. See also Bell UH-1
- Air Force Headquarters, Canberra 132
- Amberley, Queensland 117, 136, 164, 177(n156), 189(n257), 196(n297)
- No 1 (Bomber) Operational Conversion Unit. See also No 1 (Bomber) OCU
 - No 3 Aircraft Depot. See also No 3 Aircraft Depot
- ARDU. See also Aircraft Research and Development Unit
- bomber force 132
- Butterworth 91, 96, 97, 109, 111, 135, 177(n156)
- Transport Support Flight 177(n156)
- Canberra Mk 20 bomber. See also Canberra Mk 20
- Deputy Chief of Air Staff
- Air Vice-Marshal Townsend. See also Townsend
- FAC. See also Forward Air Controller
- Headquarters, Canberra A.C.T. 132
- historian
- Dr Stephens. See also Stephens
 - Dr Coulthard-Clark. See also Coulthard-Clark
- history. See also Stephens
- London 102
- Museum, Point Cook 76, **77**, 90
- navigator 137. See also bomb-aimer, No 2 Squadron
- No 77 Squadron. See also No 77 Squadron
- Vietnam 127
- Headquarters RAAFV 128, 182(n206), 197(n309)
 - No 1 OSU. See also No 1 OSU
 - No 2 Squadron. See also No 2 Squadron
 - No 9 Squadron. See also No 9 Squadron
 - No 35 Squadron. See also No 35 Squadron
- Royal Australian Artillery. See 105 Field Battery
- Royal Australian Engineers. See also 3 Field Troop
- Royal Australian Navy (RAN) 36, 38, 39
- 723 Squadron. See also 723 Squadron
 - Clearance Diving Team (CDT3) 21, 41, 42, 61
- destroyer 12, 13, 40, 41, 146
- Experimental Military Unit (EMU). See also 135th Assault Helicopter Company

Dreadful Lady over the Mekong Delta

- Fleet Air Arm 39
- Helicopter Force Vietnam (RANHFV) 39, 47, 61, 147
- HMAS *Brisbane*. See also HMAS *Brisbane*
- HMAS *Hobart*. See also HMAS *Hobart*
- HMAS *Perth*. See also HMAS *Perth*
- Royal Australian Regiment. See also 1 RAR, 5 RAR
- Royal New Zealand Artillery. See also 161 Field Battery
- Royal United Services Institute (RUSI) 69
- RPC. See also River Patrol Craft
- RPF. See also River Patrol Force
- RPG. See also Vietnam Navy
- RPG-2. See also grenade
- RPG-7. See also grenade
- RSSZ. See also Rung Sat Special Zone
- rules of engagement (ROE) 85, 164, 181(n193)
- Rung Sat Special Zone (RSSZ) 5, 13, 21, 22, 32, 35, 36, 41, 43, 46, 56, 70, **142**
- Russia. See also Soviet Union
- SAC. See also USAF Strategic Air Command
- Sa Dec 28, 39, 56, 79
- safe bombing altitude. See also bombing altitude
- Saigon 1, 3, 4, 9, 10, 13, 21-26, 27, 28, 30, 31, 33-35, 38, 39, 42, 43, 47, 53-55, 58, 63, 67, 69, 78, 80, 90, 132, 148. 161, 179(n175), 181(n191)
 - airport. See also Tan Son Nhut
 - river. See also Song Sai Gon
- salvage diving 22
- Salvail, Pilot Officer Peter, RAAF 150
- salvo. See also bombing, stick
- sampan 12, 13, 15, 22, 32, 36, 59, 85. See also target type
- sapper, VC 44
- sapper, swimming, NVA/VC 42, 44, 59
- SCATTOR. See also United States Coast Guard
- Schulz, Charles M 79
- Schulz, Flying Officer Barry, RAAF 155
- scout helicopter 28
- scramble 72
- Sea, Air and Land (SEAL), US Navy 15, 21, 23, 27, 35, 39, 41, 47, 51, 55, 58
 - armoured trimaran 22
 - platoon 22, 59
 - SEAL (Atlantic) Team Two 22
 - SEAL (Pacific) Team One 22
 - Detachment Bravo 22
 - Detachment Golf 22
 - SEAL support craft, heavy (HSSC) 22, 59
 - SEAL support craft, light (LSSC) 22, 59
 - SEAL support craft, medium (MSSC) 22, 59
 - SEAL Team Assault Boat (STAB) 22
 - special intelligence operation 22
- Seabee. See also United States Navy

Index

- SEADAB. See United States Government, National Archives
- Sea Infiltration Group. See also North Vietnam Army
- Sea Knight. See also Boeing-Vertol CH-46 Sea Knight
- search and destroy* mission/ operation/ strategy 14, 16, 21, 27, 30, 46
- searchlight 39
- Sea Wolf*. See also Helicopter Attack Squadron, Light
- secondary explosion 41, **113**, 143, 150, **152**, 153, **157**, 161, 180(n185)
- secondary fire **157**
- Self-defence Force, Vietnam 30
- self-propelled barracks ship. See also barracks ship
- Semmler, Flying Officer Ken, RAAF 146
- sensor
- body-heat activated 23
 - electronic 41, 51
 - remote 58
 - vibration-activated 23
- 'Seven Sisters/Mountains' (location). See also rendezvous icons
- Seventh Air Force, USAF 3, 51, 63-65, 69, 71, 72, 118, 128, 159, 193(n275)
- 8th Tactical Bomb Squadron. See also 8th Tactical Bomb Squadron (TBS)
 - 12th Tactical Reconnaissance Squadron (TRS). See also 12th Tactical Reconnaissance Squadron
 - 13th Tactical Bomb Squadron. See also 13th Tactical Bomb Squadron
 - 35th Tactical Fighter Wing. See also 35th Tactical Fighter Wing
 - 352nd Tactical Fighter Squadron. See also 352nd Tactical Fighter Squadron
 - 504th Tactical Air Support Group. See also 504th Tactical Air Support Group
 - 504th Theatre Indoctrination School. See also Theatre Indoctrination School
 - 557th Tactical Fighter Squadron. See also 557th Tactical Fighter Squadron
 - 558th Tactical Fighter Squadron. See also 558th Tactical Fighter Squadron
 - 559th Tactical Fighter Squadron. See also 559th Tactical Fighter Squadron
 - 612th Tactical Fighter Squadron. See also 612th Tactical Fighter Squadron
 - 614th Tactical Fighter Squadron. See also 614th Tactical Fighter Squadron
 - 615th Tactical Fighter Squadron. See also 615th Tactical Fighter Squadron
- air base **67**
- Bien Hoa. See also Bien Hoa
 - Binh Thuy. See also Binh Thuy
 - Cam Ranh Bay. See also Cam Ranh Bay
 - Da Nang. See also Da Nang
 - Nha Trang. See also Nha Trang
 - Phan Rang. See also Phan Rang
 - Tan Son Nhut. See also Tan Son Nhut
 - Tuy Hoa. See also Tuy Hoa
- aircraft, tactical
- A-37. See also Cessna A-37
 - B-57B. See also Martin B-57B
 - C-7. See also De Havilland Canada C-7
 - C-47. See also Douglas C-47
 - C-123. See also Fairchild C-123
 - C-130. See also Lockheed C-130

Dreadful Lady over the Mekong Delta

- F-4. See also McDonnell Douglas F-4
- F-100. See also North American F-100
- O-1. See also Cessna O-1
- O-2. See also Cessna O-2
- OV-10. See also North American Rockwell OV-10
- Air National Guard (ANG) tactical fighter squadron 176(n154), 198(n317)
- command and control (7th Air Force / No 2 Squadron) **127**, 193(n275)
- Commander **127**
 - General Momyer. See also Momyer
- Headquarters 63, 65, 91, 114, 128, 133, 139, 156, 157, 192(n273)
- Meteorological Service 129
- order of battle 176(n154)
- PX (retail store) 76
- Special Operations Squadron 64, 176-7(n154)
- Tactical Air Control Center (TACC) 65, 67, 68, 70, 85, 103, 126, **127**, 128, 132, 160, 190(n262), 194(n277), 197(n305), 197(n307), 200(n329-330)
 - Strike Operations Branch 194(n277)
 - Strike Plans Branch 70
- Tactical Air Control System (USAF/VNAF). See also Tactical Air Control System
- tactical fighter 72, 73, 83, 84, 88, 89, 128, 133, 158
- tactical fighter squadron 64, 67, 114, 118, 159. See also numbered squadron
- tactical fighter wing 64. See also numbered wing
- 'top gun' award 159
- VNAF advisory group 38, 69
- Seventh Fleet, United States Navy 11, 12, 13, 33, 35, 40
 - Amphibious Task Force (TF-76) 12, 35
 - Commander 35
 - Rear Admiral Wulzen. See also Wulzen
 - Attack Carrier Strike Force (TF-77), US Navy 12, 13, 35
 - Commander 11, 12, 46
 - Vice Admiral Hyland. See also Hyland
 - cruiser-destroyer Task Group (TG-70.8), USN 12
 - destroyer 12
 - minesweeper. See also minesweeper
 - radar picket escort (DER) 12
- Sharkbait*. See also 557th TFS
- Sharp, Admiral U S Grant, US Navy 168(n16)
- Shawnee. See also Boeing-Vertol CH-21
- sighter. See also bombing, sighter
- ship. See also target type
- shipyard 33
- Sibthorpe, Flight Lieutenant Arthur, RAAF 178(n173)
- Sidewinder* FAC
 - Sidewinder 31* Wing Commander Larard. See also Larard
 - Sidewinder 32* Flight Lieutenant Mitchell. See also Mitchell
 - Sidewinder 34* Flying Officer Kelloway. See also Kelloway
- Sihanouk, President Norodom 197(n309)
- Sikorsky H-19 Chickasaw, VNAF 37

Index

- Sikorsky H-34 Choctaw, VNAF 37
Sikorsky UH-34 Choctaw, USMC 34, 35
Sivyer, Flying Officer Bob, RAAF 94, 150, 152, 179(n75)
Skyhawk. See also Douglas A-4
Skyraider. See also Douglas A-1
sleeper 42
SLF. See also Special Landing Force
slick. See also Bell UH-1 or bomb, 500lb, Mk 82
Slootjes, Pilot Officer Adrian, RAAF 179(n175), 181(n189)
Slugger FAC. See also Forward Air Controller
small-arms fire 44, 108, 118, 143, 186(n239)
small-arms workshop. See also target type
smoke marker, white phosphorous ("Willie Pete") 76, 80, 81, 84, 94, 103, 106, 107,
109, 110, 114, 118, 121, 131, 165, 180(n177)
sniper fire 46
Snoopy 79
'Snoopy's Nose' (location). See also rendezvous icons
Soc Trang 13, 24, 34, 38, 69, 83, 180(n186)
Sock it to 'em Baby. See also Cooper
Song Bo De 7, 57-59
Song Cau Lon 7, 57, 58, 59
Song Co Chien 35
Song Dam Doi 7, 57
Song Ham Luong 35
Song Hau Giang (Bassac River) 4, 14, 24, 40, 50-53, 56, 142, 143
Song Long Tau 5, 20, 21, 22
Song Ong Doc 37, 41, 48, 59, 60, 61, 149
Song Sai Gon (Saigon River) 13, 57, 142, 148
Song Song Be 80
Song Vam Co Dong 42, 53, 54, 148
Song Vam Co Tay 53, 54, 80, 148
sortie. See also mission
SOS. See also Seventh Air Force
South China Sea 5, 7, 13, 21, 22, 40, 43, 52, 57, 79, 89, 147, 152
South-East Asia 2, 62, 166, 189(n257)
South East Asia database (SEADAB). See also United States Government National
Archives
South Vietnam 1-3, 5, 9, 10, 12, 13, 21-24, 26-28, 30-36, 38-45, 51-53, 56-59, 60-67,
69, 70, 72, 74, 75, 77, 78, 87, 89-95, 97, 99, 109, 111, 112, 115, 117-120, 126,
128, 131-133, 135, 139-141, 146, 152, 155, 159-161, 163, 164, 189(n257)
Army. See also Army of the Republic of Vietnam (ARVN)
Government 2, 5, 27, 28, 31, 33, 43, 51, 55, 61
Navy. See also Vietnam Navy
population 5
Soviet Union (USSR) 1-3, 10, 28, 30, 42, 62, 135, 171(n54)
BMP-2 mine. See also mine
Special Forces, US Army. See also 5th Special Forces Group
Special Forces Mike Force, US Army. See also 5th Special Forces Group

Dreadful Lady over the Mekong Delta

- special intelligence operation. See also SEAL
- Special Landing Force (SLF). See also United States Marine Corps
- special operation 11, 41
- Special Operations Squadron (SOS), USAF. See also Seventh Air Force
- special warfare groups. See also United States Navy
- Spurgeon, Air Commodore C H ('Spud'), RAAF 193(n275)
- Square Bay 7, 57
- Squires, Flight Lieutenant Barry, RAAF 178(n168)
- Stalin, Joseph 1
- Stephens, Dr Alan 91, 164, 196(n298), 210(n334)
 - The Royal Australian Air Force, The Australian Centenary History of Defence, Volume II* 91
- Stewart Seacraft Company, Louisiana 14
- stick bombing. See also bombing, stick
- storage/ supply area. See also target type
- Strategic Air Command (SAC), USAF. See also United States Air Force
- strategic hamlet resettlement 43
- strategic reconnaissance. See also United States Air Force, Strategic Air Command
- Stratofortress. See also Boeing B-52
- strike. See also tactical air strike
- Strike Plans Branch. See also Seventh Air Force Tactical Air Control Center
- Strike Operations Branch. See also Seventh Air Force Tactical Air Control Center
- Subic Bay, Philippines 36
- Super Skymaster. See also Cessna O-2
- surface-to-air missile (SAM) 2
- surveillance 52
 - aerial 12
 - coastal 12, 48, 52. See also Coastal Surveillance Force
- suspected enemy location (SEL). See also target type
- Swan, Commander R C, RAN 173(n93)
- Sweeney, Squadron Leader Brian, RAAF 123, 179(n175), 186(n239)
- Swift boat (PCF) 13, 14, 16, 21, 36, 37, 41. 48, 49, 51-53, 55, 56, 58, 59, 61, 141, 150
 - 175(n147), 191(n264)
- swimmer delivery vehicle (SDV) 21
- swimming sapper. See also sapper
- T-1 bombing computer. See also bombing computer
- T-4 bombing computer. See also Canberra Mk 20 bombing computer
- T-28 Trojan. See also North American T-28
- tactical air base 51. See also Seventh Air Force
- Tactical Air Command. See also United States Air Force
- tactical air control 13
- Tactical Air Control Center (TACC). See also Seventh Air Force
- Tactical Air Control Party (TACP) 67, 72, 84, 85
- Tactical Air Control System (TACS) 65, 66, 126, 173(n82)
 - Director, VNAF 66
 - Deputy Director, USAF 66
- tactical air, joint 64
- Tactical Air Navigation (TACAN) 72, 112
 - navigation map 88

Index

- tactical air (TACAIR) operation 35, 63, 64, 65, 67, 72, 157, 181(n191)
- tactical air power 3, 51, 64, 83
- tactical air reconnaissance 67
- tactical air requests 67
- tactical air strike 61, 66, 67, 72, 80, 81, 83, 85, 89
 - RAAF 83
 - USAF 83
 - VNAF 83
- tactical air support 13, 51, 54, 63-65, 72
- Tactical Air Support Squadron (TASS). See also 19th and 22nd TASS
- tactical air traffic 90
- tactical air transport support 51
- tactical airlift support 67
- Tactical Area of Responsibility (TAOR)
 - 1st ATF. See 1st Australian Task Force
 - 21st Infantry Division, ARVN 74
- tactical fighter. See also Seventh Air Force
- tactical fighter squadron. See also Seventh Air Force
- tactical fighter wing. See also Seventh Air Force
- Tactical Mobile Riverine Headquarters. See also Vietnam Navy
- Tactical Mobile Sea Headquarters. See also Vietnam Navy
- Tactical Operations Center (TOC)
 - US Army 72
 - US Navy, ATSB 59
- Taipan*. See also Bell UH-1D/ H
- Tamale* FAC 69, 74, 149
 - Tamale 15* Flight Lieutenant Sibthorpe. See also Sibthorpe
 - Tamale 23* Flying Officer Ennis. See also Ennis
 - Tamale 35* Flight Lieutenant Cooper. See also Cooper
- Tan An, northern 54, 55, 58, 80, 148
- Tan An, southern 41, 47, 58
- Tan Hoa district 41
- Tank Landing Ship (LST). See also Landing Ship Tank
- tanker, aerial. See also Boeing KC-135
- Tan Son Nhut (air base) 23, 38, 65, 67, 70, 75, 90
- TAOR. See also Tactical Area of Responsibility
- tape, cassette 76
- tape recorder 76, 90
- target 12, 38, 72, 76, 80, 81, 85, 86, 90, 94, 103, 105, 107, 110, 140, **141**, 160
- target, area 68, 77, 80, 84, 88, 92, 94, 105, 107, 123, 129, 134, 137, 160
 - heavily defended 135
- target coordinates 73, **113**
- target coverage **113**, 123, 125, 126
- target dimension 121, 122, 192(n272)
- target fixation danger, FAC 180(n177)
- target height 106, 108, 111, **113**, 129, 136
- target identification 103, 106, 131
- target legitimacy 85, 161

Dreadful Lady over the Mekong Delta

target marker, smoke. See also smoke marker

target, point/ pinpoint 121, 160

target type

0.30-cal sight 192(n272)

ambush sight 41

ammunition 46, 47, 54, 60

arms factory/ workshop 36, 47

base area/camp 41, 46, 52, 83, 103, 108, 110, **113**, 123, 134, **141**, 144-146,
148-150, 152, 153, 165, 180(n186), 185(n230), 188(n247), 190(n263),
195(n287),

booby trap 42, 149

bridge 13, 155, 192(n272)

bunker/ bunker complex 21, 40, 41, 59, 84, 99, 110, **113**, 122, 123, 125, 131,
140, **141**, 145, 146, 148, 149-151, 153-155, **157**, 160, 161, 165, 180(n185-6),
188(n247), 190(n263), 191(n264), 192(n270), 192(n272), 195(n296),
199(n326)

cadre meeting 153

canal 41, 52, **141**, 150, 165, 191(n264)

cave **141**, 143-146, **157**, 190(n263)

company **141**, 148, 154, 192(n272)

dam **141**

defensive position 144

encampment 145

engineering workshop 41

fighting/ gun position 145, 148, 149, **157**, 192(n272)

food 60

fortifications 52, 188(n2470)

fox hole 148, **157**

fuel storage area 41

headquarters complex **141**, 149

hooch/ structure 21, 49, 59, 84, 85, **113**, 122, 140, **141**, 145, 149-151, 153-156, **157**,
180(n185-6), 191(n264), 192(n272), 200(n328)

improvised explosive device (IED) 42

junk 13, 32, 46, 151

location **141**

log barricade 41, 42

machine shop 154, 192(n272)

medicine 60

mine 42, 46, 149, 153

observation post 41

pagoda 145

petrol, oil and lubricant (POL) 151

radio station **141**

rice mill 36, **141**, 149

road 13, 84

rocket and mortar position **141**

sampan 13, 49, **113**, **141**, 143, 149-151, 153, 155, 156, **157**, 191(n264), 192(n272)
motorised 41

Index

- ship 153
- storage/ supply area 103, 110, **141**, 145, 149, 153, 188(n247)
- suspected enemy location (SEL) **141**, 145, 178(n168)
- tax collectors staging area **141**, 145, 149
- tree line **92**, 131, **141**, 149, 154
- trench 41, **157**, 192(n270), 192(n272)
- troop concentration 41, 140, **141**
- truck 13
- truck park 84
- tunnel 41, 123, 125, 143, 149, 161, 190(n263)
- weapon cache 36, 46, 47, 54, 60, 131, 143, **152**, 153, 161
- weapon position 144, **157**
- target-weapon matching 165
- targetting, effects-based 158
- Task Force
 - TF-76. See also Seventh Fleet
 - TF-77. See also Seventh Fleet
 - TF-115. See also Coastal Surveillance Force
 - TF-116. See also River Patrol Force
 - TF-117. See also Mobile Riverine Force
 - TF-194 51, 53
- Task Group
 - TG-I. See also Vietnam Navy
 - TG-II. See also Vietnam Navy
 - TG-III. See also Vietnam Navy
 - TG-70.8. See also Seventh Fleet
 - TG-117.2 191(n268)
- tax collectors staging area. See also target type
- Tay Ninh 54, 55, 78, 148, 190(n263)
- terror 43
- Tet. See also Vietnamese New Year
- Tet offensives. See also Vietnamese New Year
- Thailand 63, 92, **120**
- Thanh Phu Secret Zone 35
- 'The Testicles' (location). See also rendezvous icons
- Third World War 1
- Thirteenth Air Force, USAF 63
 - Republic F-105. See also Republic F-105
- Thompson, Sir Robert 31, 43
- 'Three Sisters' (location). See also rendezvous icons
- Thunderchief. See also Republic F-105
- thunderstorm 89, 150
- TIC. See also troops in contact
- Tide*. See also 612th TFS, USAF
- tidal currents 35, 57-59
- Tiger Mountain 120, 136, 179(n175)
- 'Toilet Plunger' (location). See also rendezvous icons
- Tonkin 10

Dreadful Lady over the Mekong Delta

- 'top gun' award
 - RAAF. See also No 2 Squadron
 - USAF 159.
- Townsend, Air Vice Marshal W E, RAAF 149
- tracked landing vehicle (LVT). See also Alligator
- Transport Support Flight (TSF). See also RAAF Butterworth
- Tran Van Chon, Commander, VNN 60
- Tra Vinh 36
- trawler, North Vietnam Navy 12, **43**
- trench. See also target type
- trimaran, armoured. See also SEAL
- trinitrotoluene (TNT) 97
- Tri Phap 30
- tritonal. See also bomb filling
- Trojan. See also North American T-28
- troop concentration. See also target type
- troops-in-contact (TIC) 108, 131, 154, 160, 187(n241), 194(n285), 195(n287), 200(n328), 200(n330)
- tropical atmosphere/ weather. See also weather
- Truc Giang 154
- truck park. See also target type
- true airspeed (TAS) 136
- tunnel 42. See also target type
- turbulence, atmospheric 74, 128, 137
- turbulence, bomb-bay. See also Canberra Mk 20
- Tuy Hoa **67**, 71, 176(n154)
- Tuyen Nhon 54. 55
- Typhoon* magazine. See also I Field Force, MACV
- UDT. See also Underwater Demolition Team
- UH-1 Iroquois ('Huey') helicopter. See also Bell UH-1
- UH-34 Choctaw. See also Sikorsky UH-34
- UHF (ultra high frequency) radio. See also communication
- U Minh Forest 4, 27, 41, 48, 55, 57, 59, 84, **142**, 149-152
- unconventional warfare 22
- Underwater Demolition Team (UDT), US Navy 21, 22, 35, 59
 - Teams 11, 12 and 13 21
- underwater ship protection 22
- unexploded bomb (UXB). See also bomb, unexploded
- Unit History Sheet (UHS). See also No 2 Squadron
- United Kingdom 2, 31, 69, 94, 102
- United States 1, 2, 4, 7, 10, 13, 20-22, 24, 25, 27, 28, 30, 31, 33, 35-37, 45, 47, 48, 58, 60, 61, 72, 75, 79, 83, 84, 95, 97, 128, 155, 157, 164, 181(n191)
 - advisors 2, 3, 10, 21, 22, 28, 31, 33, 34, 36-38, 61, 66, 69, 171(n53)
 - archives. See also United States Government
 - field commanders 2
- United States Air Force (USAF) 34, 35, 63-66, 68, 69, **70**, 71, 72, 75, 84, 88, 92, 97, 99, 109, 111, 112, 114, 119, 156, 159
 - 2nd Air Division. See also 2nd Air Division

Index

- 7th Air Force. See also Seventh Air Force
- 13th Air Force. See also Thirteenth Air Force
- F-111. See also General Dynamics
- Pacific Air Forces (PACAF) 63
- Headquarters 118, 133
 - Contemporary Historical Examination of Current Operations (CHECO) Report 118
 - IV DASC Operations, 1965-1969* 181(n191)
 - The RAAF in SEA: Special Report* 133, 182(n197), 189(n259), 198(n314), 199(n318)
 - U.S. Rules of Engagement in the Vietnam War, November 1969 to September 1972* 181(n193)
- Strategic Air Command (SAC) 63, 64
- B-52. See also Boeing B-52
 - radar control station, *Gap/ Milky*. See also *Combat Proof/Combat Skyspot*
 - strategic reconnaissance aircraft 63
 - tanker. See also Boeing KC-135
- Tactical Air Command (TAC) 64
- United States Army 2, 7, 10-12, 15-17, 19, 23-28, 30-32, 34, 35, 38, 42, 44, 45, 63-66, 72, 83, 93, 122, 177(n157)
- 1st Air Cavalry Division, US Army. See also 1st Cavalry Division (Airmobile), 1st Cavalry Division (Airmobile), US Army. See also 1st Cavalry Division (Airmobile),
 - 1st Infantry Division. See also 1st Infantry Division
 - 5th Special Forces Group. See also 5th Special Forces Group
 - 8th Aviation Transportation Company. See also 8th Aviation Transportation Company
 - 9th Infantry Division. See also 9th Infantry Division
 - 13th Combat Aviation Battalion. See also 13th Combat Aviation Battalion
 - 57th Aviation Transportation Company. See also 57th Aviation Transportation Company
 - 62nd Aviation Company. See also 62nd Aviation Company
 - 101st Airborne Division. See also 101st Airborne Division
 - 114th Aviation Company. See also 114th Aviation Company
 - 121st Aviation Company. See also 121st Aviation Company
 - 135th Assault Helicopter Company. See also 135th Assault Helicopter Company
 - 164th Combat Aviation Group. See also 164th Combat Aviation Group
 - 173rd Airborne Brigade. See also 173rd Airborne Brigade
 - 184th Reconnaissance Airplane Company. See also 184th Reconnaissance Airplane Company
 - 191st Assault Helicopter Company. See also 191st Assault Helicopter Company
 - 220th Combat Aviation Battalion. See also 220th Combat Aviation Battalion
- advisor to 7th ARVN. See Vann
- aircraft
- AH-1G. See also Bell AH-1G
 - CH-21. See also Boeing-Vertol CH-21
 - CH-47. See also Boeing-Vertol CH-47
 - O-1. See also Cessna O-1
 - UH-1. See also Bell UH-1

Dreadful Lady over the Mekong Delta

- aviation 28
- Continental Army Command (CONARC) 64
- Delta Aviation battalion. See also Delta Aviation battalion.
- fixed wing aviation 27, 28
- helicopter pilots 90
- Pacific, Commander-in-Chief (COMUSARPAC)
 - General Waters. See also Waters
- Reconnaissance Airplane Companies 36
- Tactical Air Control Party (TACP) 72
 - 1st Cavalry 191(n266)
- United States bombing archive. See also United States Government
- United States Coast Guard 12, 33, 36, 37, 41
 - cutter (WPB) 12, 33, 36, 37, 48, 51
 - Point Comfort* (WPB-82317) 37
 - Division #11 36
 - Division #12 36
 - Division #13 36
- SCATTOR (Small Craft Assets, Training, Turnover of Resources) 33
- United States Government 39, 61
 - Department of Defense 10
 - export program 38
 - Joint Chiefs of Staff (JCS) 25, 181(n193)
 - Air Operating Authority 181(n193)
 - Pacific Command (PACCOM) 63
 - Basic Operations Order (BOO) 181(n193)
 - Secretary of Defense
 - Robert McNamara, See also McNamara
 - National Archives and Records Administration 124, 142, 157, 192(n273)
 - Combat Air Activity (CACTA) database 192-3(n273), 197(n307)
 - South East Asia database (SEADAB) 192-3(n273)
 - United States Marine Corps (USMC) 3, 10, 11, 16, 34, 35, 36, 39, 56, 63
 - 1st Battalion, 9th Marines. See also 1st Battalion, 9th Marines
 - 1st Division 12
 - 3rd Division 12
 - aircraft
 - CH-46. See also Boeing-Vertol CH-46
 - F-4B. See also McDonnell Douglas F-4B
 - UH-34. See also Sikorsky UH-34
 - Air Division 173(n82)
 - Air Naval Gunfire Liaison Company (ANGLICO) 36, 40
 - HMM-163. See also Helicopter Transport Squadron Medium
 - HMM-362. See also Helicopter Transport Squadron Medium
 - Special Landing Force (SLF) 34, 35
 - United States Military Assistance Command Vietnam (MACV). See also Military Assistance Command Vietnam (MACV)
 - United States Naval Academy 48
 - United States Naval Forces Vietnam. See also Naval Forces Vietnam (NAVFORV)

Index

- United States Naval Ordnance Systems Command, Bureau of Ordnance
 - NAVORD OP 1665, *British Explosive Ordnance* 183(n210)
- United States Navy 5, 10-22, 25, 27, 31-33, 35-37, 43, 45, 46, 50-52, 54, 58, 59-61, 68, 122, 148, 161, 162
 - 7th Fleet. See also Seventh Fleet
 - aircraft
 - A-1. See also Douglas A-1
 - A-4. See also Douglas A-4
 - A-6. See also Grumman A-6
 - OV-10. See also North American Rockwell OV-10
 - P-2. See also Lockheed P-2
 - P-3. See also Lockheed P-3
 - UH-1B. See also Bell UH-1B
 - aircraft carrier. See also Seventh Fleet
 - Amphibious Ready Group (ARG) 34, 35
 - Amphibious Task Force. See also Seventh Fleet
 - Attack Carrier Strike Force (TF-77). See also Seventh Fleet
 - Coastal Division 13
 - destroyer escort 36
 - Explosive Ordnance Disposal (EOD) Group 41
 - Mekong Delta 'Green Fleet' 16
 - Mine Squadron 11. See also Mine Squadron 11
 - mine sweeper. See also mine sweeping
 - Pacific Fleet (PACFLT) 16, 63
 - Commander-in-Chief (CINCPACFLT)
 - Admiral Sharp. See also Sharp
 - Patrol Division 101 13, 14
 - Radar Escort Picket ship (DER). See also Radar Escort Picket
 - Seabee 59
 - SEALs. See also Sea, Air and Land (SEAL)
 - ships. See also USS
 - Special Warfare Groups. See also UDT, SEALs, Beach Jumpers
 - Task Force TF-76. See also Seventh Fleet
 - Task Force TF-77. See also Seventh Fleet
 - Task Force TF-115. See also Coastal Surveillance Force
 - Task Force TF-116. See also River Patrol Force
 - Task Force TF-117. See also Mobile Riverine Force
 - Task Force TF-194. See also Task Force TF-194
 - Task Group TG-70.8. See also Seventh Fleet
 - Task Group TG-117.2. See also Task Group TG117.2
 - Underwater Demolition Team (UDT). See also Underwater Demolition Team
- Universal Transverse Mercator (UTM) coordinates 72, 78, **113**, 148, 149, 153
- USCGC *Point Comfort*. See United States Coast Guard
- USS *Askari* (ARL-30) 46
- USS *Benewah* (APB-35) 17, 46, **54**
- USS *Camp* (DER-251) 33
- USS *Colleton* (APB-30) 17, 46
- USS *Cook* (LPR-130) 21

Dreadful Lady over the Mekong Delta

- USS *Garrett County* (LST-786) 33
- USS *Henrico* (APA-45) **45**
- USS *Iwo Jima* (LPH-2) 35
- USS *Morton* (DD-948) 13
- USS *Princeton* (LPH-5) 13, 35
- USS *Tunny* (SS-282) 21
- USS *Tutuila* (ARG-4) **49**
- USS *Vernon County* (LST-1161) **17**
- USS *Washoe County* (LST-1165) **16**
- USSR. See also Soviet Union
- UTM. See also Universal Transverse Mercator
- VAL-4 *Black Pony*. See also Light Attack Squadron
- Valley Forge 7
- Vam Co Dong River. See also Song Vam Co Dong
- Vam Co Tay River. See also Song Vam Co Tay
- Vann, Lieutenant Colonel John Paul, US Army 171(n53)
- Variable Ratio Gear Box (VRGB). See also Canberra Mk 20
- variable time fuzing. See also bomb fuze
- V bomber. See also Royal Air Force
- VB. See also bombing, visual or Victoria Bitter, 'VC Lake' (location). See also rendezvous icons
- vectors 73
- vibration-activated sensor. See also sensor
- Victoria Bitter (VB) beer 74
- Viet Cong (VC) 2, 10, 12, 14, 16, 20, 21, 27, 28, 30, 32, 34-36, 39, 41-44, 46, 47, 49, 51-58, 60, 61, 76, 78, 83, 85, **92**, 123, 134, **141**, 144, 145, 148-150, 153, 154, 162, 180(n186), 190(n263), 192(n272), 195(n286)
 - 261st Battalion. See also 261st Battalion, VC
 - 263rd Battalion. See also 263rd Battalion, VC
 - 267th Battalion. See also 267th Battalion, VC
 - 502nd Battalion. See also 502nd Battalion, VC
 - 506th Battalion. See also 506th Battalion, VC
 - 514th Battalion. See also 514th Battalion, VC
 - cadre meeting. See also target type
 - company. See also target type
 - Local Force 44
 - Main Force 44, 55
 - radio station. See also target type
- Viet Minh 10, 28, 42, 43
- Vietnam/ vietnamese 2, 3, 7, 10, 14, 15, 20, 22-24, 27, 28, 33, 36, 37, **40**, 41, 46, 57, 58, 60, 61, 63, 64, **66**, 75, 83-85, 106, 128, 132, 133, 147, 155, 164
- Vietnam Air Force (VNAF) 37, **38**, **66**, 67, **68**, 69, 72, 75, 83, 84, 85, **151**
 - aircraft
 - A-1. See also Douglas A-1
 - A-37. See also Cessna A-37
 - B-57. See also Martin B-57
 - CH-47. See also Boeing-Vertol CH-47
 - H-19. See also Sikorsky H-19

Index

- H-34. See also Sikorsky H-34
- F-8F. See also Grumman F-8F
- O-1. See also Cessna O-1
- T-28. See also North American T-28
- UH-1. See also Bell UH-1
- UH-34. See also Sikorsky UH-34
- FAC 69, 84. See also Forward Air Controller
- Headquarters 63
- interchange with No 2 Squadron. See also No 2 Squadron
- Tactical Air Control System, Director 66
- Vietnam Army. See also Army of the Republic of Vietnam (ARVN)
 - Field Force Commander 11
- Vietnam Marine Corps 10, 16, 26, 32, 34, 47, 55
 - 3rd Battalion 35
 - 4th Battalion 35
 - 5th Battalion 47
 - Brigade Force Bravo
- Vietnam Navy (VNN) 12, 13, 15, 21, 31-34, 37, 47, 50, 51, 52, 54, 55, 58-61, 161,
172(n65), 175(n147)
 - amphibious force 31, 32
 - ASPB. See also Assault Support Patrol Boat
 - ATC. See also Armoured Troop Carrier
 - CCB. See also Command and Communications Boat
 - coastal (junk) force 31, 32
 - Commander 58
 - Commander Tran Van Chon. See also Tran Van Chon
 - destroyer 32
 - escort patrol vessel 32
 - Fleet Command 32
 - frigate 32
 - hospital ship 32
 - Logistics Command Headquarters 33
 - naval support bases 33
 - PBR. See also River Patrol Boat
 - Regional Force (RF) 31
 - River Assault Group (RAG) 31, 47
 - River Assault Interdiction Division (RAID) 33
 - River Force 31
 - River Interdiction Division (RID) 33
 - River Patrol Force/Group (RPG) 32, 33
 - River Transport Escort Group 31
 - River Transport Group 31
 - Tactical Mobile Sea Headquarters 32
 - Task Groups, TG-I, TG-II, TG-III 32
- Vietnam War 1, 7, 9, 12, 22, 23, 36, 62, 63, 64, 86, 164, 166, 193(n274), 194(n282)
- Vietnam-Cambodia border. See also Cambodia, border
- Vietnamese National Army 28

Dreadful Lady over the Mekong Delta

- vietnamese new year (Tet) 2, 27
 - offensive, 1967 (Tet-'67) 20
 - offensive, 1968 (Tet-'68) 2, 3, 27, 30, 35, 47, 51, 61
 - offensive, 1969 (Tet-'69) 55
- Vietnamization program 3, 37, 58, 60, 67, 72, 83, 178(n174)
- Vinh Binh 40
- Vinh Long 16, 24, 31, 47
- Vinh Te canal. See also canal
- visual bombing (VB) mission. See also bombing, visual
- visual reconnaissance (VR) 27, 83, 85
- Vi Thanh 36, 39, 47
- VNAF. See also Vietnam Air Force
- VNN. See also Vietnam Navy
- VT-fuzed bomb. See also bomb fuze
- Vung Tau 5, 13, 33, 39, 56, 70, **125**, 128, 152, 179(n175)
- 'Wagon Wheel' junction (location). See also rendezvous icons
- Walt 72 FAC. See also Laurence
- Walters, Flying Officer Wally, RAAF 191(n269)
- War of Independence. See also American War of Independence
- Ward, Rear Admiral Norvell G, US Navy 13, 168(n16)
- Waring, Flying Officer Bob, RAAF 191(n269)
- Warner, Denis 47, 61
- Warsaw Pact 63
- water borne guard post (WBGp) 58
- water jet propulsion 15
- Waters, General John K, US Army 168(n16)
- weapon cache. See also target type
- weapon position. See also target type
- Weapons Research Establishment (WRE), Department of Supply 186(n240)
- weather 89, 90, 94, 128, 145, 150, 190(n262)
 - cancellation/ diversion 89, 148
 - dry season 4, 6, 53, 190(n262)
 - monsoon 6, 19, 89, 118, 190(n262)
 - tropical 74, 89, 128
 - wet season 4, 6, 190(n262)
- Weekes, Pilot Officer Greg, RAAF 179(n175)
- Welch, Flying Officer Shane, RAAF 150, 151, 154, 186(n239)
- Westmoreland, General William, US Army 2, 26, 30, 35, 48, 168(n16), 169(n22), 173(n82)
- wet season. See also weather
- Weyand, General Frederick C, US Army 168(n14)
- Whitehead, Wing Commander John, RAAF 74, 130, 149, 159, 160, 186(n239), 199(n322), 200(n330)
- white phosphorous ('Willie Pete') smoke rocket. See also 2.75-inch rocket
- Wilkinson, Pilot Officer John, RAAF 151, 186(n239)
- wind speed/ velocity **113**, 126
 - direction 113, 114
 - drift 106, 108, **113**, 114, **118**, 135-137

Index

- Woomera test range, South Australia 133, 186(n240)
- World War II 1, 21, 23, 25, 58, 64, 94, 97, 101, 106, 111, 119, 128, 133, 164, 165,
171(n54), 182(n197), 183(n210), 183(n214), 185(n234), 188(n251), 194(n282),
196(n298)
- European Theatre 64
- WPB. See also United States Coast Guard
- Wright, Flight Lieutenant/Squadron Leader Tom, RAAF 71, 192(n270)
- Wulzen, Rear Admiral Don, US Navy 169(n22)
- WWII. See also World War II
- Xuan Loc 30, 39, 47
- 'Y Bridge' (location). See also rendezvous icons
- Yankee Station 13
- Zippo 18, 19, 59
- Zumwalt, Vice Admiral Elmo, US Navy 12, 31, 32, 48, 50, 53, 57, 58, 60, 62, 83, 162,
165
- Accelerated Turnover to Vietnam (ACTOV) program 32, 33, 58, 61, 83
- memoirs (*On Watch*) 167(n13), 168(n16), 174(n103)

