

Fighting Columns In Small Wars: On OMFYS Model

CSC 2000

Subject Area - Warfighting

Preface

From August to December 1987, South Africa conducted a little-known campaign in southeastern Angola to prevent a communist regime from gaining complete control of the state and further destabilizing the region. The fighting was the culmination of many years of intermittent conflict along the border of Angola and Namibia. The campaign is of contemporary interest for two reasons. First, it provides an excellent example of the political utility of carefully modulated military power. In short, South Africa achieved its policy goals by employing a small but potent strike force. Second, the force selected was a modern version of the colonial war era "flying column", a mobile all-arms battle group tailored to operate effectively at the end of a long supply line. Both aspects of the operation make it an interesting model for potential United States Marine Corps (USMC) Operational Maneuver From the Sea (OMFTS) applications. Part I will establish the strategic context behind the *Modular* campaign. Chapter One will examine the historical background, the primary players involved in the drama, and the results of previous South African military excursions into the maelstrom of Angola. Subsequent chapters will examine the elements of the operation itself, the tactical lessons it underscores, and the pointers it provides towards possible naval applications. Part II will assess the viability of Marine fighting columns launched from the sea to conduct similar combat operations several hundred miles inland.

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 2000	2. REPORT TYPE	3. DATES COVERED 00-00-2000 to 00-00-2000			
4. TITLE AND SUBTITLE Fighting Columns In Small Wars: On OMFYS Model		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) United States Marine Corps, Command and Staff College, Marine Corps University, 2076 South Street, Marine Corps Combat Development Command, Quantico, VA, 22134-5068		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 73	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

EXECUTIVE SUMMARY

Title. Flying Columns in Small Wars: An OMFTS Model

Author. Major Michael F. Morris, USMC

Thesis. The colonial war "flying column" concept provides an effective model for MEU and MEB level OMFTS/STOM operations.

Discussion. This monograph examines the feasibility of MEU and MEB level STOM operations in the 2014 timeframe. It concludes that specially organized, trained, and equipped MAGTFs can conduct STOM versus objectives up to three hundred miles inland. Specific MEU and MEB models, based on the proven concepts inherent in various historical flying column operations, are proposed. Required shifts in doctrine, organization, training, and equipment are identified.

The study also illustrates the utility of battalion and brigade level MAGTFs at the operational level by analyzing a case study, Operation *Modular*. In 1987 in southeastern Angola the South African Defense Force employed a three thousand man mobile strike force to defeat a combined Angolan / Cuban division size force intent on destroying the UNITA resistance movement. The campaign's military outcome convinced the Soviets and Cubans to settle the twenty-three year Angolan border war and the political future of Namibia in a diplomatic venue rather than by force of arms. Operation *Modular* highlights the potential of small, mobile, hard-hitting fighting columns in a small war environment.

Conclusion. Most OMFTS/STOM analysts have thus far advocated either infestation or vertical envelopment tactics. Few recommend using surface battle groups with significant organic CS and CSS capabilities. This study suggests that fighting columns, heavy (by Marine standards) in armor, artillery, and logistic support, provide the most flexible and powerful STOM employment option. It concludes that a combination of robust, mobile CSSDs and aerial resupply can furnish the supplies, particularly Classes I, III, and V, necessary to fight and win.

Table of Contents

	<i>Page</i>
MMS COVER SHEET	i
DISCLAIMER	ii
PREFACE.....	iii
EXECUTIVE SUMMARY	iv
TABLE OF CONTENTS.....	v
LIST OF ILLUSTRATIONS.....	viii
LIST OF TABLES	ix
LIST OF MAPS	x
PART I: OPERATIONAL MANEUVER FROM THE VELD: 20 SOUTH AFRICAN BRIGADE IN ANGOLA, AUG-DEC 1987.....	1
CHAPTER 1: STRATEGIC CONTEXT.....	2
Prelude to Conflict	2
Superpowers and Proxies.....	4
External Operations: A Legacy of Intervention.....	8
CHAPTER 2: OPERATION <i>MODULAR</i>	12
Doctrine.....	12
Equipment.....	13
Organization.....	16
Phases of the Campaign.....	19
Phase I: Defending UNITA (4 Aug-5 Oct).....	20
Phase II: Refit and Pursuit (6 Oct - 27 Oct).....	25
Phase III: Counteroffensive (28 Oct - 5 Dec)	29
Conflict Termination.....	32
CHAPTER 3: TACTICAL LESSONS	35
Command and Control.....	36
Intelligence.....	40
Maneuver	43
Fires.....	47
Force Protection	51
Logistics	53
Conclusion	57

CHAPTER 4: <i>MODULAR'S PRECEDENTS</i>	59
Small Wars Heritage	59
Conventional War Examples	63
Fighting Column Theory.....	66
Fighting Column Feasibility	69
Fighting Column Potential.....	71
PART II: OPERATIONAL MANEUVER FROM THE SEA: MEU AND MEB FIGHTING COLUMNS.....	73
INTRODUCTION	74
CHAPTER 5: OMFTS OPTIONS	75
Infestation	75
Vertical Envelopment	76
Fighting Columns.....	78
CHAPTER 6: THE MAGTF FIGHTING COLUMN	81
Command Element.....	81
Ground Combat Element	84
Aviation Combat Element.....	88
Combat Service Support Element	92
Conclusion	95
CHAPTER 7: THE MEU FIGHTING COLUMN	96
Command and Control.....	96
Task Organization.....	98
Logistics.....	101
Amphibious Considerations.....	107
Conclusion	108
CHAPTER 8: THE MEB FIGHTING COLUMN.....	110
Command and Control.....	110
Task Organization.....	112
Logistics.....	115
Amphibious Considerations.....	120
Conclusion	123
CHAPTER 9: BUILDING AN OMFTS CAPABILITY	125
Doctrine.....	126
Organization.....	128
Training.....	129
Equipment.....	131
Conclusion	134

APPENDIX A: SADF EQUIPMENT	136
APPENDIX B: FAPLA EQUIPMENT	139
APPENDIX C: MEU ASSAULT LANDING PLAN	142
APPENDIX D: MEB ASSAULT LANDING PLAN	146
APPENDIX E: ACRONYMS.....	152
BIBLIOGRAPHY.....	165

List of Illustrations

	<i>Page</i>
Figure 1. Phase I SADF Task Organization.....	24
Figure 2. Phase II SADF Task Organization	27
Figure 3. Phase III SADF Task Organization.....	29
Figure 4. Marine Expeditionary Unit.....	98
Figure 5. Components of the Amphibious MEB.....	112

List of Tables

	<i>Page</i>
Table 1. 61 Mechanized Battalion	17
Table 2. Artillery Ammunition Usage Rates	55
Table 3. Historical Rates of Advance	86
Table 4. Refueling Plan.....	93
Table 5. MEU GCE Fighting Columns.....	99
Table 6. MEU Fighting Column Mobile CSSDs	102
Table 7. MEB GCE Fighting Columns.....	114
Table 8. MEB Fighting Column Mobile CSSDs	116
Table 9. Equipment Shortfalls	131

List of Maps

	<i>Page</i>
Map 1. South-West Africa	5
Map 2. Southeastern Angola.....	21
Map 3. The FAPLA Offensive to the Lomba River	23
Map 4. Interim Operations.....	26
Map 5. The South African Counter-Offensive	31

Part I

Operational Maneuver from the Veld: 20 South African Brigade in Angola

August - December 1987

A Boer commando travelled light, light and fast. DeWet's commando moved like a hunting cat on the veld....It was not a majestic fighting machine, like a British column, it was a fighting animal all muscle and bone: in one sense, the most professional combatant of the War.¹

Thomas Pakenham

...enemy forces are consistently forced to group together, in order to protect or defend their important...infrastructures....This enables smaller, highly mobile forces to act effectively. They are able to surround, then penetrate and overpower them.... Several external offensive operations conducted by the South African forces during recent years have confirmed the above fact. Although not thought possible--fast, mobile, mechanized forces can move with freedom and nerve in close proximity of enemy forces who are clustered around their own defense stronghold.²

Colonel Roland De Vries, SADF
Chief of Staff, 20 Brigade

¹Thomas Pakenham, *The Boer War* (New York: Avon Books, 1979), 347.

²Colonel Roland de Vries, SADF, *Mobile Warfare: A Perspective for South Africa* (Menlopark, South Africa: F.J.N. Harman Uitgewers, 1987), 16.

Chapter 1

Strategic Context

...the most far-reaching act of judgement that the statesman and commander have to make is to establish ...the kind of war on which they are embarking; neither mistaking it for, nor trying to turn it into, something that is alien to its nature.³

— Carl von Clausewitz

Prelude to Conflict. By 1975, Portugal had been a colonial power in Africa for more than four hundred years. The tides of nationalism, however, swept the Dark Continent as they had Asia. As a result, Portugal faced three insurgencies simultaneously in Mozambique, Guinea-Bissau, and Angola. The Portuguese armed forces waged counterinsurgency campaigns in Africa with great skill despite limited manpower, aging equipment, and the great distance separating Lisbon from its three colonies.⁴ Funding the wars, however, took half the national budget, and the fighting became unpopular at home with anti-war protests analogous to those staged in the U.S. against the Vietnam conflict only a few years before.⁵

³ Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), 88.

⁴ Portugal is more than two thousand miles from Guinea-Bissau, four thousand miles from Angola, and six thousand miles from Mozambique.

⁵ Willem Steenkamp, *South Africa's Border War: 1966-1989* (Gibraltar: Ashanti Publishing Limited, 1989), 32. For an assessment of the Portuguese counterinsurgency experience in Africa, particularly in comparison to that of the US in Vietnam and the French in Algeria, see John P. Cann, *Counterinsurgency in Africa: The Portuguese Way of War, 1961-1974* (Westport, Conn: Greenwood Press, 1997).

In 1975 the social unrest in Portugal led to a coup in Lisbon, and the new government decided to withdraw from Africa. Portuguese military authorities in Angola, led by Admiral "Rosa" Coutinho, elected to cooperate with the People's Movement for the Liberation of Angola (MPLA), a Marxist movement under the leadership of Agostinho Neto. The United Nations (UN) charter called for free elections, but the MPLA refused to allow the voting, because it believed it could not win the plurality needed to govern. Despite this intransigence, Portugal cut its losses in Angola and handed over the reigns of government to the MPLA.⁶

There were two other competing insurgent movements in Angola that opposed the MPLA both before and after the Portuguese departure. The stronger of the two initially was the Angolan National Liberation Front (FNLA), a black nationalist movement based on the Bakongo tribe and centered chiefly in the far north of the country. It had been the most effective military opponent of the Portuguese, but its troops were still relatively poorly trained and led. The FNLA was anticommunist, but it received support from China because the Chinese hoped to undermine Soviet influence in the region.⁷

The second opponent of the MPLA was the National Union for the Total Independence of Angola (UNITA), an offshoot of the FNLA led by Doctor Jonas Savimbi. UNITA was most active in the south and southeastern regions of Angola. It drew most of its strength from the Ovimbundu tribe, the largest in the country. UNITA

⁶ Steenkamp, 32-36.

⁷ Ibid., 32-34.

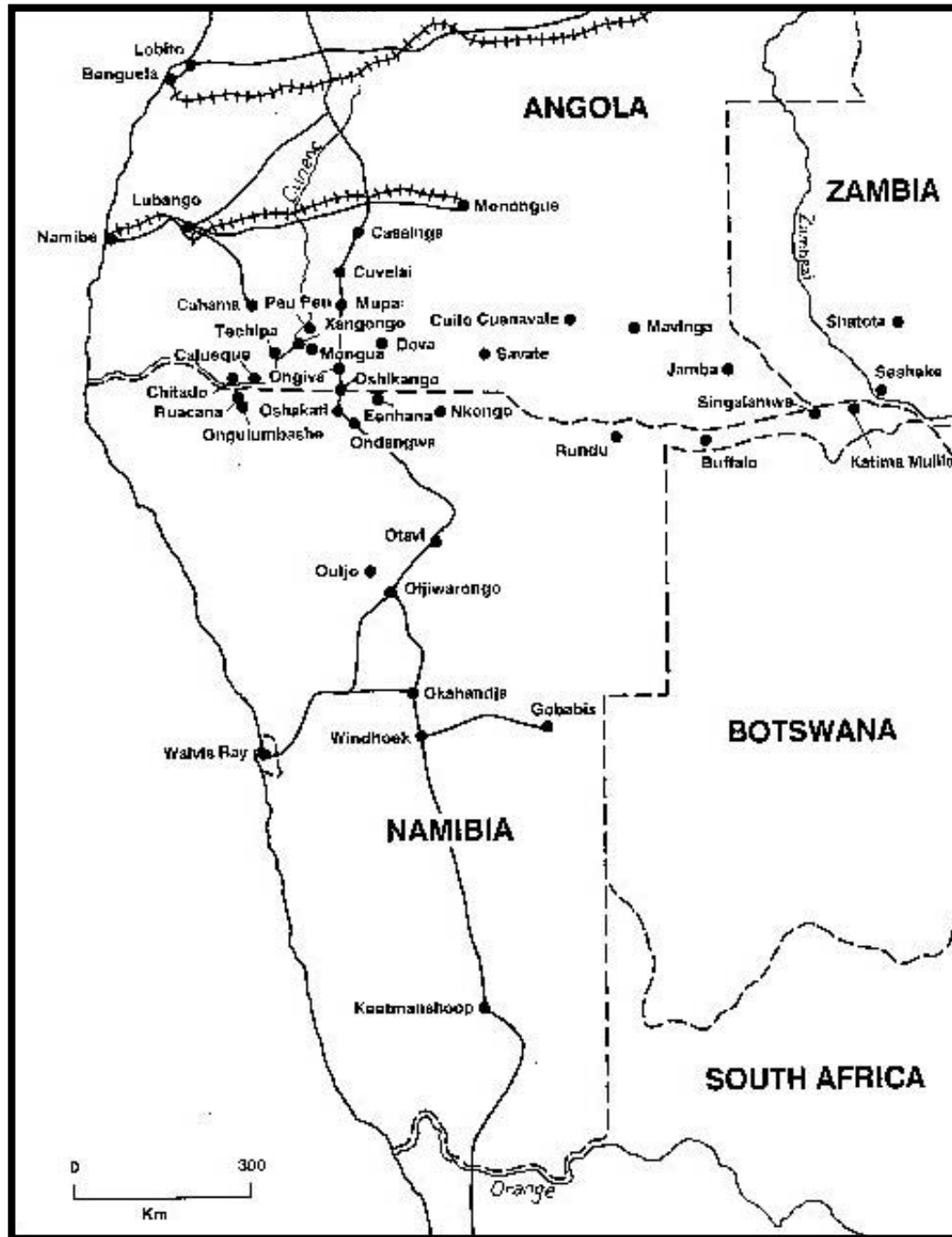
received aid from China along with the FNLA, but it was a socialist as well as a nationalist political movement.⁸

Another insurgency in Angola that was loosely allied with the MPLA was the South West Africa People's Organization (SWAPO). SWAPO formed in 1960 to seize power in Southwest Africa, the territory bounded by the South Atlantic Ocean, Angola and South Africa (see Map 1). Southwest Africa, also known as Namibia, had been a German colony, a South African protectorate, a League of Nations territory, and finally a ward of the United Nations occupied by South Africa pending determination of its style of government. SWAPO launched its military wing, the People's Liberation Army of Namibia (PLAN), in 1962. Between 1962 and 1974, PLAN insurgents made a series of generally unsuccessful infiltrations over the border from Angola into Namibia to foment revolution among the Ovambo tribe, which comprised nearly half the country's population. These incursions were largely defeated by the Southwest Africa (SWA) police force through an aggressive border patrol regimen.⁹

Superpowers and Proxies. In addition to the assistance provided to Angola's contending factions by the Chinese, the Russians and the Americans also became involved in the country. For the Soviet Union, Africa was a promising region in which to champion "wars of national liberation". Moscow also supported insurgencies in Rhodesia, Mozambique, Guinea-Bissau, Ethiopia, Sudan, and Somalia. These proxy wars provided an effective and low risk means of challenging the West while increasing

⁸ Ibid; Fred Bridgland, *The War for Africa: Twelve Months that Transformed a Continent* (Gibraltar: Ashanti Publishing Limited, 1990), 13-14. Zaire, France, Saudi Arabia, the Gulf Emirates, Egypt, and Morocco also supported UNITA.

⁹ Steenkamp, 18-26.



Map 1¹⁰

¹⁰ Helmoed-Romer Heitman, *Modern African Wars 3: South-West Africa* (London: Osprey Publishing Ltd, 1991), 6.

Russian prestige, access to raw materials and natural resources, and military presence along critical trade routes.¹¹

The revolutionary wars the Soviets spawned were, of course, ideological in nature as well as a quest for economic and military gain. The Russians thus found it easy to back the Marxist MPLA in Angola. Many MPLA officers went to Russia or other Warsaw Pact states for military training. In 1974, Russia provided more than six million dollars worth of heavy weapons to the MPLA.¹² Between 1977 and 1987, the Soviet Union provided more than four billion dollars worth of military aid to Angola. In 1987, this figure grew to one billion dollars worth of equipment each year. Moscow provided armored vehicles, 550 tanks, artillery, antiaircraft missile systems, fifty-five MiG-23 aircraft, ships and patrol craft to the Angolan Marxist government forces. Three thousand North Koreans, five hundred East Germans, 950 Russians, and 150 Vietnamese intelligence operatives, security specialists, equipment technicians and military advisors assisted Angola in its internal counterinsurgency campaign against UNITA and its border war with South Africa. Soviet General Konstantin Shaganovitch directed all communist military forces in Angola, including those of FAPLA, from December 1985 onwards.¹³

Like the Soviet Union, Fidel Castro's Cuba also became heavily involved in Africa. In addition to Angola, Cuban troops had deployed to nineteen other countries worldwide in a determined bid to stake out a leadership position in the Third World. Cuba sought to

¹¹ Morgan Norval, *Death in the Desert: The Namibian Tragedy* (Washington: Selous Foundation Press, 1989), 15; a good overview of Soviet involvement in African "wars of liberation" is provided in John W. Turner, *Africa Ablaze: The Insurgency Wars in Africa 1960 to the Present* (London: Arms and Armour Press, 1998).

¹² Steenkamp, 34.

¹³ Raymond W. Copson, *Africa's Wars and Prospects for Peace* (New York: M.E. Sharpe, Inc., 1994), 122; W. Martin James, *A Political History of the Civil War in Angola: 1974-1990* (New Brunswick, NJ: Transaction Publishers, 1992), 218; Bridgland, 17.

propagate its communist ideology, gain useful military experience, and through its proxy forces to repay the Soviet Union for propping up the anemic Cuban economy. Castro provided military trainers and bodyguards to Neto beginning in 1966. In response to Admiral Coutinho's invitation, more than 250 Cuban military advisors were in Angola in support of the MPLA by May of 1975. The purpose of this mission was to transition the largely guerrilla MPLA into a conventionally equipped and trained army in order to ensure that Angola would not fall under the influence of the West. By 1987, more than thirty-seven thousand Cuban personnel were stationed in Angola. A year later that number had increased to fifty thousand soldiers.¹⁴

The final external actor on the Angolan scene was the Republic of South Africa. Its strategic goal was to prevent insurgencies, whether nationalist or communist in nature, from encroaching on its own borders. South Africa had assisted the Rhodesians in their struggle against communists and Renamo in its bid to overthrow communist Mozambique, so it was only natural that it would also help UNITA against the MPLA. The South Africans believed a Marxist Angola would serve as a potent launching pad for SWAPO incursions into Southwest Africa. SWAPO could then undermine Namibia and communist insurgents would be poised on the border of South Africa itself. The South African government saw its neighbors as mere stepping stones for insurgency that would threaten its own existence.¹⁵

This opposition to regional instability induced South Africa to take control of the Namibian border in 1974. Elements of the South African Defense Force (SADF) patrolled the border to shield Namibia from PLAN incursions. Thirteen battalions

¹⁴ Arthur Jay Klinghoffer, *The Angolan War: A Study in Soviet Policy in the Third World* (Boulder, Co.: Westview Press, 1980), 109-110, 115; Steenkamp, 34-36; James, 216.

deployed along the border and worked in conjunction with police units to blunt the growing threat of armed revolutionaries infiltrating from bases in Angola. Beginning in 1978, the SADF launched a series of preemptive raids into Angola to destroy PLAN staging bases, training camps, and supply depots. The first South African incursion into Angola, however, occurred three years earlier in a bid to bolster FNLA and UNITA forces in their struggle against the MPLA.¹⁶

External Operations: A Legacy of Intervention. South Africa decided to intervene in Angola initially in 1975 at the behest of other African states, the United States, and FNLA/UNITA.¹⁷ The resulting campaign, known as Operation *Savannah*, was limited in nature; the goal was to drive the MPLA out of southwestern Angola. Political considerations limited the SADF to less than 2,500 men and six hundred vehicles across the border. One of its fighting columns, Task Force (TF) Zulu, advanced 3,159 km in thirty-three days. During this brief period it fought twenty-one skirmishes and conducted sixteen hasty and fourteen deliberate attacks. TF Zulu accounted for 210 MPLA dead, ninety-six wounded, and fifty-six prisoners while suffering five killed and forty-one wounded. The task force was led and supported by South Africans, but most of the combatants were actually anticommunist Angolan tribesmen. One of Task Force Zulu's two battle groups was comprised of Angolan bushmen that had fought for the Portuguese. The other battle group consisted primarily of former FNLA troops led by Colonel Jan Breytenback, a noted South African Special Forces officer. This FNLA cadre later

¹⁵ James, 153.

¹⁶ Helmoed-Romer Heitman, *Modern African Wars 3: South-West Africa*, 14; Steenkamp, 26.

¹⁷ Helmoed-Romer Heitman, *South African Armed Forces* (Cape Town: Buffalo Publications, 1990), 203-205; Bridgland, 11-12.

became the nucleus of 32 Battalion, the so-called "Foreign Legion" of the SADF. *Savannah* ended when Russian equipment and advisors and Cuban reinforcements began to reach the MPLA. Until then the primary challenge was logistic in nature; it was more than 1,500 miles from the primary logistics base at Grootfontein to the front.¹⁸

In 1978 the SADF conducted two coordinated raids against SWAPO in Angola. Operation *Reindeer* consisted of an airborne assault on Cassinga, a training base more than 250 kilometers from the border. It resulted in six hundred dead and 340 wounded insurgents. Simultaneously, a mechanized task force comprised of fifty-four armored vehicles conducted a successful raid against a headquarters (HQ) and log base at Chetequera. *Reindeer* produced excellent intelligence on PLAN doctrine, organization, and strategy. It also demonstrated the vulnerability of light airborne forces; when the Cassinga task force withdrew via helicopter, it was under heavy pressure from FAPLA armor units.¹⁹

Operation *Sceptic*, in 1980, was a three-week raid on SWAPO HQ by four mechanized battalion combat groups. The groups destroyed, over a period of four days, a huge base area more than two thousand square kilometers in size. The goal of the operation was to force the insurgents to move further away from the border area and complicate their access to the Ovambo population in Namibia. *Sceptic* killed 380

¹⁸ Ibid., 204-210; the metamorphosis of 32 Battalion from *ad hoc* guerrilla band to a regular formation is best described in the first four chapters of Colonel Jan Breytenbach, *They Live by the Sword: 32 'Buffalo Battalion', South Africa's Foreign Legion* (Alberton, SA: Lemur Books {Pty} Ltd, 1990). Breytenbach was the founder and first commander of 32 Battalion.

¹⁹ Steenkamp, 149-151; Heitman, *Modern African Wars 3: South-West Africa* 33; Heitman, *South African Armed Forces*, 149-151.

guerrillas at the cost of seventeen South Africans; it also produced hundreds of tons of captured ammunition, weapons, and equipment.²⁰

Protea, in 1981, was another three-week operation conducted by six SADF combat groups. During this raid the SADF fought a combined FAPLA/PLAN force in a series of set-piece battles. The South African combat groups mauled two FAPLA brigades, destroyed three hundred tons of ammunition, and captured eight T-34 tanks, three PT-76 amphibious tanks, three BRDMs, one BM-21, twenty-four 76mm guns, sixteen AU-23-2 antiaircraft guns, fourteen M55 20mm AAA guns, and two hundred trucks. FAPLA's defeat forced it and SWAPO to withdraw far from the southern edge of Angola.²¹

Daisy, a follow-on operation derived from *Protea's* intelligence windfall, saw SADF fighting columns roam four hundred kilometers into Angola to destroy a SWAPO HQ at Bambi and a base at Cherequera. It took four days to get to the targets; once on site the mechanized columns spent twelve days razing the base. Due to the damage induced by *Protea* and *Daisy*, SWAPO terrorist incidents in Namibia declined twenty-eight percent during the following year.²²

Some of SWAPO's military infrastructure was rebuilt in 1982. Operation *Askari*, in 1983-84, was designed to neutralize the growing threat and disrupt the logistic support necessary for the annual infiltration of insurgents into Namibia. Four SADF battalion-size mechanized task forces combed southern Angola over a five week span. On 3 January 1984, the SADF fought 11 Brigade (FAPLA) and for the first time, two Cuban battalions, in a hard fought engagement. The South Africans killed 324 enemy and

²⁰ Steenkamp, 155-156; Heitman, *Modern African Wars 3: South-West Africa*, 34; Heitman, *South African Armed Forces*, 155-157.

²¹ Steenkamp, 159-164; Heitman, *Modern African Wars 3: South-West Africa*, 35; Heitman, *South African Armed Forces*, 159-164.

captured eleven T-54 tanks and much other combat equipment for the loss of twenty-one men. The SADF's experience in Operation *Askari* reinforced the growing military potential of the FAPLA and Cuban enemy and the need for significant anti-armor capability in future external operations.²³

External operations proved the SADF's ability to operate mobile battle groups deep in Angola. The raids were designed to punish lightly armed PLAN guerrillas, not Angolan and Cuban conventional forces. Despite the fact that the task forces acquitted themselves well in combat against both types of adversaries, South Africa was not eager to commit larger ground forces to up the ante in Angola. The political goal remained constant: to foster an environment conducive to the development of a stable and peaceful Namibia. From Pretoria's perspective, the border conflict had been persistent but bearable in terms of blood and treasure. Operation *Modular* was destined to challenge that status by changing the low intensity nature of the war.

²² Steenkamp, 164; Heitman, *Modern African Wars 3: South-West Africa*, 35; Heitman, *South African Armed Forces*, 154-166.

²³ Steenkamp, 167-168; Heitman, *Modern African Wars 3: South-West Africa*, 36; Heitman, *South African Armed Forces*, 167-169.

Chapter 2

Operation Modular

The mission of UNITA and ourselves was to destroy the offensive against Jamba. We did just that;.... After this the Soviets lost their appetite for war in Angola. Only a few months later they told us that nobody could win the war in Angola - the answer was negotiations.²⁴

—General Jannie Geldenhuys
Chief of Staff, SADF

Operation *Modular* introduced the heaviest fighting seen in the entire twenty-three year border war. This chapter will examine the doctrine, equipment, and task organization of the opposing forces, the distinct phases of the campaign, and the way in which the conflict finally terminated.

Doctrine. South Africa's military doctrine was unique. It derived partly from its own colonial experience against the Zulus and other African foes. Certainly the South African style of warfare also enshrined the flexibility, toughness, and mobility exhibited by the Boers in their three-year conflict with the British at the turn of the century. It also drew heavily on lessons learned while serving alongside British forces in both World Wars. South African soldiers earned widespread acclaim for their performance as raiders in the Long Range Desert Group, pilots in the Royal Air Force, and assault infantry in North

Africa and Italy. Colonel Rolend De Vries, 20 Brigade's Chief of Staff during Operation *Modular*, published a text on South African doctrine just before the start of the campaign. He stressed the primacy of mobility and suggested the utility of combining conventional mobile warfare with the techniques of guerrilla action. He also noted the requirement to perform both modes of warfare proficiently at night. All three doctrinal elements - mobility, guerrilla tactics, and night operations - figured prominently in Operation *Modular*.²⁵

FAPLA military doctrine was purely Soviet in nature. The level of training of the Angolan troops was never sufficient, however, to capitalize on the strengths of the methodical Russian offensive approach. Lack of adequate training and leadership denigrated the potential of FAPLA's vast quantities of Warsaw Pact equipment as well. The presence of Cuban advisors, Soviet technicians, and pilots from both countries could not make up for the training deficiencies of the Angolan soldiers who did most of the fighting.²⁶ In short, FAPLA's doctrinal underpinnings were sound, but its execution was dreadful.

Equipment. SADF combat equipment was unique because much of it was home made due to the sanctions levied on South Africa by the West. Armscor, the national weapons design and manufacturing corporation, created a number of products optimized for service under African conditions. Most of the combat vehicles were wheeled rather than tracked to give them enhanced operational range. A majority of the vehicles were mine

²⁴ Jannie Geldenhuys, *A General's Story: From an Era of War and Peace* (Johannesburg: Jonathan Ball Publishers, 1995), 227.

²⁵ de Vries, see especially chapters 2, 3, 9, and 10; similar points on South African doctrine are made in Heitman, *South African Armed Forces*, 34.

²⁶ Heitman, *Modern African Wars 3: South-West Africa*, 23.

resistant, with V-shaped hulls to deflect blast and increase passenger survivability. The fighting vehicles tended to be large, tall, and mechanically robust. These features allowed columns to smash through the African bush, provided vantage points above the scrub from which soldiers could more readily locate the enemy, and enabled them to survive the grueling passage across hundreds of kilometers of some of the worst terrain in the world. In terms of its impact on the campaign, the most important arm was the artillery. South Africa fielded towed 120mm mortars, towed G-5 and self-propelled G-6 155mm gun-howitzers, and truck mounted 127mm multiple rocket launchers (MRLs).²⁷

The South African Air Force (SAAF) also suffered from the sanctions imposed by the international community. The air arm was small and relied primarily on a handful of Mirage fighters to challenge the Angolan Air Force with its Soviet planes and Cuban/Russian advisors and pilots. SAAF combat aircraft were older and less capable than those of their rivals. They also had to contend with an elaborate air defense system that exceeded in complexity those encountered by the Israelis in the Bekaa Valley or over the Golan Heights.²⁸ As a result the SAAF had to develop proficiency in tactics such as "toss bombing", which allowed planes to ingress at low level and then climb swiftly to loft bombs in an indirect trajectory to within two hundred meters of their intended targets from seven to eight kilometers away.²⁹ The hostile air environment in southeastern Angola, coupled with the paucity and technical inferiority of their aircraft, forced the SAAF to husband their assets for only the most critical targets. Ground forces could not rely on plentiful and timely close air support; on the contrary they fought under a blanket

²⁷Heitman, *South African Armed Forces*, 122-126; Heitman, *War in Angola*, 47.

²⁸Bridgland, 49-50.

²⁹Ibid., 50-51.

of enemy air superiority.³⁰ Appendix A contains more information on both the primary pieces of ground equipment and on specific aircraft used by the SADF in Operation *Modular*.

FAPLA's ground combat equipment was Soviet in origin. The Angolans fielded T-54/55 and PT-76 tanks, BRDM/BMP/BTR armored vehicles, and excellent cannon and rocket artillery systems. FAPLA also incorporated eight missile and two gun air defense systems within its formations. Soviet trucks and engineering equipment completed the all arms package and provided superior mobility, obstacle crossing and barrier construction capabilities. Most of the technical support required to service and employ this modern equipment was furnished by Russian, Cuban, East German, or Vietnamese advisors.³¹

The Angolan Air Force, similar to its army, was well equipped with first line equipment. In some cases, the equipment that the Soviet Union furnished FAPLA was so new that western arms experts gained access to Soviet material not previously encountered elsewhere. For example, the SA-8 surface to air missile and the Flat Face radar, the system associated with the SA-6 missile, were first acquired in Angola and provided to western specialists for closer technical examination. FAPLA flew MiG-23 fighters, MiG-21 and SU-22 fighter-bombers, Mi-24/25 attack helicopters and Mi-8/17 transport helicopters; by 1987 its Air Force numbered eighty fighters and 123 helicopters. The size of their air component, the proximity of their air bases, and the anemic state of SADF air defense assets allowed FAPLA commanders to provide greater air coverage than their enemy over the battle zone. This impressive capability did not, however,

³⁰ Heitman, *War in Angola*, 310; Bridgland, 102-103.

³¹ Heitman, *Modern African Wars 3: South-West Africa*, 22-24; Heitman, *War in Angola*, 366, 357-362.

decisively impact the outcome of *Modular* due to the poor training of the Angolan pilots.³² Appendix B provides additional information on specific air and ground weapons systems used by FAPLA during the *Modular* campaign.

Organization. 20 Brigade comprised three maneuver elements and an artillery component. The first infantry formation was 32 Battalion. This unit was initially formed from FNLA insurgents who had fought as part of Zulu Force under South African leadership during Operation *Savannah*.³³ After the withdrawal from Angola many of the men moved to Namibia to continue the war against the MPLA. This cadre developed into 32 Battalion, South Africa's most famous and effective counterinsurgency unit. Its members were particularly deadly because they had long experience in the war zone; the battalion had operated for years in southern Angola and participated in most of the external operations listed previously. Moreover, most 32 Battalion soldiers were black and spoke Portuguese and native tongues. They therefore blended in well among both SWAPO insurgents and border tribesmen.³⁴

By 1983, 32 Battalion featured a recon detachment, mortar platoon, and seven rifle companies. As the war in Angola became more conventional in 1984, the battalion was strengthened to counter Cuban armor and FAPLA heavy weapons. An anti-tank company with Ratel 90mm assault guns, a Valkiri 127mm MRL battery, a M-5 120mm mortar battery, and a detachment of 20mm antiaircraft artillery (AAA) guns were added. A support company with 106mm recoilless rifles, 81mm mortars, Milan antitank (AT)

³² Heitman, *Modern African Wars 3: South-West Africa*, 24; Heitman, *War in Angola*, 22, 82, 158, 310, 363-364; Bridgland, 37, 150, 162. Also UNITA's American supplied Stinger SAMs forced Angolan planes, even those piloted by Cubans or Russians, to bomb from high altitude, thus reducing their accuracy.

³³ Breytenbach, 11-18.

³⁴ Steenkamp, 231.

missiles, and .50 caliber machine guns was also formed. By the start of the *Modular* campaign, 32 Battalion had been transformed from a counterinsurgent to a mechanized infantry unit with tremendous firepower.³⁵

The 61 Mechanized Battalion was created in 1979 and participated in most of the external operations mentioned earlier. It comprised two infantry companies and a variety of fire support and combat service support elements as shown in Table 1. This battalion was the key counterattack unit committed to stop and roll back FAPLA's 1987 offensive.

Table 1: 61 Mechanized Battalion

Sub - Unit	Major Equipment or Function
2 rifle companies	Twelve Ratel 20s each
Armored car squadron	Twelve Ratel 90 assault guns
Artillery battery	Eight G-5 155mm towed howitzers
Mortar battery	Eight M5 120mm towed mortars
Antitank platoon	Six Ratel 90s & two AT missile Ratels
Mortar platoon	Twelve 81mm mortars
Antiaircraft troop	Twelve 20mm Ystervark SP AA guns
Combat service support units	Engineer, Comm, Medical & Maint Dets

Source: Heitman, *Modern African Wars 3: South-West Africa*, 15-16.

The mechanized battalion deployed into Angola with fifty-five Ratels, five Rinkhals ambulances, sixty-two logistic trucks, and four recovery vehicles. A contingent of trucks carrying fuel and supplies also accompanied the 126 vehicle main body.³⁶ Four South African Infantry Battalion (4 SAI) was a similarly organized and equipped combined arms mechanized infantry formation that was committed to Operation *Modular* during the latter part of the campaign.

³⁵ Breytenbach, 230; Jeff Fannell and Robert Pitta, *South African Special Forces* (London: Osprey Publishing, Ltd., 1993), 18-19.

The 101 Battalion was another unit optimized for counterinsurgency duties. With the Koevet police unit, it ran mobile reaction force patrols inside Owambo and into southern Angola. The battalion grew to a regimental strength of some 2,500 soldiers, over one third of whom were "turned" SWAPO guerrillas. The 101 Battalion developed four Mike Force reaction companies. Each company contained platoons of four Casspir armored personnel carriers (APCs) and one mine-proof supply truck. These platoons conducted independent operations of several weeks duration. The Mike Force elements and Recce Wing frequently operated in Angola. The battalion also employed two companies on civic action in Namibia and sported a support company with AT, mortar, tracker, interpreter, engineer and medical platoons.³⁷ During *Modular* two companies from 101 Battalion played a key role in one of the more decisive battles.

The artillery component of 20 Brigade initially consisted of three batteries. Quebec battery was an eight gun G-5 unit. It was augmented by two 32 Battalion infantry platoons for local security; four UNITA Stinger teams, two SADF SA-7 teams and eight 14.5mm heavy machine guns for air defense; and a Mobile Air Operations Team (MAOT) to control SAAF assets. Papa battery, a 127mm MRL unit, featured a 32 Battalion rifle company for local security, a troop of 20mm AAA guns, two UNITA Stinger teams, twenty-four SADF SA-7s, and a MAOT. Sierra battery, a 120mm-mortar unit, had one 32 Battalion platoon for local security purposes.³⁸ South African reconnaissance commandos located behind FAPLA's lines provided much of the observation services for the artillery group throughout the campaign.

³⁶ Bridgland, 119.

³⁷ Steenkamp, 204; Heitman, *Modern African Wars 3: South-West Africa*, 18.

³⁸ Heitman, *War in Angola*, 47.

UNITA had developed from a guerrilla force into a more formidable army by the time *Modular* commenced. It contained Special Forces trained by the South Africans; guerrilla units used for harassment, intelligence collection, and transportation duties; semi-regular battalions with organic supply/fire support capabilities and used to screen SADF elements; and regular battalions. The latter contained the best-trained conventional troops and were supported by AT and AAA weapons, APCs, heavy mortars, artillery, and MRLs. Much of UNITA's equipment was captured from FAPLA in previous battles.³⁹

FAPLA brigades were 1,900 men strong and organized into three motorized infantry battalions, a tank company with ten T-54/55 tanks, and an artillery battalion. FAPLA also employed separate combined arms units of battalion strength called "tactical groups." Angolan infantry battalions contained three rifle companies in vehicles with a separate mortar platoon (6 x 82mm), AT platoon (6 x Sagger or B-10 recoilless rifles), grenade launcher platoon (6 x AGS-17), and ADA platoon (3 x SA-7 and 4 x 14.5mm heavy machine guns). The artillery component was twice the size of a normal battalion and contained six batteries: two 6-gun D30 122mm howitzer batteries; two 4-gun ZIS-3 76mm guns; one 8-launcher 122mm BM-21 MRL battery; and one 6-tube 120mm mortar battery.⁴⁰

Phases of the Campaign. In 1985-86 FAPLA conducted several offensives designed to capture the Jamba complex in southeastern Angola, the site of Savimbi's UNITA headquarters. A combination of poor weather and fierce UNITA resistance, both near the rebel capital and along the extensive supply lines connecting the coastal ports and

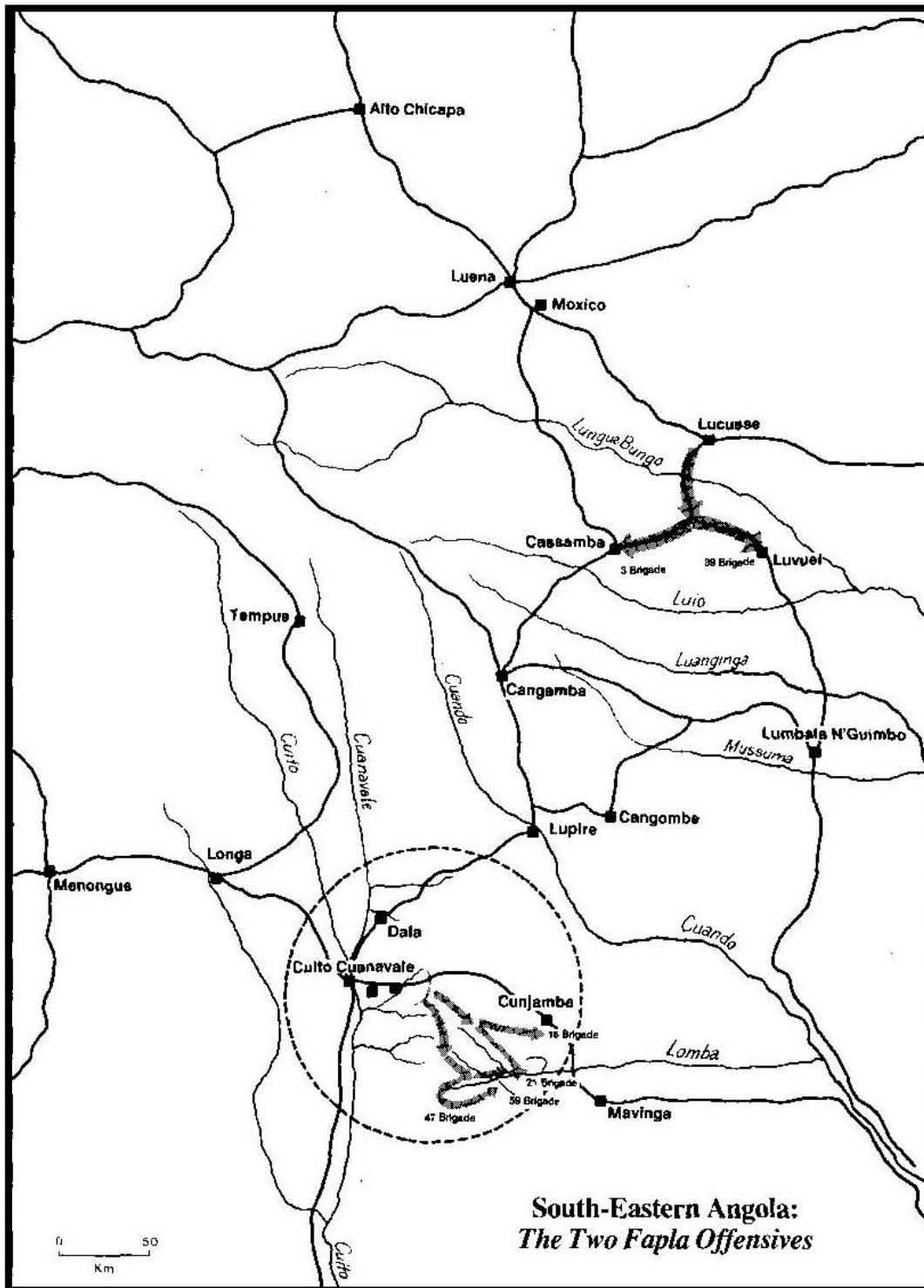
³⁹ Heitman, *Modern African Wars 3: South-West Africa*, 22-24.

⁴⁰ Heitman, *War in Angola*, 366; Heitman, *Modern African Wars 3: South-West Africa*, 23-24.

airfields with the theater of combat operations, destroyed these efforts. Angolan President dos Santos, advised by military experts from Cuba and the Soviet Union, elected to try again in the 1987 dry season. To that end FAPLA conserved its strength while Russia poured fresh arms and advisors into Angola. Cuba also reinforced its Angolan contingent. The Cuban reinforcements were primarily used to free FAPLA units from garrison duties elsewhere in Angola so they could mass for the upcoming offensive. During *Modular* some Cubans, however, served as advisors at the brigade level or fought in key battalion-level artillery or tank commander positions. Cuban personnel also piloted some Angolan aircraft.⁴¹

Phase I: Defending UNITA (4 Aug - 5 Oct). By August 1987 the Angolans had concentrated five brigades around Lucusse and assigned them the mission of seizing the cities of Cangamba and Lumbala (see Map 2). Eight other brigades and two battalion-size tactical groups assembled near Cuito Cuanavale, the town situated at the end of the improved road closest to Jamba. Cuito Cuanavale also contained an important air base from which Angolan fighters and bombers could range in a matter of minutes over the expected battlegrounds. The northern most threat UNITA handled without SADF assistance. The FAPLA offensive in the north collapsed due to insufficient logistics and an aggressive UNITA defense. The southern front, however, was a different story. UNITA lacked the heavy weapons necessary to block the armored thrusts that 16, 21, 25, 47, and 59 Brigades (FAPLA) could develop. The South African government, fearing the collapse of Savimbi's anticommunist resistance, elected to assist UNITA. Initially the

⁴¹ Heitman, *War in Angola*, 11, 16, 26-36, 70-71, 128-129; Heitman, *South African Armed Forces*, 217-218; Bridgland, 19, 104, 133, 180.



Map 2⁴²

⁴² Heitman, *War in Angola*, 23.

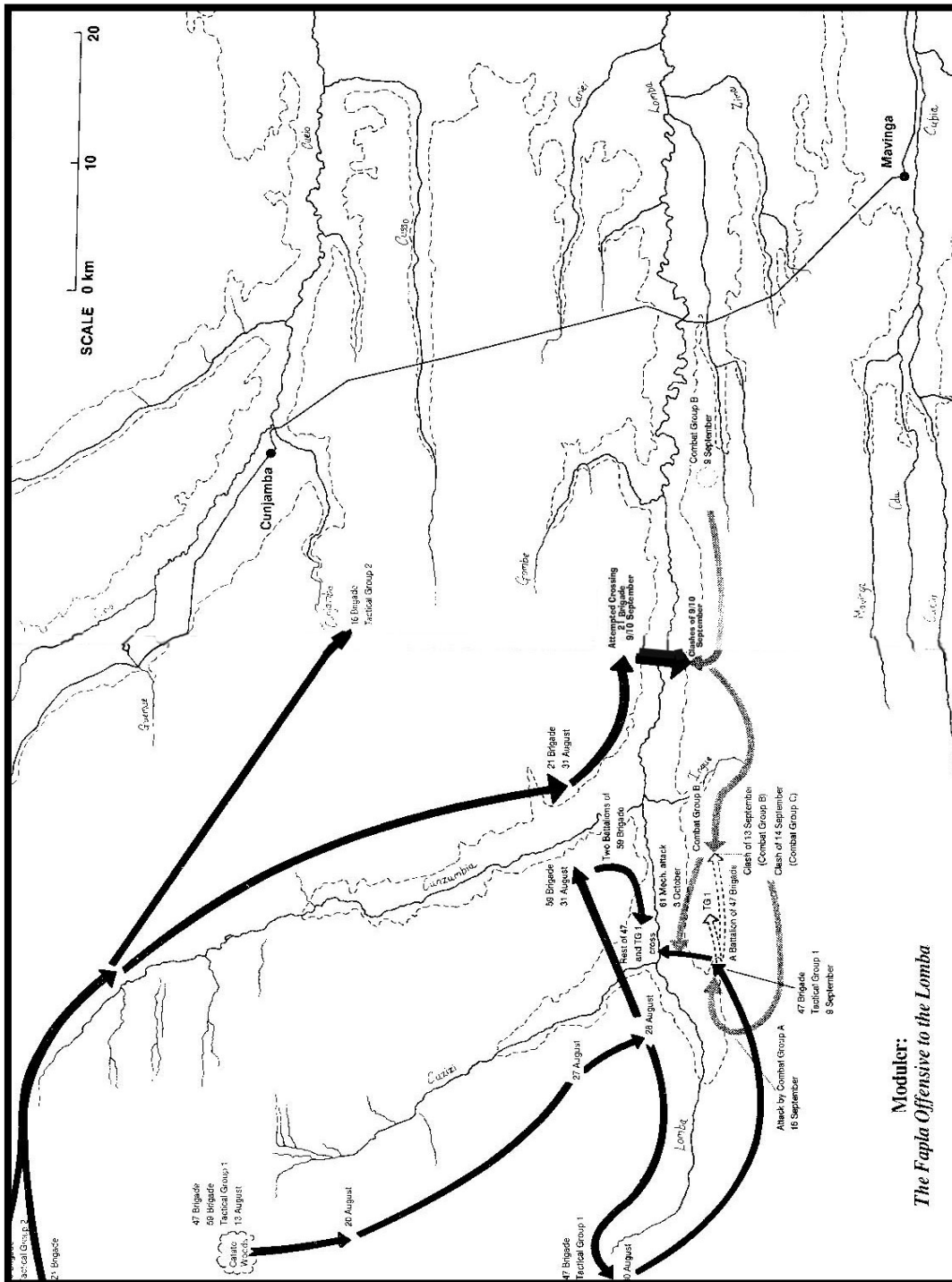
response was limited to liaison officer (LNO) cells whose purpose was to help plan antitank defenses for Savimbi's forces. It soon became apparent that more help would be required to save Jamba.⁴³

On 14 August the FAPLA advance commenced. Two units, 47 and 59 Brigades (FAPLA) moved south/southeast from Cuito while 16 and 21 Brigades (FAPLA) moved east and then south towards Mavinga (see Map 3). Mavinga, a UNITA forward supply base, was the intermediate objective of the offensive. The Angolan advance was extremely slow; the brigades averaged only four kilometers per day. Partly this was a product of the difficult terrain - a mix of sand and thick scrub brush. Tenuous logistic support also contributed to the glacial pace. Finally, FAPLA elected to move its forces in a concentrated fashion. This methodical advance conferred two advantages: it facilitated more efficient air defense of the close formations and enhanced force protection should the South Africans counterattack with their deadly mechanized columns.⁴⁴

The initial South African ground forces committed were a 120mm mortar battery and a 127mm multiple rocket launcher (MRL) battery. An infantry unit from 32 Battalion protected each battery. These fire support assets provided UNITA much needed killing power and effectively engaged the advance elements of the FAPLA columns, but they were not enough by themselves to stop the mechanized enemy. The artillery was quickly reinforced by a detachment from 101 Battalion, a mechanized infantry and armored car

⁴³ Heitman, *South African Armed Forces*, 217-218; Heitman, *War in Angola*, 26-36. In addition to the five brigades and two tactical groups that attacked towards Mavinga, FAPLA employed two brigades to defend Cuito Canavale and one to protect surface logistic convoys travelling the 160 kilometers between Menongue and Cuito Cuanavale.

⁴⁴ Heitman, *South African Armed Forces*, 218-219; Heitman, *Modern African Wars 3: South-West Africa*, 40.



Map 345

⁴⁵ Heitman, *War in Angola*, 28-29.

group from 61 Mechanized Battalion, and a G-5 155mm towed howitzer battery. The initial task organization adapted by 20 Brigade is shown in Figure 1. Less than a month after the Angolans began their offensive, the reinforced SADF component met the enemy in direct combat.⁴⁶

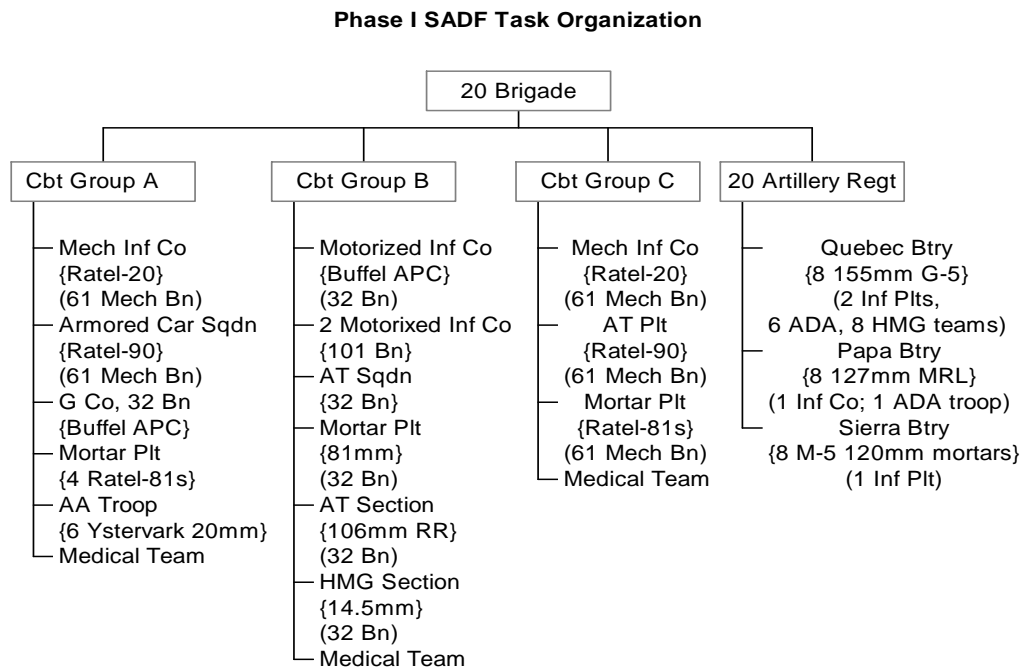


Figure 1⁴⁷

On 9 and 10 September 1987 Combat Group Bravo engaged two battalions and five tanks from FAPLA's 21 Brigade as they crossed to the southern bank of the Lomba River. One FAPLA battalion was destroyed and the other was badly damaged in the ensuing battle. Three T-55 tanks were also destroyed. Much of the damage to the FAPLA infantry was done by South African artillery. On 13-14 September, Combat Group Bravo encountered two battalions and another tank detachment belonging to 47 Brigade (FAPLA). Two 101 Battalion companies and an assault gun squadron from

⁴⁶ Heitman, *South African Armed Forces*, 219; Heitman, *Modern African Wars 3: South-West Africa*, 40.

⁴⁷ Heitman, *War in Angola*, 46-47.

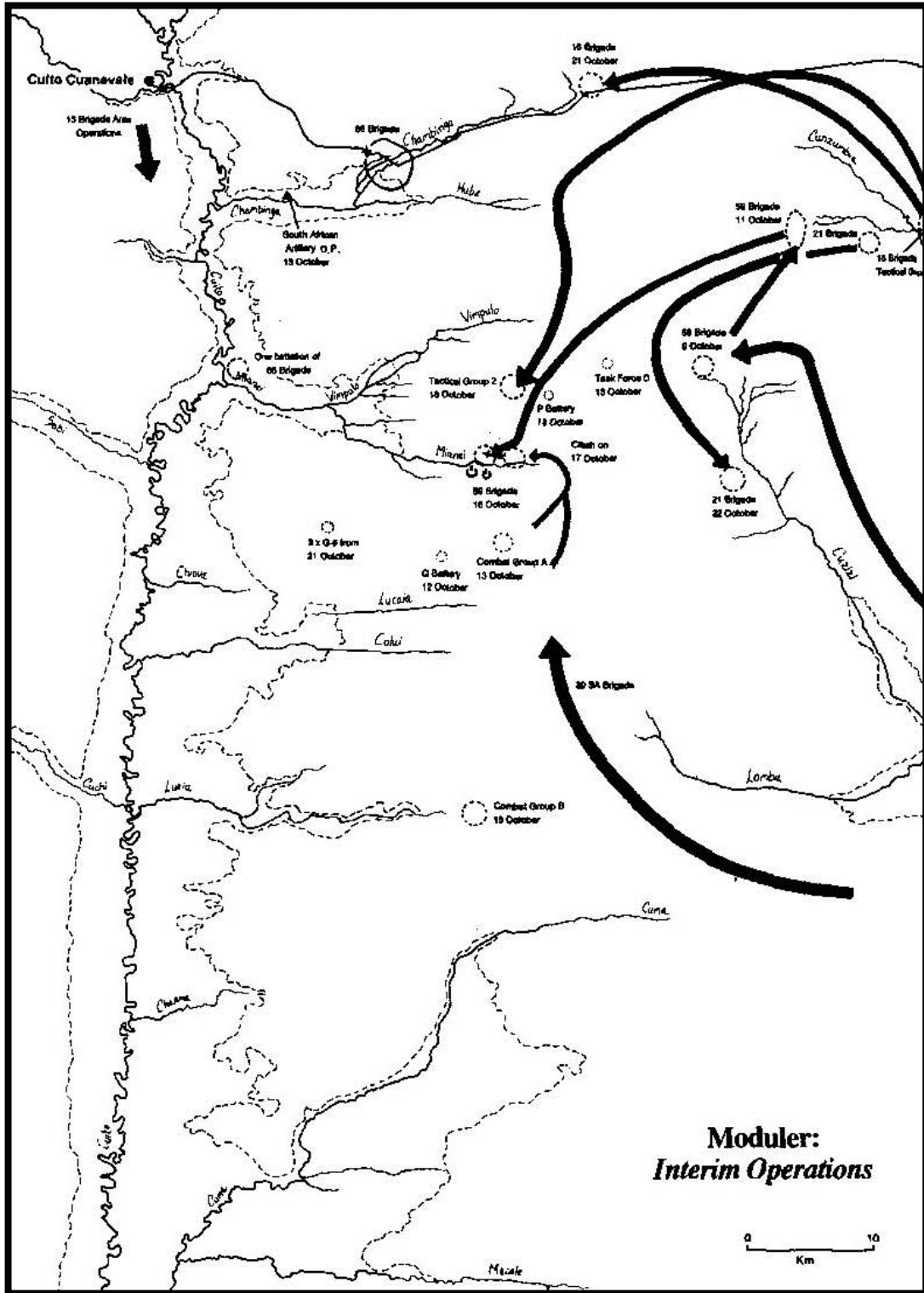
Bravo commenced the fighting; Combat Group Charlie concluded the contest with a bitter eight hour long night battle. FAPLA's 47 Brigade lost three hundred soldiers and three T-55s in the confusing melee with Groups Bravo and Charlie. Two days later Combat Group Alpha attacked 47 Brigade (FAPLA) again, but heavy indirect fire and limited visibility resulting from thick vegetation frustrated the assault.⁴⁸

A three-week pause, during which each side delivered numerous artillery and air strikes against its opponent, ensued. During the break in infantry combat, FAPLA attempted to resupply its three brigades in the Lomba River region. On 3 October Combat Groups Alpha and Charlie ambushed 47 Brigade (FAPLA) near the intersection of the Cuzizi and Lomba Rivers. The Angolan unit lost 250 soldiers in an uneven engagement. Large quantities of equipment were also left on the battlefield. The SADF recovered eighteen T-54/55 tanks, three BMP-1 infantry fighting vehicles, twenty-four BTR-60 armored personnel carriers, two TMM mobile bridges, four SA-8 SAMs and one Flat Face radar, six ZU-23-2 23mm antiaircraft guns, four BM-21 multiple rocket launchers, three D-30 122mm towed howitzers, and eighty-five logistic vehicles. During the defensive phase of *Modular 21*, 47, and 59 Brigades (FAPLA) lost approximately one third of their combined combat strength.⁴⁹

Phase II: Refit and Pursuit (6 Oct - 27 Oct). After the destruction of 47 Brigade, FAPLA began a slow withdrawal north towards Cuito Cuanavale (see Map 4). Accordingly, during Phase II, 20 Brigade sought to disrupt FAPLA logistic support and prevent its maneuver brigades from retreating west across the Cuito River. The SADF

⁴⁸ Heitman, *War in Angola*, 53-64.

⁴⁹ *Ibid.*, 65-78.



Map 4⁵⁰

⁵⁰ Heitman, *War in Angola*, 80.

task force prepared to transition from the operational defense to the offense and reorganized itself as shown in Figure 2. Combat Group Charlie was incorporated into Alpha, while a small 32 Battalion detachment whose mission was to harass FAPLA logistic lines east of Cuito Cuanavale was designated Task Force D.⁵¹

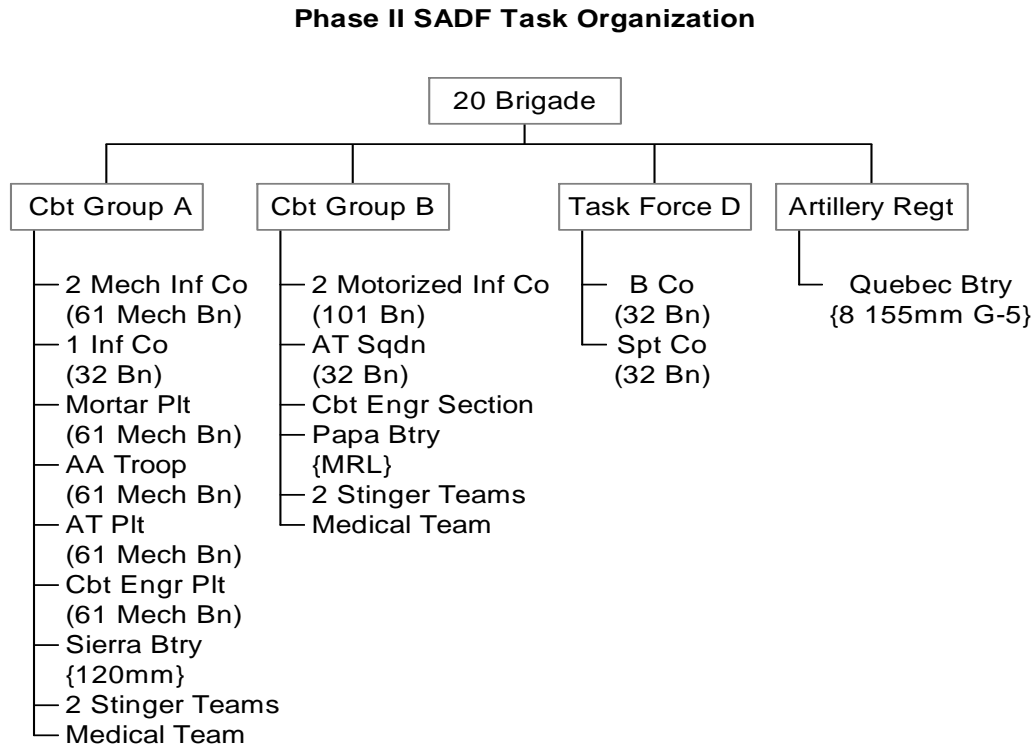


Figure 2⁵²

Sporadic contact occurred during the pursuit but no decisive actions ensued. By the middle of October, however, South African artillery was within range to commence bombardment of the airfield at Cuito Cuanavale. Soon the FAPLA jets were driven from the field and had to fly from the next closest air facility at Menongue.⁵³ On 17 October Combat Groups Alpha and Bravo tracked and located 59 Brigade (FAPLA) near the

⁵¹ Ibid., 75-87.

⁵² Ibid., 86.

⁵³ Heitman, *War in Angola*, 92, 108-110; Heitman, *Modern African Wars 3: South-West Africa*, 40; Heitman, *South African Armed Forces*, 220; Steenkamp, 151.

Mianei River Source. Heavy but inconclusive fighting resulted amid the narrow tracks lacing the thick bush. The SADF, hampered by lack of maneuver space, withdrew under cover of friendly artillery fire. FAPLA's 59 Brigade remained in position for two more weeks, suffering continual attrition to air and artillery attacks.⁵⁴

FAPLA's series of tactical setbacks in September and October convinced Castro to reinforce his forces in Angola. The 50th Armor Division, a crack force reputed to be the best in the entire Cuban army, deployed to Angola. By the end of Operation *Modular* more than fifty thousand Cuban combatants and advisors were present in the country. South Africa too reinforced its Angolan expeditionary force. Fourth South African Infantry battalion entered the operational area. With it came an additional 127mm MRL troop, an Olifant tank squadron, another G-5 battery, and three pre-production self-propelled G-6 artillery pieces.⁵⁵

With this increase in strength, both sides faced operational decisions on how best to employ the new forces. Cuba elected to station its armor division in the southwestern quadrant of Angola; from there the tanks could drive south into Namibia and outflank the South African force around Mavinga. South Africa chose to use its reinforcements to bolster the tactical success it had already achieved near Cuito Cuanvale. There were two options available. First, the SADF could use mobile forces to cut the supply line to Cuito and then storm the town. This course of action would require a force stronger than the weak brigade available, particularly to defend the town from the inevitable communist counterattacks. Moreover, defense of the town and airfield with a river directly behind them was both militarily unsound and unnecessary so long as SADF guns denied use of

⁵⁴ Ibid., 93-95, 98-108.

⁵⁵ Heitman, *South African Armed Forces*, 220.

the airfield to the enemy. The option selected instead was to destroy the FAPLA bridgehead on the eastern side of the river to prevent future offensive incursions from the Cuito Cuanavale staging base.⁵⁶

Phase III: Counteroffensive (28 Oct - 05 Dec). The new forces available to 20 Brigade were task organized as shown in Figure 3. Clearly Combat Group Charlie, composed primarily of the new 4 SAI, was given the preponderance of the combat power. Group Alpha retained a balanced mix of arms while Group Bravo was weighted more heavily with infantry. Accordingly, throughout the final phase of the operation, the strong and fresh Group Charlie served most frequently as 20 Brigade's main effort.

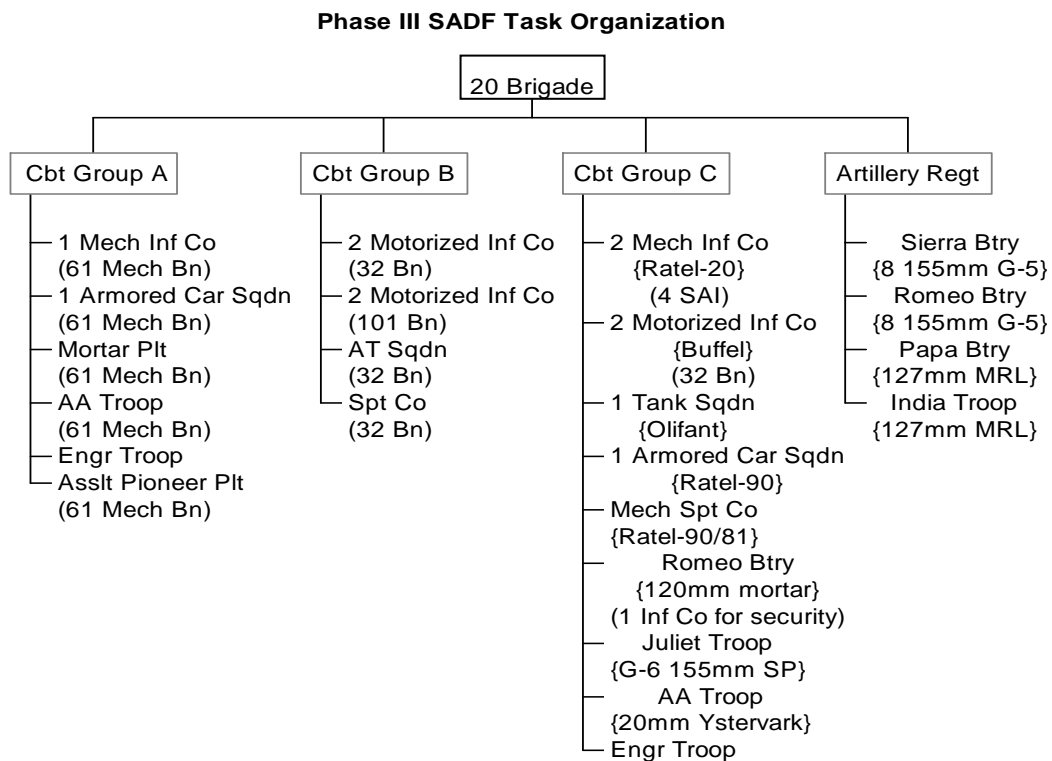


Figure 3⁵⁷

⁵⁶ Heitman, *War in Angola*, 93; Heitman, *South African Armed Forces*, 220.

⁵⁷ Heitman, *War in Angola*, 105, 114, 120.

The offensive to clear the bridgehead commenced on 9 November 1987, when Combat Group Charlie attacked 16 Brigade (FAPLA) between the Chamingo and Hube Rivers (see Map 5). This methodical assault, the first SADF tank action since WWII, netted thirteen tanks, two BM-21s, two 76mm guns, four 23mm AA guns, fourteen SA-7/SA-14s, one 14.5mm heavy machine gun (HMG), one 82mm mortar, and thirty-two trucks. FAPLA's 16 Brigade was displaced but not destroyed; it lost seventy-five KIA and six POWs. Group Charlie suffered seven KIA and nine WIA, one Ratel-20 destroyed and one damaged, and one tank damaged.⁵⁸

On 11 November Combat Groups Alpha and Charlie followed up the initial contact with a coordinated attack on FAPLA's Tactical Group 2. Again the enemy was battered but not broken. FAPLA lost fifteen tanks, three armored vehicles, three AA guns, twelve trucks, and 394 men. SADF losses numbered five killed, nineteen wounded, and two Ratels destroyed.⁵⁹

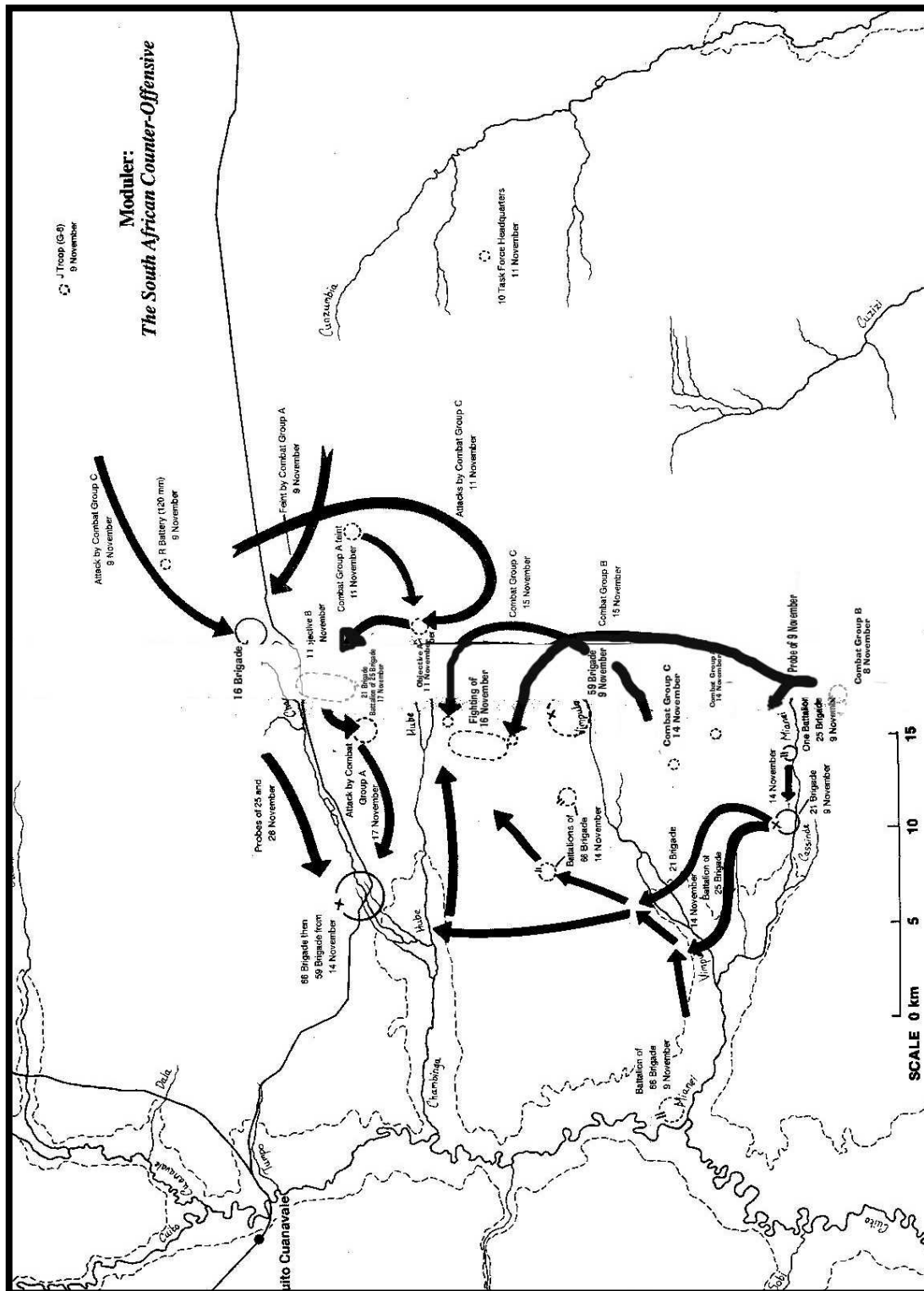
Between 13 and 17 November, 20 Brigade sought to trap 21 Brigade (FAPLA) south of the Hube River to prevent its linkup with remaining enemy forces located near the Chabinga crossing site. In a series of sharp fights and tactical miscues, 20 Brigade failed to stop its elusive Angolan opponent. During this critical four day period, subsequently known as the "Chabinga Gallop", 21 Brigade (FAPLA) lost 131 KIA, seven T-55s, one BTR-60, two BM-21s, and four trucks. The Angolans, however, were able to slip away and bring the bulk of the brigade safely into the Chabinga bridgehead.⁶⁰

The final attacks of Operation Modular occurred on 25-26 November. These assaults

⁵⁸ Ibid., 120-129.

⁵⁹ Ibid., 132-138.

⁶⁰ Ibid., 140-155.



Map 5⁶¹

⁶¹ Ibid., 112-113.

took place north of the Chambinga River and were designed to put further pressure on Cuba to resolve the Angolan dispute diplomatically. UNITA battalions formed the main effort of the attack, with Combat Groups Bravo and Charlie conducting supporting actions. This offensive, across difficult ground and against well-prepared defensive positions, foundered in the face of heavy enemy artillery fire. The Angolan force retained control of the high ground controlling the approaches to the east bank of the Cuito River and the critical bridge to Cuito Cuanavale. Four FAPLA brigades (16, 25, 59, and 66) remained firmly entrenched on the east side of the Cuito river when *Modular* concluded on 5 December.⁶²

Conflict Termination. Combat continued around Cuito Cuanavale through the spring and summer of 1988. Two subsequent operations, *Hooper* and *Packer*, concluded the SADF campaign in Angola. During January and February, additional attacks on 21 and 59 Brigades (FAPLA) resulted in fierce fighting but little tactical gain for the South Africans and their UNITA allies. In the last week of February, two more attacks were conducted on the Tumpo bridgehead without significant success. During the first half of March, 82 South African Brigade, a citizen reserve force, relieved 20 Brigade (SADF) in Angola. On 23 March the new 82 Brigade, reinforced by four UNITA battalions, launched the third attack on FAPLA's Tumpo stronghold. The SADF suffered minor casualties but the assault, like the previous two, failed due to extensive FAPLA minefields and heavy artillery fire. Desultory fighting continued until the end of April when 82 Brigade (SADF) handed control of the theater to a small SADF holding force. This battalion size element, dubbed Combat Group 20, maintained watch over the

⁶² Steenkamp, 153; Heitman, *War in Angola*, 161-169.

FAPLA brigades around Cuito Cuanavale until it too was withdrawn in August 1988 in compliance with the U.S. sponsored peace accords.⁶³

Chester Crocker, U.S. Under Secretary of State for African Affairs, had been conducting a series of negotiations to end the border war since July of 1987. The early rounds of peace talks were unproductive because Angola, in conjunction with Cuba and Russia, sought a military solution and determined to await the results of the FAPLA offensive. With continued U.S. support by the Reagan administration for UNITA and total lack of success on the battlefield in their engagements with the SADF/UNITA team, the communist block eventually conceded to an agreement that linked South African and Cuban withdrawal from Angola.⁶⁴

All SADF troops were withdrawn from Angola by 30 August 1988. Negotiations continued throughout the spring and culminated in an agreement on 22 December.⁶⁵ Cuba was given twenty-seven months to evacuate its forces from Angola. Namibia was to hold elections in November 1989 and become an independent state. A United Nations Transitional Assistance Group deployed to the war zone to monitor compliance with the provisions of the peace treaty. In April 1989 PLAN disrupted the transition process by infiltrating several thousand insurgents into Namibia. This offensive was crushed within a month by the SADF, Namibian army, and Namibian police force. Namibia attained its independence on 21 March 1990, but Angola continues to be wracked by a civil war between the MPLA government and the UNITA rebels of Savimbi. The superpowers and

⁶³ Heitman, *Modern African Wars 3: South-West Africa*, 40-41; Heitman, *South African Armed Forces*, 221-230.

⁶⁴ Heitman, *South African Armed Forces*, 224, 226; Heitman, *War in Angola*, 309.

⁶⁵ Angola lies in the Southern Hemisphere and thus experiences spring from September to December.

their proxies disengaged from the agony of Angola, but the country's warring internal factions continued their bloody struggle for supremacy.⁶⁶

Operation *Modular* was significant because it convinced the Soviet Union, Cuba, and the MPLA that South Africa would do whatever was necessary militarily to safeguard its interests in Namibia. After many years of fruitless effort, FAPLA's foreign military advisors recognized that the Angolan army was incapable of defeating a SADF assisted UNITA without massive intervention by either Soviet or Cuban ground and air forces. The cost of such escalation exceeded the price both Russia and Cuba were willing to pay in support of the MPLA's revolutionary movement.

Thus South Africa, with a brigade of less than three thousand men, provided the military justification for the diplomatic negotiations that finally achieved its desired regional goals. Soviet and Cuban forces withdrew from Angola, PLAN ceased its efforts to determine the government of Namibia by force of arms, and peaceful elections in Namibia followed. The election result, a narrow SWAPO victory, was not the desired outcome from South Africa's perspective. But the voting process was fair and open and South Africa was ready to turn from its neighbor's political problems to resolving its own. The border war, a continuation of politics by other means, ended with the reemergence of peaceful political behavior in Namibia.

⁶⁶ Steenkamp, 170-176; 180-184; Laurent C. Kaela, *The Question of Namibia* (Macmillan Press Ltd, 1996), 125.

Chapter 3

Tactical Lessons

Maneuvering is considered as a particularly suitable form of battle for South African conditions. Because warfare is developed in depth and also because of long external communication lines, fighting has to be coordinated. This implicates coordination of groups, high mobility, powerful organic support, effective logistic support, flexibility and effectual command and control.⁶⁷

— Colonel Roland de Vries, SADF
Chief of Staff, 20 Brigade

The *Modular* campaign offers some interesting lessons at the tactical level. Some of them are unique to the physical environment, strategic context, and operational style of the forces involved. The examination that follows is not meant to suggest that Marine forces imitate the SADF's approach to war. It is, however, useful to assess the experiences of a small mobile brigade conducting conventional operations against a well-equipped, numerically superior enemy encountered at the end of a tenuous supply line. The following sections will examine 20 Brigade's successes and failures across the six warfighting functions: command and control (C2), intelligence, maneuver, fires, force protection, and logistics.

⁶⁷ de Vries, 31.

Command and Control. Many participants felt that the campaign suffered from excessive micromangement from both senior military and political officials. The established chain of command was not the problem. From the combat groups in the field it extended to the brigade tactical headquarters, Rundu forward headquarters, Southwest Africa Territorial Headquarters, Army Headquarters in Pretoria, and finally to the national command authority.⁶⁸ The close supervision the combatants so resented was instead a function of the type of conflict it was.

The length and ferocity of the twenty-three year border war produced high domestic sensitivity to excessive casualties and encouraged greater interest in the tactical details of the operations.⁶⁹ Because it involved conflict with Cuba and the Soviet Union, the conflict also demanded a high degree of involvement by senior South African military and political leaders. One advantage associated with the presence of senior military leaders well forward is that they can serve as a buffer between tactical commanders and well-meaning superiors. For example, in the midst of some of the intense fighting along the Lomba River in September, 20 Brigade received a visit at its forward headquarters from four government ministers. General Jannie Geldenhuys, Chief of the SADF, handled the visitors while Colonel Deon Ferreira, Commanding Officer of 20 Brigade, controlled the brigade's battle.⁷⁰ Finally, South Africa's partnership with UNITA forced it to employ senior officers in the forward areas because Savimbi was reluctant to deal with anyone else; often it took the Chief of the SADF himself to get the desired decisions or cooperation from UNITA's leader.⁷¹

⁶⁸ Heitman, *War in Angola*, 342.

⁶⁹ *Ibid.*, 25, 31, 341.

⁷⁰ Geldenhuys, 214-215.

⁷¹ Heitman, *War in Angola* 341.

The 20 Brigade labored under close political scrutiny from on high, but it had no one to blame but itself for its convoluted method of task organization. Seldom did units from the same parent headquarters work together in a battle group. In the initial grouping, for example, Colonel Ferreira mixed an infantry company of 61 Mechanized Battalion with a rifle company of 32 Battalion in Combat Group Alpha. Combat Group Bravo featured a motorized company of 32 Battalion infantry with two rifle companies of 101 Battalion. Group Charlie was 61 Mechanized Battalion pure. Meanwhile, the protective force for the artillery contained elements of two more 32 Battalion rifle companies.⁷² The 20 Brigade demonstrated exceptional flexibility in task organization, but it would have been more effective to keep 61 Mech and 32 Battalion units together in their own battle groups. The 101 Battalion could then have formed the protection element for the artillery. Flexible task organization can be a strength, but cohesion of combat units is enhanced by keeping established teams together whenever possible.

The staffs that directed the elements of the force were also *ad hoc* in nature. The 20 Brigade was not a standing formation; its staff was gathered from other units. Nor was its artillery regiment a stand-alone organization. Its officers came from a variety of sources while its firing batteries came from 32 Battalion, 61 Mechanized Battalion, and 4 SAI. The fact that members of the staffs were not accustomed to working together could not have facilitated their efficiency. Similarly, the October decision to create a new mini-division level command structure with 20 Brigade and 32 Battalion reporting separately to Brigadier General 'Fido' Smit was questionable. This shift in C2 architecture occurred just prior to commencing the counteroffensive and served no useful purpose.⁷³

⁷² Ibid., 46-47.

⁷³ Ibid., 33, 46, 106.

Despite the *ad hoc* nature of the staffs and command arrangements, 20 Brigade managed to maintain an efficient planning cycle. The operational plans for the phase I defensive campaign and phase II pursuit took only two days to produce.⁷⁴ Subsequent planning efforts were delayed more by uncertainties as to FAPLA's disposition than by inefficiencies caused by the staff's lack of familiarity with SOPs or each other. By comparison, the six hour Marine rapid response planning cycle is somewhat quicker while the doctrinal Marine Corps Planning Process is flexible enough to move faster or slower as required. Mobile operations, however, lend themselves to fast paced decisions. Action itself often preempts the enemy's attempts to complete the first three stages of the orient, observe, decide, and act (OODA) loop.

Whenever possible, the brigade staff produced detailed written orders that were rehearsed before execution. For the set piece attack on FAPLA's 16 Brigade conducted on 9 November, the combat groups spent two days in assembly areas conducting routine troop leading procedures. Combat group leaders issued their orders the day prior on a sand table model of the assault objective. The model was based on aerial reconnaissance photographs, Special Forces patrol reports, intelligence derived from UNITA patrols, and observations relayed by artillery observers overlooking the objective.⁷⁵

SADF battle group commanders operated far forward during fights. This tendency reflected both the operational style of the leaders and the physical conditions of the area. Very high frequency (VHF) radio communication and physical line of sight were often problematic due to the nature of the heavily wooded terrain. Visibility was less than ten meters in some of the battle group contacts, so commanders had to move forward to gain

⁷⁴ Ibid., 46, 90.

⁷⁵ Ibid., 122-123.

a better feel for the ebb and flow of the fighting. The brigade headquarters normally remained between ten and forty kilometers behind the front lines, positioned to communicate with all the battle groups and the tactical headquarters in Rundu. At times, however, the brigade command post (CP) exercised control from the brigade admin area near Mavinga. Interestingly, the reconnaissance teams and artillery observation teams were often led or accompanied by majors or lieutenant colonels, so it was not uncommon for SADF field grade officers to be behind enemy lines and in the very thick of the action throughout the campaign.⁷⁶

The 20 Brigade fielded three liaison teams during *Modular*. Each was led by a lieutenant colonel or colonel and deployed alongside major UNITA headquarters. The LNOs kept both units advised of the others' movements and provided UNITA with advice on conventional operations, a subject about which it was much less expert than guerrilla tactics. In addition to its role as an interface with UNITA, the liaison cells also moved forward to monitor the movements of FAPLA formations. This aspect of their duties created unique task organization requirements for the cells. Each team consisted of eighteen liaison personnel, including staff officers, communicators, and intelligence specialists, and eleven soldiers dedicated to the security of the team. The latter came from the Pathfinder section of the Airborne Brigade; these men were adept in weapons proficiency, small unit tactics, and operating behind enemy lines. The twenty-nine man LNO team moved in five vehicles: two C2 Casspir APCs, two supply trucks, and a recovery vehicle.⁷⁷ The 20 Brigade's three liaison teams resembled the new MEF LNO

⁷⁶ Heitman, *War in Angola*, 40-42, 49-52, 58, 64, 68, 85, 90, 91, 97, 123-126, 144, 161; Bridgland, 61, 137.

⁷⁷ Heitman, *War in Angola*, 26-27, 45, 50-51; Bridgland, 110-111.

section in that they worked at high levels, but their scouting duties were more ambitious than those formerly assigned to USMC Anglico teams.

Intelligence. Accurate knowledge of the enemy is a prerequisite for effective plans, and 20 Brigade struggled to garner the information necessary to defeat FAPLA. Three elements contributed to the challenge: close terrain, limited collection assets, and the nature of the SADF's relationship with UNITA.

The physical characteristics of the theater challenged both ground and aerial reconnaissance elements. Dense scrub thickets, vast forests, and extensive marshes made it difficult for recce teams to move quickly or observe accurately. Around the Lomba River there was little high ground from which stationary observers could track FAPLA's movements. Further north, in the Chambinga high ground, this situation improved markedly, but it was still challenging to pick out enemy formations dug in and camouflaged amidst heavy vegetation. Aerial observers faced similar challenges magnified by the high speed and constant jinking required in a deadly SAM zone.

Organic collection assets were limited to recce teams augmented by forward observers and liaison personnel, RPVs, and electronic intelligence (ELINT). Both 1st and 5th Reconnaissance Commandos provided teams to 20 Brigade. These men, the most elite soldiers of the SADF, ranged far behind enemy lines in small teams to report on FAPLA activities. They also directed artillery fire, controlled close air support missions, and provided navigational assistance to the battle groups. Teams from 32 Battalion's recce wing performed similar services.⁷⁸ While the duties of the 32 Battalion recon teams fit their tactical mission, the recon commando personnel normally performed

deeper, strategic level missions; their employment in the close fight underscored the seriousness of the *Modular* campaign for the South African government. Forward observers (FOs) and liaison teams also shadowed FAPLA brigades. Usually the observers accompanied recon teams or were provided UNITA protection elements, but often the more robust liaison teams worked independently.⁷⁹ On the Marine side, both force and battalion reconnaissance teams are trained and equipped to emulate the recon work in close terrain. Both elements would require greater mobility to scout ahead or along the flanks of a mobile group moving quickly in more open terrain. Even in dense bush, the South African recon sometimes lost contact with FAPLA brigades when they decamped quickly.

The Seeker remotely piloted vehicle (RPV) had a nineteen foot wingspan, carried an eighty-eight pound payload, and could provide 2.5 hours of station time two hundred kilometers from its base. This platform fed real time video down links to its control station. FAPLA's air defense network proved capable of locating and tracking the Seekers, but the drones proved exceedingly difficult to shoot down. FAPLA fired seventeen SAMs at the first RPV before finally striking it. Two more RPVs were shot down, the last one by a SA-8, but the Seeker RPVs provided great assistance in locating suitable targets for 20 Brigade's artillery. Moreover, every SAM launched at a RPV was one less available to attack SAAF planes. RPVs will likely play a correspondingly important role in providing information, target location, and battle damage assessment for mobile MAGTFs.⁸⁰

⁷⁸ Pitta and Fannell, 19-27.

⁷⁹ Heitman, *War in Angola*, 40, 45, 49, 64, 85, 91, 97, 123, 144, 161.

⁸⁰ *Ibid.*, 67, 69, 87, 355; Bridgland, 116-117.

The 20 Brigade profited immensely from its electronic intercept capability. Mobile electronic warfare (EW) Casspirs monitored FAPLA's tactical communications along the front. This capacity revealed accurate casualty statistics, indications of morale, and movement plans. Often signals intelligence (SIGINT) intercepts even enabled 20 Brigade gunners to adjust their artillery fire on target by listening to FAPLA shell reports to their higher headquarters. Across the border in Namibia, the SADF manned more powerful electronic eavesdropping equipment and was able to collect operational level message traffic between Luanda and the front. FAPLA rarely bothered to encrypt its traffic, nor did it ever seem to realize the extent to which its signals were being exploited.⁸¹ Radio battalion assets, including reconnaissance teams and Marine Electronic Warfare Support System (MEWSS) LAVs, are capable of providing similar SIGINT support to Marine formations.

Despite the notable successes of its recon teams, RPVs, and ELINT units, 20 Brigade often lacked accurate information on the location and intentions of its enemy. Much of its intelligence, as much as eighty percent of the total available, came from UNITA sources. This was because UNITA possessed excellent human intelligence (HUMINT) sources throughout the region and because its guerrillas literally controlled all the ground except that physically occupied by FAPLA. The problem was that much of the information provided to 20 Brigade did not tally with intelligence derived from independent sources and did not prove to be correct when validated by SADF assets. Part of the dichotomy could be written off to unreliable or outdated sources, but some of the problem flowed from more invidious causes. UNITA sometimes manipulated the SADF,

⁸¹ Heitman, *War in Angola*, 52, 71, 76, 99-100, 145; Bridgland, 140, 144.

particularly if its information might lead to military actions resulting in high casualties among 20 Brigade. Ever sensitive to the realities of the South African domestic scene, Savimbi knew that high losses would inevitably lead to the SADF's withdrawal from Angola. While this interpretation made sense at the strategic level, the deceit often confused and debilitated 20 Brigade's actions at the tactical level.⁸² U.S. forces sometimes face similar challenges with allies based on an inability or unwillingness to provide or receive useful information due to classification protocols.

Maneuver. Three independent maneuver elements comprised 20 Brigade. All of them were task organized battalion level task forces. They normally included infantry fighting vehicles, assault guns (90mm), antiarmor units, organic fire support (81mm mortars), air defense assets, fire support specialists, and medical teams. All the units in the columns were fully mobile in wheeled vehicles. These vehicles proved remarkably resilient in the African bush. SADF infantry usually rode their transport until contact was imminent, at which point they debussed to conduct conventional infantry operations. The antiarmor threat from a variety of FAPLA weapons was too great to fight from the vehicles themselves. In addition to the transport they provided across vast tracts of bush, the columns' vehicles also made it easier for the troops to support themselves. Each armored personnel carrier carried sufficient food, water, and ammunition to support its squad for days at a time.⁸³ While 20 Brigade did not have helicopter assets sufficient to conduct large scale air assaults, it is unlikely that company or battalion level helicopter lifts would

⁸² Heitman, *War in Angola*, 98, 140, 154, 167. Sometimes too UNITA intelligence reports were couched in ways designed to elicit more action from SADF units. Bridgland, 44, 73.

⁸³ *Combat and Survival*, 700-705.

have survived anyway given the SAM threat.⁸⁴ Historically, Marine landing forces do not contain sufficient vehicles to provide transport for the entire force. As a result, since the advent of rotary wing lift, great reliance has been placed on helicopters to transport at least one third of the landing force whenever long distance movements are required.

Modular demonstrated again that even well designed IFVs like the Ratel can not defeat tanks in a stand up fight. The Ratel-90s of 20 Brigade destroyed many Angolan T-54/55 tanks throughout the campaign, but their HEAT rounds were not powerful enough to generate a first round kill. Even at the short ranges typical of the area of operations, 90mm rounds were too light to destroy tanks. Ratel AT troops fired volleys at enemy tanks whenever the terrain allowed this tactic, but frequently single Ratel-90s had to hit an enemy tank seven or eight times before knocking it out. Perhaps two of the seven projectiles would penetrate a T-54's armor at ranges of 150 meters and less. Quick reflexes, good crew drill, and cover in which to play hide and seek saved more than one SADF assault gun surprised at close range by enemy armor. This of course was no substitute for proper equipment, so 20 Brigade introduced its own armor before going on the offensive.⁸⁵

Both FAPLA and SADF tanks proved capable of operating in the thick bush between Mavinga and Cuito Cuanavale. The close terrain put the emphasis on instinctive shooting rather than sophisticated fire control engagements at long range. Nonetheless superior training proved just as important in tank versus tank quick-draws as in more distant gunnery. The dense bush also emphasized the importance of close tank-infantry

⁸⁴ Author's interview with Lt. Marcus Duvenhage, SADF, (ret) 28 December 1999. Duvenhage, now a history teacher in Rustenburg, South Africa, was stationed on the Angolan border in western Ovamboland in 1987-1988. He furnished useful insights into SADF tactics, techniques, and procedures; he was not, however, directly involved in the *Modular* campaign.

cooperation. Again the SADF held the advantage. The terrain also provided concealment for the armor of both sides from the others' air force. This was particularly important for 20 Brigade given the paucity of its air defense coverage.⁸⁶ The effectiveness of South Africa's remodeled Centurians suggests the importance of including tanks, despite their logistic handicaps, in fighting columns that may encounter enemy armor. *Modular* reminds us that tank is spelled neither LAV nor AAV.

Three major rivers and nine tributaries lace the 8,650 square miles over which this campaign was fought. Not all of the rivers were large, especially during the July-December dry season. Nonetheless most were edged by swampy *shonas*, flooded grasslands bordering the rivers, that made the obstacles much broader than the width of the streams themselves.⁸⁷ As a result much of the fighting occurred around the bridges and fords along the rivers. FAPLA employed Soviet bridging equipment to cross the streams, but the passage points became bottlenecks and slaughter pens once 20 Brigade infantry fighting vehicles (IFVs) and artillery arrived to contest the crossings. The South Africans chose to take the longer routes around the rivers' headwaters rather than delay their advance by crossing the streams en route. Naturally that will not always be an option for future fighting columns. The capacity to cross numerous water obstacles quickly and at night is an absolute requirement to guarantee swift maneuver by mobile battle groups.

All types of maneuver are more difficult at night; they are also more effective in dislocating the enemy. During *Modular* most night movement was defensive in nature. South African units, especially the artillery batteries, moved at night to decrease the

⁸⁵ Heitman, *War in Angola*, 54, 59, 75, 78.

⁸⁶ *Ibid.*, 125-127, 342-346.

likelihood of being acquired by FAPLA attack aircraft. Daylight movements were delayed while the vehicles sought cover, if an air raid was deemed imminent.⁸⁸ Convoy movements were sometimes detected and bombed if carried out in the day. Logistic resupply efforts and casualty evacuations were routinely done at night for survivability reasons also. Offensive operations, however, were seldom conducted during darkness. Dense vegetation that complicated coordination, abundant enemy fighting positions that could ensnare wheeled vehicles, and lack of precise information on enemy locations argued against offensive operations at night. SADF battle groups operating in more open terrain would likely have conducted more night attacks, as Colonel De Vries advocated in his tactical primer.⁸⁹ Marine forces, without the benefit of infantry fighting vehicles or strong artillery support, must also capitalize on the tactical advantages conferred by night operations to achieve their objectives.

The 20 Brigade frequently operated on multiple axes in both defensive and offensive scenarios. The self-contained nature of the battle groups enabled them to do so efficiently. On the defense, a column fronted both of FAPLA's lines of advance, with a reserve group available to support either as required. During pursuit operations and set piece attacks, the independent task forces presented the enemy with a tactical quandary in terms of assessing SADF intent. Often one of the separate columns would conduct a feint to draw FAPLA's intention in the wrong direction and facilitate the strike of the other battle group.⁹⁰ The ability to move simultaneously on separate routes also decreased

⁸⁷ Bridgland, 35.

⁸⁸ Heitman, *War in Angola*, 84, 120, 154.

⁸⁹ de Vries, 112-115, 120.

⁹⁰ Heitman, *War in Angola*, 121-124, 133, 152-152, 162-163.

passage time through potential chokepoints and sped the closure rate on a shared objective.

Colonel de Vries stressed the need for superior tempo in his writings on maneuver warfare South African style. During *Modular*, 20 Brigade battle groups normally generated greater tempo than FAPLA. This allowed them to preempt the Angolan brigades' crossing of the Lomba River line and to punish them on their withdrawal to the Tempo bridgehead. During the confused maneuvering of the Chambinga Gallop, however, Combat Groups Charlie and Alpha allowed 21 Brigade to slip away while they reprovisioned their forces. The FAPLA brigade's escape allowed it to reach the Chambinga high ground and join in the defense of the Cuito bridgehead. This was the sole instance during the campaign when Angolan maneuver forces achieved a tactical success through superior speed of movement.⁹¹ Tempo in campaigns of rapid movement is often dictated by logistic support; *Modular* reflected this verity. In both the transition to pursuit and the subsequent shift to set piece attacks on the Chambinga high ground, 20 Brigade was forced to pause while bringing up additional forces, resupplying the columns, and repairing equipment. Sustaining high tempo in fighting column operations clearly calls for both sound logistic support and enough combat power to provide an effective rest plan for the combatants.

Fires. Most of the damage done to FAPLA during *Modular* was due to effective fire support. The SADF artillery, in particular, was the star of the campaign; its long range and impressive accuracy enabled 20 Brigade to batter its opponent with little fear of retribution. For a force whose total strength never exceeded three thousand men, the

brigade's composite artillery regiment was very strong: two 155mm towed batteries (sixteen G-5s), one 155mm self-propelled troop (three G-6), one battery and one troop of 127mm MRL (twelve Valkiris), and one towed 120mm mortar battery (eight M-5). The thirty-nine pieces of artillery of at least 120mm caliber provided more than twice the firepower potential of the eighteen tube M198 155mm howitzer battalion organic to a standard USMC amphibious MEB, despite the fact that a MEB's personnel strength may be five times greater than that of 20 Brigade.⁹²

Observers that had infiltrated FAPLA positions controlled most of this artillery firepower. These spotters worked much like advocates of OMFTS infestation tactics envision USMC observers operating: small teams deep behind enemy lines employing precision fires to disrupt enemy formations. Early in the campaign the SADF artillery regimental commander was killed while conducting an aerial observer mission from a light spotter aircraft. Once the deadly nature of the Angolan mobile SAM belt was established, subsequent fire missions employed RPVs or simply reverted to ground based spotters. The G-5s routinely engaged individual vehicles with single rounds; corrections were often given in precision fire increments of only twenty-five meters. In one instance, a radio relay through twelve different ground stations resulted in a vehicle destroyed at a range of thirty-eight kilometers.⁹³

Given the start and stop nature of the fighting, 20 Brigade's towed guns had no trouble keeping up with their supported maneuver forces. Often the howitzers and rockets deployed by troops rather than batteries to increase range fans and decrease

⁹¹ Ibid., 144-151.

⁹² USMC MEBs are "scalable" in size, ranging from 3,000 to 20,000 Marines. The full MEB capability is resident in the upper end of that manpower range. Draft MCCDC MEB concept paper, 2 Feb 2000. The 20

vulnerability. The guns repositioned every night to prevent FAPLA aircraft from locating them. The artillerymen also worked especially hard at concealment; many of the battery positions were deep in the woods with limited fields of fire. Extensive camouflage was employed and the artillery normally remained silent whenever FAPLA MiGs were airborne. Due to the relative importance of the fires, the bulk of 20 Brigade's anti-aircraft capability, including UNITA's CIA-provided Stingers, deployed around the battery positions. In addition, two rifle companies provided local security for the guns. FAPLA devoted much time and energy to locating and destroying the artillery that hurt it so badly; both aircraft and infantry hunted for the guns throughout the campaign without success.⁹⁴

Air strikes complemented the all-weather bombardment unleashed by the artillery. Despite the lethal air defense system deployed alongside FAPLA maneuver brigades, the SAAF managed to operate effectively throughout the campaign. Five forward air controller (FAC) teams accompanied 20 Brigade maneuver elements, but very few close air support sorties were flown. Instead, most air missions were preplanned strikes against targets located and marked by SADF reconnaissance forces. Aerial interdiction of the ground supply lines of communication (LOC) between Menegue and Cuito Cuanavale also yielded significant results. Unlike the more numerous yet less effectual missions flown by the Angolans and Cubans, most of the SAAF strikes hit their intended targets.⁹⁵ Despite facing more capable aircraft provided by the Soviet Union, South African pilots

SA Brigade was a relatively weak brigade-size formation in historical terms; most conventional army brigades contain approximately 5,000 soldiers.

⁹³ Heitman, *War in Angola*, 67-68, 73, 100, 343.

⁹⁴ *Ibid.*, 41-42, 47, 61, 115. Bridgland, 57-59.

⁹⁵ *Ibid.*, 47-48, 311-319, 328-329. FAPLA flew 1,108 ground attack missions in the *Modular* area of operations between August 1987 and May 1988. These strikes killed four South Africans, wounded several more, and destroyed one Ratel.

continued to support the ground tactical campaign. The SAAF lacked the technology and numbers to achieve air superiority over the theater, but careful planning, superior training, and innovative tactics enabled its pilots to complement surface fires effectively. Over time the constant hammering by both shells and bombs eroded FAPLA morale, damaged significant quantities of equipment, and accumulated the lion's share of the casualties produced throughout the campaign.

Direct action by special operations forces (SOF) contributed to SADF operational fires as well. In September a team comprised of six operators from the 4th Reconnaissance Regiment and Lieutenant Colonel Les Rudman, one of the LNOs to UNITA, inserted by helicopter forty kilometers northwest of Cuito Cuanavale. They walked to the Cuito River and moved twenty-four kilometers downstream to the vital bridge linking the Tumpo supply dumps east of the river with the airhead near the city. The team set charges on the span and then moved off to a helicopter extraction. The bridge did not drop completely, but the damage was sufficient to prohibit the movement of heavy vehicles and tanks across it for the rest of the campaign.⁹⁶ Mobile operations often require both strategic reconnaissance and direct action support from SOF; in the Angolan campaign the emphasis was on the former but it is always important to strike the right balance between the two competing taskings.

The 20 Brigade employed nonlethal fires to great effect during *Modular*. Several times SADF electronic warfare (EW) technicians jammed FAPLA's command circuits to prevent their tank companies from coordinating their assaults. Aggressive use of psychological operations (PSYOP) also characterized the campaign. A PSYOP cell composed of specialists brought in from South Africa was established at the Brigade HQ

on 18 September. Specially modified Casspir APCs broadcast a variety of audio messages to the enemy. These included surrender appeals and the cries of a hyena pack that unnerved the soldiers of both sides. Ultimately the South Africans, like all forces that have sought to leverage PSYOP, learned to depend on local experts who better understood cultural nuances to develop the themes portrayed in the campaign. UNITA eventually joined the effort and improved the effectiveness of the final product. Interestingly, the PSYOP cell also controlled some of the artillery fire; the intent was to maximize the value of harassment fires by carefully timing the nightly salvos as well as to deploy leaflets among the FAPLA brigades.⁹⁷

Force Protection. After more than twenty years of war Angola was littered with a huge quantity of unmarked mines. Recognizing the scope of the threat, the small South African expeditionary force employed one of the most sophisticated mine resistant vehicle fleets in the world. All of 20 Brigade's tactical transport, including Ratels, Casspirs, and Buffels, incorporated this life saving technology. Features included V-shaped hulls that deflected blast away from troop compartment floors, water tanks beneath the cargo space to absorb heat, and troop restraints to keep the shock from flinging personnel around the interior of the APCs. SADF APCs that did trigger mines often suffered no personnel casualties and minimal material losses such as tires that were blown off and easily replaced. Even the basic Samil-series cargo trucks often sported mine resistant cabs to protect the drivers.⁹⁸ Given the proliferation of mines throughout

⁹⁶ Ibid., 42.

⁹⁷ Ibid., 50, 65, 68, 71, 78, 103, 176; Bridgland, 115-116, 144.

⁹⁸ Heitman, *South African Armed Forces*, 44-48; Norval, 119-120; Steenkamp, 235-237.

the Third World, all future U.S. military vehicles should incorporate similar mine protection features as a priority force protection issue.

The 20 Brigade was less fortunate in its air defense capability. South African mobile columns had only captured SA-7s, loaned UNITA Stingers, and the Ystervark self-propelled single-barralled 20mm AA gun. The Cactus SAM system and radar controlled twin 35mm radar guns protected stationary positions later in the campaign. These defenses, while not robust by Soviet standards, proved sufficient to keep FAPLA aircraft high enough to be ineffective in locating and targeting SADF units. The 20 Brigade relied primarily on concealment to avoid air attack; recce commandos outside Menogue airfield and electronic intercepts provided some early warning of imminent MiG attacks. This queuing usually provided sufficient time for SADF units to hide before enemy air arrived on station.⁹⁹ U.S. forces have not faced a sustained air threat since WWII, but point defense of critical nodes will remain a requirement despite presumed air superiority.

Deception was an important element of South African tactical doctrine and frequently practiced in *Modular*. Much of the tactical deception was designed to protect the force by misdirecting FAPLA fires. A favorite deception target was the Angolan Air Force. 20 Brigade artillery batteries prepared dummy positions to lure FAPLA pilots into wasting ordnance on them. Medium mortars were then used to simulate G-5 muzzle blast near the fake sites; when MiGs attacked the area, prepositioned Stinger teams engaged the strike aircraft. Similarly, 120mm smoke shells were sometimes fired into tracts of empty bush or even FAPLA positions to induce Angolan pilots to bomb what they believed to be lucrative SADF targets hit by previous air strikes. In one instance, SAAF

Mirages approached Cuane Cuanavale to draw MiG interceptors into the air. As the planes moved from their shelters to the runways the Mirages diverted and a preplanned G-5 bombardment commenced; a MiG, a ZPU-2, and a truck were destroyed by the shellfire.¹⁰⁰ Unfortunately, Marine forces seldom practice tactical deception because it normally requires assets needed to resource actual combat operations.

Logistics. Two principal factors limited 20 Brigade's combat capability versus FAPLA. The first was the size of the force South Africa's political leaders were willing to commit to the fight; a force significantly larger than the small brigade committed would have required additional activation of the reserve component and proven unpopular with the citizenry. Closely linked with the political costs of a larger force was the logistical price associated with supporting it.

The 20 Brigade operated at the end of a long and tenuous supply line. Moving fuel, ammunition, food, parts, and casualties from SADF bases in Namibia to the fighting zone proved a significant challenge. It was approximately two hundred miles from Rundu, the major staging base south of the border, to the area of operations around Cuito Cuanavale. From there it was another hundred miles northwest to the battlefields near Cuito Cuanavale. No developed roads or convenient rivers provided easy access to the combat zone. Supplies moved in trucks via primitive paths through the bush or were flown in via

⁹⁹ Heitman, *War in Angola*, 52, 326-328, 350-352; Bridgland, 67.

¹⁰⁰ Heitman, *War in Angola*, 97, 107, 343.

transport aircraft to the strip at Mavinga, which served as an intermediate forward operating base (FOB).¹⁰¹

The dense vegetation and rough ground in the theater took a surprisingly heavy toll on the fuel consumption of the brigade's vehicles. Diesel usage rates for cross-country movement proved much higher than expected for off-road travel. Keeping the several hundred SADF vehicles full of gas was a constant worry; at times the columns had to be withdrawn from combat prematurely or redistribute gasoline within the battle groups to reach the refueling points. Fuel moved by air and ground to Mavinga, from there tanker trucks shuttled back and forth to the front. On previous external operations SADF mobile columns often resupplied their helicopters with fuel; the tanks of the Ratels and supply lorries provided a sort of mobile FARP for the aviation element. During *Modular* helo operations were limited by the air threat to night time casualty evacuation, so ground based fuel for wide ranging C2, air assault, and fire support helicopters wasn't necessary.¹⁰²

Perhaps the most serious logistic constraint was ammunition. Because the artillery fought both during periods of maneuver force contact and during periods of relative quiet along the front, its demand for ammunition was much higher than anticipated. During the twenty days in November when the G-6 self-propelled troop fought, it fired ninety rounds per gun per day. This rate of fire is fairly typical by historical standards, as shown in Table 2. More importantly from a logistical point of view, this ammunition usage rate required five truckloads of ammunition per day for these three guns alone. During the

¹⁰¹ Ibid., 326. The Cactus SAMs, in particular, took a beating in their drive north to the operational area. Generally two or three sorties of transport aircraft serviced the primitive strip at Mavinga each night; the field was lighted only by candles bordering the runway.

¹⁰² Ibid., 157, 345-346.

campaign more than forty-five tons of supplies were flown into Mavinga each night via C-130/C-160 sorties. Much of this tonnage was artillery ammunition, but there were not enough trucks to carry the projectiles to the front. Moreover, the SADF discovered that its ten-ton capacity Samil-100 trucks could only carry half their normal payload and still effectively negotiate the punishing Angolan terrain. Because the batteries displaced frequently, they were reluctant to stage rounds on the ground to free the ammunition

Table 2: Artillery Ammunition Usage Rates

Date	Nationality	Location	# of Guns	Ammo Used	Rd/Gun/Day
1807	French	Friedland	30	3,750 rounds	125
1863	Union	Gettysburg	80	32,000	133
1916	German	Verdun	2,000	24,000,000	107
1942	Soviet	Stalingrad	13,000	700,000	54
1944	British	Cassino	890	195,969	220
1944	British	Normandy	180	18,000	100
1945	Soviet	Vistula/Oder	32,143	3,200,000	100
1945	US	Okinawa	324	19,000	59
1954	Viet Minh	Dien Bien Phu	300	300,000	19
1967	US	Dak To, Vietnam	77	150,000	53
1984	US	Fulda Gap	NA	NA	300(projected)

Source: J.B.A. Bailey, *Field Artillery and Firepower* (Oxford: The Military Press, 1989), 337-341.

trucks to return to the ammunition supply point (ASP) near Mavinga. Instead the batteries maintained mobile ASPs and returned the vehicles only when they were empty. At the end of October the transport deficiency produced an ammunition shortage; batteries were restricted to one gun fire for effect missions until the supply system could catch up to the demand. The 20 Brigade managed to keep its guns in action over the four-month campaign, but it was a narrow margin of sufficiency.¹⁰³

Maintenance proved to be a significant challenge for the columns as well. Overall, tire and track life was less than expected in the field. The G-6s, however, despite

¹⁰³ Ibid., 48, 102, 115, 168, 346.

creating their own lanes through the bush because they were the widest vehicles in the South African inventory, suffered no flats at all in 1,800 kilometers of *bundu* bashing in Angola. The mobile groups maintained organic recovery vehicles and carried mechanics in each column. Engines were routinely replaced in the field when required. Wear and tear on the cannon proved especially difficult to repair. The long-range howitzers fired high powder charges that quickly damaged the bores of the guns. Two G-5s were deadlined by 21 October. By 13 November three more were down as well as forty percent of one battery's trucks. By the end of the campaign, ten of the sixteen G-5s were damaged; six of the guns required barrel replacements. This repair occurred at the brigade administrative area near Mavinga.¹⁰⁴

There is no evidence of robust security measures associated with the ground movement of the critical logistics convoys between Mavinga and the front. UNITA generally controlled the area, but FAPLA did make some efforts to interdict the LOCs by mining and ambushing the routes. Certainly UNITA stressed disruption of the Angolan supply route between Menongue and Cuito Cuanavale. FAPLA assigned at least one maneuver brigade to protect each resupply convoy. These convoys comprised approximately one hundred trucks and ran the route on a weekly basis. UNITA and the SAAF scored some successes in attacking these supply trains, but never enough to cripple the combat power of the various brigades around Cuito and beyond.¹⁰⁵ The Angolan experience, like those of WWII Italy, Korea, and Vietnam, underscored the difficulty in winning a campaign through interdiction of enemy LOCs.

¹⁰⁴ *Combat and Survival*, 700-705; Heitman, *War in Angola*, 103, 114, 143, 177-178, 345.

¹⁰⁵ Heitman, *War in Angola*, 98, 105; Bridgland, 162. Derek Kirkman, a Ratel crewman with 32 Battalion during *Modular*, reported eighty-one FAPLA reconnaissance men killed behind SADF lines during the campaign. Their impact on SADF operations was negligible. Author's interview, 31 December 1999.

The low casualties incurred by the SADF during *Modular* did not overwhelm the medical handling system. The 20 Brigade suffered only twenty-six KIA and forty-eight WIA between August and December 1987.¹⁰⁶ When casualties did occur, the first stage of treatment, beyond self-aid and buddy aid, was provided by the company operations medics or "ops medics" as they were known by the troops. Before being posted to their units, these highly skilled corpsmen received thirty-six weeks of training including medical theory, trauma management, and nursing skills. In addition, the columns contained armored, mine-resistant Rinkal ambulances that carried a doctor, an orderly, six litter patients, and two ambulatory cases. The ambulances evacuated casualties to the medical post, normally less than thirty minutes away, where they were stabilized prior to air evacuation. Typically a team comprised of a doctor and an ops medic rode the medevac Pumas to continue treatment enroute to the hospital. The standard was to get casualties to Rundu Military Hospital, or Ondangwa Surgical Hospital for more serious cases, in less than six hours from receipt of the injury. The most serious cases were flown by C-130 to 1 Military Hospital in Pretoria.¹⁰⁷

Conclusion. The 20 Brigade enjoyed successes and failures across all the battlefield operating systems. The point to emphasize, however, is that a fully mobile brigade conducted conventional combat of varying degrees of intensity for more than four months. The operational style was not as fluid as that practiced on previous SADF external operations, but it maximized mobility and firepower to defeat the Angolans and

¹⁰⁶ Heitman, *War in Angola*, 155, 159.

¹⁰⁷ Heitman, *South African Armed Forces*, 94-97; Heitman, *War in Angola*, 123; Bridgland, 186,196; author's interviews with Mark Davies, who served as a SADF ops medic and medical support wing planning officer from 1986 to 1996, conducted on 4, 5, and 10 April 2000.

save UNITA. Logistic support was tenuous but sufficient to sustain the campaign, and as we shall see, *Modular's* place was merely the most recent in a long line of small, nimble, hard-hitting mobile columns exerting operational level impact.

Chapter 4

Modular's Precedents

*There is one law of nature, one single law that the Boer never forgets, the answer to victory is greater movability.*¹⁰⁸

— Thomas Pakenham

Operation *Modular* provides an excellent modern example of the fighting column concept. It is particularly interesting because, unlike earlier SADF external operations, it involved not just brief raids to punish lightly armed insurgents but also sustained conventional combat. The Soviet-based doctrine, equipment, and training of the FAPLA and Cuban opposition was similar to that employed by potential Third World opponents that USMC formations might encounter in the future. To link the *Modular* case study and the manner in which mobile battle groups might be employed to execute OMFTS, the following sections will outline the precedents, theory, feasibility, and potential of fighting column operations.

Small Wars Heritage. The fighting column or flying column, as it was known in the vernacular of nineteenth century colonial wars, is not a recent concept. In a sense, it is as old as armies themselves; any logistically self-reliant fighting force throughout history

¹⁰⁸Pakenham, 348-349.

could be considered a precursor to the model. Colonial armies used flying columns extensively to pursue indigenous rebels into the hinterlands. The French perfected the technique under Marshal Thomas-Robert Bugeaud in Algeria during the 1840s. Brigade-minus size task forces of infantry, artillery, cavalry and engineers chased Abd-el-Kader's Rif guerrillas through the deserts and mountains of Algeria. Accompanying supply trains transitioned from wagons to mules and camels to improve the columns' mobility. Bugeaud's disciples, Joseph-Simon Gallieni and Louis Hubert Lyautey, further refined the drill in their campaigns in Tonkin in the 1890s and in Morocco in 1910.¹⁰⁹

Great Britain employed flying columns on the Northwest Frontier, in Sudan, and especially in South Africa. During the Boer War the early columns consisted mostly of infantry, but the mounted Boers rode rings around the plodding regulars and forced them to adapt mounted infantry to keep up. Early in the contest the advances of Generals Sir Redvers Buller and Lord Methuen were in essence large flying columns. Their corps depended on huge trains of wagons pulled by oxen to ferry the food and ammunition the fighting men required on campaign. The vast distances they had to cross sometimes exceeded the capacity of their logistical trains; when this occurred the men and animals literally ate through their supplies before reaching the next supply depot. As a result the final approach to Pretoria followed the railroads. During the later guerrilla phase of the war, the British employed more than eighty flying columns to hound the Boer commandos. One of the more successful, led by Colonel Sir Henry Rawlinson, consisted of two thousand mounted men and a six-gun artillery battery. Supplies were limited to

¹⁰⁹ Beckett, Ian F.W., ed., *The Roots of Counter-Insurgency: Armies and Guerrilla Warfare, 1900-1945* (London: Blandford Press, 1988),40-59.

what could be carried on horseback. The column operated independently for a week at a time with no supply wagons to slow the pursuit.¹¹⁰

The flying column is no stranger to American soldiers either. U.S. Army troopers employed such techniques to corral the elusive Plains Indians. The history of the Indian wars is replete with tales of slow moving Army columns failing to catch more mobile Indian bands. The Army's synchronized search for the rebellious Sioux in the summer of 1876 illustrates not only logistic challenges inherent in flying column operations, but also the careful balance required between speed and combat power.

The immediate task in the Sioux campaign, not unlike conventional forces' experience in most guerrilla conflicts, was to find and fix the enemy. To that end three converging flying columns scouted the Yellowstone River basin. Colonel John Gibbon led a 450 man mixed force of cavalry and infantry some 220 miles, including two river crossings, to seal the Indian's escape route to the north. General Alfred Terry's column numbered 925 men: forty Indian scouts, twelve cavalry troops, three infantry companies to guard the 150 wagon supply train, and three Gatling guns. This element moved 360 miles and crossed seven rivers enroute from Fort Abe Lincoln on the Missouri River to its rendezvous with the enemy south of the Yellowstone. General George Crook led fifteen troops of cavalry, five companies of infantry, 262 Indian scouts, 120 wagons, and one thousand pack mules north from Fort Fetterman to the head of the Rosebud River. His 1,309 man column crossed six rivers in its 190 mile trek.¹¹¹

This MEU-size force covered OMFTS distances, crossed fifteen river obstacles, and carried organic sustainment in mobile combat trains resupplied periodically by river

¹¹⁰ Pakenham, 572-574.

steamers. The goal of the converging columns was to cut off and destroy the Indians. Crook's rebuff at the Battle of the Rosewood and the subsequent demise of a portion of Terry's command, Custer's Seventh Cavalry, at the Little Bighorn underscores the danger of fighting columns with insufficient firepower to prevail once the enemy is located. Douglas Porch, in his introduction to a reprint of Colonel C.E. Callwell's classic 1896 manual, *Small Wars: Their Principles and Practice*, captured the challenge precisely:

The dilemma for colonial commanders was to disembark with a force with sufficient mobility and firepower to protect itself from the fate of Jean Danjou, surrounded with his Foreign Legionnaires and forced to fight to the death at the Mexican village of Camaron (Camerone) in 1863, Custer at the Little Big Horn, Chelmsford at Isandlwana, or Hicks Pasha on the Nile in 1883. On the other hand, the force must not become so large that it might collapse under the weight of its own logistics (as nearly did the 1868 British expedition to Abyssinia and the French invasion of Madagascar in 1895) or simply be stung to fury by more mobile indigenous forces, as were early French expeditions in Algeria.¹¹²

The balance between mobility and firepower remains a challenge in contemporary expeditionary operations.

U.S. Marines employed flying columns extensively in their colonial campaigns in Latin America. Chesty Puller's fast-marching infantry patrols employed mules to carry supplies and heavy support weapons in their pursuit of Augusto Sandino. Red Mike Edson employed boats, mules, and aircraft to support his patrols along the Coco River.¹¹³ In both cases, the infantry remained largely afoot as dictated by the terrain while heavy equipment and supplies were transported by other means. Puller and Edson's light infantry patrols gained significantly enhanced operational range and combat power from

¹¹¹ Robert M. Utley, *Frontier Regulars: The United States Army and the Indian, 1866-1891* (Lincoln, Ne: University of Nebraska Press, 1973), 250-261.

¹¹² Colonel C. E. Callwell, *Small Wars: Their Principles & Practice* (Lincoln, Ne: University of Nebraska Press, 1996; reprint, London: His Majesty's Stationary Office, 1896), xiii.

the pack animals, boats, and aircraft that carried their food, machine guns, and ammunition. Based on these and other counterinsurgency experiences, the 1940 *Small Wars Manual* defined the flying column as:

a detachment, usually of all arms, operating at a distance from, and independent of, a main body or supporting troops, lightly equipped to insure mobility and sufficiently strong to exempt it from being tied to a base of supplies through a fixed line of communications.¹¹⁴

These small but deadly detachments became a fixture of Marine warfighting throughout the Banana War campaigns. Marine lessons from this era stressed the value of separate but cooperating columns, the full spectrum of combined arms, sparse supply support, and a task organization marked by fewer men and more firepower than standard infantry formations.¹¹⁵

Conventional War Examples. The fighting column is not a technique suitable only for counterinsurgency operations. Its conventional descendent was the self-contained mobile battle group used by the Germans, Americans, and Russians in WWII. German Panzer divisions were potent exemplars of all arms mobile forces with sufficient logistic support to sustain operationally significant assaults. They were not, however, tank pure formations. Rommel's 7th Panzer Division in the Battle for France, for instance, consisted of one armor regiment, two truck-borne infantry regiments, a towed howitzer battalion, motorcycle and light armor reconnaissance battalions, and engineer and antiaircraft

¹¹³ Beckett, 117-124; Jon T. Hoffmann, "Counterinsurgency Along the Coco: Merritt Edson, Aviation, and Light Infantry Versus Sandino," in *Selected Papers from the 1992 (59th Annual) Meeting of the Society for Military History*, ed. Donald F. Bittner (Quantico, Va: Marine Corps Association, 1994), 133-150.

¹¹⁴ *United States Marine Corps Small Wars Manual, 1940*, (Manhattan, Ks: Sunflower University Press, no date; reprint, Washington: Government Printing Office, 1940), 5-8.

¹¹⁵ "The movement may be...along separate lines of advance....Normally, the addition of mounted detachments, armored cars, and aircraft is desirable in such columns....The numerical strength of a column

detachments. This mobile force led the charge across the Meuse River and fought its way forward 130 kilometers to Arras in ten days. In the following summer's Russian campaign, 7th Panzer sealed the northern arm of each of the three great encirclements completed on the central front. The division covered 345 kilometers in four days in June, 365 kilometers in thirteen days in July, and 140 kilometers in five days in October in some of the most impressive division-level blitzkrieg performances of the war. Of particular note, this MEB-sized formation contained robust engineering support and effectively employed expedient rafts to cross the numerous rivers it encountered. In its after action report from France, 7th Panzer also recommended adding a second bridging column to the division organization to enable simultaneous crossings of consecutive water obstacles.¹¹⁶

American armor divisions employed similar task organizations and blitzkrieg style to pursue the Germans to the Rhine after the Normandy breakout. The 2nd Armor Division, for example, typically employed two combat commands; each comprised a tank regiment, an infantry regiment in half-tracks, a self-propelled artillery battalion, and recon, medical, supply, and maintenance companies.¹¹⁷ This organization for combat enabled the force to advance on two axes simultaneously. Frequently the brigade level combat commands subdivided further into battalion size task forces of all arms; these columns allowed the division to cover ground even more quickly. Moreover, the combat commands carried their own mobile fuel and ammo stores with them to facilitate swift

may be decreased by the inclusion of an increase of automatic weapons..." *Small Wars Manual*, 5-8 and 5-9.

¹¹⁶ Russel H.S. Stolfi, *A Bias for Action: The German 7th Panzer Division in France & Russia, 1940-1941* (Quantico, Va: Marine Corps Association, 1991), 3, 8, 43-44, 73, 93-94.

¹¹⁷ Donald E. Houston, *Hell on Wheels: The 2d Armored Division* (Novato, Ca: Presidio Press, 1977), 147-148, 150, 162, 197-199.

movement in the pursuit.¹¹⁸ Such techniques produced a powerful yet flexible offensive formation whose speed prohibited the Germans from recovering quickly to establish new defensive lines.

The Russian army employed similar techniques in its August 1945 Manchurian campaign. Careful task organization of assets at every level from platoon to army enabled the Soviets to deal with both the terrain and the enemy. Specially tailored combined arms detachments were created to develop the situation forward of the main bodies. The goal was for these robust, independent formations to either destroy or fix enemy forces so that the main assault echelon could continue to advance without having to deploy from its columnar movement. This approach paid handsome returns in terms of overall speed of advance. The 6th Guards Tank Army, for example, averaged eighty-two kilometers per day for eleven days. Soviet forces also employed mobile combat service support detachments and sometimes used airplanes to ferry fuel forward to its fast moving tank columns.¹¹⁹ While the scope and scale of Russian operations in Manchuria exceed that envisioned by OMFTS planners, the techniques that facilitated their deep operations are still applicable.

¹¹⁸ Houston, 209. After the Normandy breakout U.S. 1st Army's 7th Corps carried over 500 tons of ammo in a motorized ASP protected by two SP AAA batteries. 3rd Army's XX Corps also employed a mobile ASP during the pursuit to the German border. Moreover, 17th Army received more than 12,000 tons of supplies by air during a single month during this period. Roland G. Ruppenthal, *Logistic Support of the Armies, Volume 1: May 1941 - September 1944* (Washington: Center of Military History, 1989; reprint, Washington: Government Printing Office, 1953), 525, 527, 581. 4th Armor Division carried more than 70 thousand gallons of fuel in trucks during this period. This organic POL reserve enabled it to operate freely more than 400 miles from its designated fuel supply point. Major David F. Tosch, USA, "Sustaining Tactical Maneuver on the AirLand Battlefield: Will the Current Support Concept for Supplying Fuel Provide the Means?" (U.S. Army Command and General Staff College School of Advanced Military Studies Monograph, Fort Leavenworth, Ks, 1986, 10-11.

¹¹⁹ Lieutenant Colonel David M. Glantz, USA, *August Storm: Soviet Tactical and Operational Combat in Manchuria, 1945* (Fort Leavenworth, Ks: Combat Studies Institute, 1983), 32, 52, 148-150, 189-192; P.H. Vigor, *Soviet Blitzkrieg Theory* (New York: St. Martin's Press, 1983), 112-113. The Russian 2d Tank Army received fifty tons of fuel per day for nine consecutive days in the Korsun-Shevchenkovskiy Operation in 1944. Tosch, 17.

In Indochina French expeditionary forces employed eighteen brigade-sized mobile groups in an economy of force role to police the region's vast interior and defend a series of widely scattered outposts. Each *Groupement Mobile* (G.M.) included a small staff with an associated security detachment, a communication detachment, three infantry battalions, an artillery battalion, and a tank squadron. Only one of the three infantry battalions was truck-borne due to a vehicle shortage within the theater, but all the other elements were fully motorized. G.M.s were powerful combat formations, but the poor road network coupled with the hilly jungles of central Vietnam to obviate much of the groups' utility. Viet Minh ambushes sometimes took a fearsome toll of the groups; the spectacular demise of the 3,500 man strong G.M. No. 100 in June 1954 illustrates the potential dangers associated with employing road-bound columns in terrain unsuited to their use.¹²⁰

Fighting Column Theory. Regardless whether the concept is termed flying columns, battle groups, combat commands, or fighting columns, the key to its success is mobile yet sustainable combat power. Since the 1950s, several refined applications of the old idea have been proposed. The first example is what the Soviets called the Operational Maneuver Group (OMG). This was a division or corps size element that would exploit a penetration of the front lines to conduct operational and strategic level attacks against critical targets in NATO's vulnerable rear areas. These large mechanized assault forces would be accompanied by organic combat service support elements. When necessary, the Soviets planned to refuel the armor spearheads by helicopter. The OMGs were still

¹²⁰ Colonel V.J. Croizat, USMC, *A Translation from the French: Lessons of the War in Indochina Volume 2* (Santa Monica, Ca: The Rand Corporation, 1967), 206-215; Bernard B. Fall, *Street Without Joy* (New

significantly larger than the Marine fighting columns proposed in this paper, but their purpose and impact in a mid-intensity environment - that is, disruption of the enemy's rear - were similar.

During the 1970s Brigadier General Richard Simpkin, a British armor officer and maneuver warfare enthusiast, produced an intriguing theory of mobile warfare in his book *Race to the Swift*.¹²¹ Simpkin called for a marriage of rotary wing and mechanized units. Something akin to this has been achieved in U.S. Army cavalry regiments and mechanized/armor divisions. The problem, of course, is that the resulting formations are large and rather slow to deploy from the continental United States. Simpkin also predicted the combination of airborne and amphibious units with light armor capability. The goal was to provide maneuver forces that already possessed strategic reach with matching operational/tactical mobility once they were on the ground in the area of operation. This fusion has thus far escaped both the Army and the Marine Corps.

Colonel Douglas A. Macgregor broached the subject in his book *Breaking the Phalanx*, while the Army proper has begun to move in that direction with its new Medium Brigade/Strike Force concept.¹²² Macgregor essentially envisioned existing equipment (eventually augmented by SP Crusader artillery, Comanche attack helicopters, and assault guns) organized into brigades rather than divisions and deployed administratively by sea.¹²³ Recognizing the vulnerability of light infantry deployed

York: Schocken Books, 1961), chapter 9 - "End of a Task Force."

¹²¹ Richard E. Simpkin, *Race to the Swift: Thoughts on Twenty-First Century Warfare* (London: Brassey's Defence Publishers, 1985).

¹²² Douglas A. Macgregor, *Breaking the Phalanx: A New Design for Landpower in the 21st Century* (Westport, Cn: Praeger Publishers, 1997).

¹²³ Macgregor focuses on the need for a new organizational construct rather than new doctrine, training, or equipment, *per se*. His case for the ultimate primacy of land warfare is interesting, as are his ideas concerning how to make the Army more effective. Unfortunately, he spends too much energy justifying why the Army's slice of a stable or shrinking DOD budget should be larger. His grasp of naval issues is

without mobility or protection, he recommended the establishment of combined airborne-air assault brigades. These proposed units would meld the forcible entry capability of the 82nd Division with the tactical mobility and firepower of the 101st Division. The actual constitution of the medium brigades proposed by Army Chief of Staff General Eric K. Shinseki remains to be determined, but the intent is for the new formations to be both light and lethal. Medium brigades are designed to be fully deployed anywhere in the world no later than ninety-six hours after notification.¹²⁴ This implies, of course, an air landed force that may approach in capability the vision sketched by Simpkin fifteen years ago.

The amphibious component of Simpkin's force is also still unrealized. Colonel Arthur J. Stuart, a visionary tanker of WWII, recommended similar ideas in a series of *Gazette* articles published in 1950.¹²⁵ He advocated the marriage of amphibious and mechanized doctrine, pointing out that there is no reason why armor could not come ashore in the initial assault wave. Furthermore, mechanized infantry, artillery, and logistics trains with mobility equivalent to that of tanks could quickly range far inland to operational objectives. The problem, of course, is that no fighting force has ever fielded a totally mechanized all-arms force. Even U.S. Army armor divisions rely on significant numbers of wheeled and unarmored CSS assets. Fiscal restraints prohibit the Marine

shaky; in his eagerness to make his ground-centric case, he commits errors of both fact and logic. For instance, he lists a MEB GCE as a BLT and decries the vulnerability of "industrial age" targets such as carriers and amphibious ships. Somehow the commercial shipping (presumably not "industrial age" vessels) that carry his brigade-size combat groups into theater, not to mention the stationary airfields that support them once they are there, are considered less vulnerable.

¹²⁴ Colonel John E. Greenwood, USMC, "Editorial: Watching the Army," *Marine Corps Gazette*, March 2000, 4.

¹²⁵ Lieutenant Colonel Kenneth W. Estes, USMC, "Future Amphibious Landings: From the Pages of the Gazette to OMFTS," *Marine Corps Gazette*, December, 1999, 64-68.

Corps from pursuing a fully mechanized combat force. They do not, however, prohibit the fielding of a fully mobile combat force as outlined in Part II.

Fighting Column Feasibility. There are three hurdles to be overcome before the Marine Corps can initiate a mobile battle group concept. First is the realization that battalions and brigades can exert operational level influence far out of proportion to their size in small war environments. Second, there must be consensus on the logistic supportability of wide ranging fighting columns. Finally, a change in mindset is required to appreciate the inherent advantages of increased ground mobility.

Fighting columns do not obviate traditional calculations of combat power. Indeed, the careful balancing of troop strength and firepower versus logistic requirements is the art that enables successful mobile operations. But there is a school of thought within the Marine Corps that MEUs are so insignificant that it is dangerous to consider using them in conventional operations. The strategic impact of 20 Brigade, which was only marginally larger than a MEU, provides a counterpoint. The SADF provided critical firepower in the form of artillery, tanks, and fighting vehicles that complemented the more lightly equipped and more numerous UNITA infantry. Together they blunted the attack of the larger FAPLA/Cuban force. When combined with allies who possess other military strengths, Marine fighting columns could prove equally decisive.

In counterinsurgency environments, both SADF and Marine experience suggest the utility of mobile battle groups. The *Small Wars Manual* characterized the key attributes of such a force as follows:

The columns may vary in size from a reinforced company to a reinforced regiment, but the size best adapted to such operations has been found to be a reinforced battalion....The mission of the flying column will be to seek out the hostile groups, attack them energetically, and then pursue them to the limit. Therefore, there should be nothing in its composition or armament that would tend to reduce its mobility or independence of action beyond that absolutely necessary for combat and subsistence.¹²⁶

The lesson, in both unconventional and conventional contexts, is that small but extremely mobile combat formations can be both powerful and survivable.

The second problem is more prosaic in nature: can a mobile battle group be adequately supplied from ships off-shore? What must be established is that a combination of organic combat trains and aerial resupply can sustain the force several hundred miles inland. Fuel, ammunition, and maintenance are the critical factors. While the necessary logistic calculations are easy enough to complete, the shift in emphasis is more complicated. Dedication of significant assault support assets to resupply runs and the reconfiguration of MSSG assets to support mobile operations entail a shift in doctrinal emphasis as well as strictly practical challenges.

The final barrier on the road to more mobile amphibious operations is intellectual in nature. Developing an organizational mentality that appreciates the virtues of mobility via trucks in addition to that furnished by ships, helicopters, and forced marches is perhaps the greatest challenge. Historically, Marines have not organized or equipped their combat formations so that all the elements have inherent vehicular mobility. From the Halls of Montezuma to Desert Storm, Marine units have borrowed transport from the Army, allies, or taken it from the enemy.¹²⁷ As a result some Marines have come to

¹²⁶ *Small Wars Manual*, 5-8.

¹²⁷ During the 1846 advance on Mexico City, the twenty-five thousand man expeditionary force required 1,447 tons of supplies carried in 9,303 wagons and on 17,413 mules. The small Marine component (a battalion) relied on Army transport for its sustainment. When a Marine brigade landed at Vera Cruz again in 1914 as part of a larger joint force, General Lejeune asked the Army Quartermaster for support including

believe amphibious doctrine negates the necessity for organic mobility while service tradition seems to suggest its undesirability. Both conclusions are off the mark. The fighting column concept does not require a fleet of new vehicles or a change to our combat techniques, only a task organization that provides each unit with its own organic mobility assets.

Fighting Column Potential. There are several reasons why increased ground mobility is a valuable goal for a MAGTF. Most importantly, it extends the operational reach of US naval forces. It has long been said that an army is a bullet fired from the Navy's gun. If so, the full force of the projectile is limited by the capacity of the landing force to quickly range far inland. Organizing and equipping combined arms Marine task forces to move by vehicle enables them, under the right conditions, to penetrate farther inland than previously possible. Furthermore, they can use the increased range to perform missions across the spectrum of conflict: conventional combat, counterinsurgency, and operations other than war.

Fighting column operations complement Army and Air Force warfighting initiatives. MAGTF fighting columns can conduct enabling operations, supporting attacks, or defensive missions at considerably greater distances from the sea. In a sense the disparate capabilities of fully mobile Marine landing forces transform them into a sort of

horses, wagons, and teamsters, should another 300 mile advance on the Mexican capital be required. In Desert Storm, both the Army and Marine Corps relied heavily on contracted heavy equipment transporters and third country national drivers. K. Jack Bauer, *The Mexican War: 1846-1848* (New York: Macmillan Publishing Co., Inc., 1974), 259; Colonel James H. Alexander, USMC, "Roots of Deployment - Vera Cruz, 1914," in *Assault from the Sea: Essays on the History of Amphibious Warfare*, ed. Lieutenant Colonel Merrill L. Bartlett, USMC (Annapolis, Md: Naval Institute Press, 1983), 140; Lieutenant General William G. Pagonis, USA, *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War* (Boston: Harvard Business School Press, 1992), 123.

operational level cavalry capable of a wide variety of missions in support of theater objectives. At the MEU level, it is a cavalry force with the advantage of being forward deployed and readily available to act on short notice. At the MEB level, it is a cavalry force that has the ability to enter a theater against opposition or away from established ports and airfields. Both capabilities are unique in the DOD arsenal.

Finally, increased ground mobility enhances existing MAGTF capabilities. It addresses some of the shortfalls of the traditional landing force without compromising established strengths. Naturally terrain or tactical situations may obviate the usefulness of the additional mobility assets. In such a scenario trucks, light armor, and amtracs will simply be left aboard ship; the landing force will always employ the method of movement that promises the greatest chance of success whether that be boot, small boat, or helicopter. Flexibility is gained, however, by having vehicles available to use when it is appropriate rather than initiating unfamiliar task organizations or arranging to borrow equipment at the last minute.

History, up to and including the SADF's experience in *Modular*, demonstrates the utility of the fighting column in both conventional and unconventional conflicts. Part II examines the feasibility and potential of conducting OMFTS operations via these mobile battle groups. Required modifications in MAGTF structure, sample MEU and MEB fighting column models, and changes in Marine doctrine, organization, training, and equipment will be assessed.

PART II

Operational Maneuver From the Sea: MEU and MEB Fighting Columns

A Military, Naval, Littoral War, when wisely prepared and discreetly conducted, is a terrible Sort of War....For it comes like Thunder and lightning to some unprepared Part of the World.¹²⁸

Thomas More Molyneux:
Conjunct Expeditions 1759

It is a crime to have amphibious power and leave it unused.¹²⁹

Winston Churchill
1 December 1940

¹²⁸ Heintz, 12.

¹²⁹ Heintz, 13.

Introduction

Operational Maneuver from the Sea (OMFTS) is a Marine Corps warfighting concept that envisions launching and supporting decisive ground operations from naval platforms twenty-five miles offshore against targets up to 175 miles inland. Ship to Objective Maneuver (STOM) is a supporting concept calling for movement directly from naval vessels to objectives deep inland with no pause to establish traditional amphibious beachheads or build supply dumps ashore. OMFTS is frequently associated with brief raids, but the concept also supports a variety of other military operations, from humanitarian assistance to sustained conventional combat, extending across the spectrum of conflict. The model developed in Part II will examine only one mission, conventional combat operations, in order to test the concept's feasibility in the most challenging potential scenario. This assessment, based on a 2014 timeframe, will assume the presence of currently programmed equipment including the AAV, MV-22, JSF, M777 lightweight howitzer, medium tactical vehicle replacement, and light strike vehicle. The model also applies STOM tenets to an objective three hundred rather than 175 miles inland in order to demonstrate the inherent capacity of fighting column style landing forces. Much of the analysis done thus far on OMFTS/STOM recognizes serious challenges in command and control (C2), fire support, and logistics. Even with the fielding of the programmed new equipment, most analysts have concluded that the Marine Corps' new warfighting concept is still problematic. This study suggests that the solution lies in organizational as well as equipment innovations. It concludes that carefully task-organized fighting columns, periodically resupplied by air and augmented as necessary by heliborne forces, can conduct operationally decisive STOM.

Chapter 5

OMFTS Options

The vulnerable artery is the line of communications....Bring in the goods like Father Christmas, down the chimney.¹³⁰

— Major General Orde Wingate recommending wholly air-supplied operations in Burma, 1943

Infestation. There are three primary options available for conducting OMFTS/STOM operations: infestation, air assault, and fighting columns. All three methods rely heavily on aviation support. Infestation has received the most attention to date. This concept envisions a network of fire team or squad size elements stealthily inserted into enemy territory to control close air support (CAS) or naval surface fire support (NSFS) in attacking key targets. The idea is a descendant of Vietnam's Stingray program, in which reconnaissance teams called in supporting arms fires on critical nodes. Infestation, however, would primarily employ NSFS and CAS rather than the artillery predominantly used in Vietnam to destroy the enemy. The Marine Battle Lab tested this concept with mixed results during Exercise *Hunter Warrior* in the spring of 1997. The infestation idea is particularly appealing, because it minimizes the logistical and manpower footprint ashore and relies on fires rather than maneuver forces to attack the enemy.

Drawbacks to the concept include limited mobility and high vulnerability of the forces put ashore. Moreover, there are significant technical challenges to be overcome,

not the least of which is the reliable long-range communications needed to make over-the-horizon fires responsive.¹³¹ Infestation envisions insertion and support of the teams via air; afterwards the Marines would be limited to boot speed, like dragoons whose mounts disappear for hours or days at a time. The teams would rely on concealment for security; once they are discovered they would likely require a "hot extract". This outcome sparked frequent complaint by conventional commanders in Vietnam, where recon patrols often required early extraction under duress.¹³² Most importantly, infestation requires reliable communications links to a Supporting Arms Coordination Center afloat and naval ordnance that can range and accurately engage both stationary and moving targets ashore. Time of flight for projectiles travelling sixty-three miles is seven minutes, thus making successful engagement of moving targets by conventional munitions particularly difficult.¹³³ Warheads with seeker heads such as the Brilliant Antitank Munition (BAT) increase the likelihood of hitting mobile targets, but despite improved accuracy, time of flight remains a problem for responsive long-range suppressive fires.

Vertical Envelopment. Another popular notion for implementing OMFTS is helicopter borne operations using MV-22 and CH-53 aircraft. This solution calls for the aerial

¹³⁰ Heintz, 164.

¹³¹ Rear Admiral Michael G. Mullen, USN, Director, Surface Warfare Division (N86), CNO, presentation to USMC Command & Staff College, 15 March 2000. The most likely technical solutions to provide wireless LAN and wide-area radio coverage at OMFTS distances depend on airborne relays to retransmit the communication signals.

¹³² While long range patrols in Vietnam were often intended to last five days or more, one third of all LRRP missions through mid-1968 were extracted in less than twenty-four hours. Shelby L. Stanton, *Rangers at War: Combat Recon in Vietnam* (New York: Orion Books, 1992), 314-315. For other negative views of the generally highly regarded recon men, see Terry White, *Swords of Lightning: Special Forces and the Changing Face of Warfare* (London: Brassey's, 1992), 154-157; Michael Lee Lanning, *Inside the LRRPs: Rangers in Vietnam* (New York: Ivy Books, 1988), chapter 11; and Greg Walker, *At the Hurricane's Eye: U.S. Special Operations Forces from Vietnam to Desert Storm* (New York: Ivy Books, 1994), chapter 8.

¹³³ Major Michael E. Langley, USMC, Expeditionary Warfare Branch (OPNAV N-853G), Naval Surface Fire Support presentation to USMC Command and Staff College, 25 February 2000.

delivery of more robust ground forces to include conventional infantry formations, light vehicles, and artillery. This approach is also appealing due to its minimal footprint ashore and the speed, range, and flexibility of tilt-rotor aircraft. Essentially this method is similar to the techniques employed by the 101st Air Assault Division in executing its battalion and brigade level air assaults. This type of OMFTS lends itself to operations in restricted terrain such as Korea or Norway, where infantry can use terrain for cover while maximizing the tactical advantages of its restrictive mobility corridors. Like the 101st Division, which uses its infantry to seize and defend forward operation bases (FOB) from which its Apache attack battalions can operate, the Marine Corps could also establish FOBs to project the aviation combat element's (ACE's) combat power further inland.

The inherent challenge of OMFTS air assault techniques is the simultaneous demand placed on the ACE for troop lift, artillery movement, and resupply missions. The bulk of the aircraft would be required to shift the assault forces, but dedicating aircraft to troop movement detracts from other vital air missions such as C2, casualty evacuation, and fire support. Moreover, air assault forces are relatively immobile once separated from their rotary wing lift. In *Desert Storm* the 101st Division, with its complement of 315 helicopters, did not have sufficient rotary wing lift to simultaneously move and sustain multiple brigade size packages by air; ground logistic convoys were necessary to supplement aerial resupply of new forward operation bases.¹³⁴ MAGTFs, with far less assault support available, can not afford to both move and sustain ground elements of significant size.

¹³⁴ For details on the 101st Air Assault Division's experience in the desert, see Lieutenant General Edward M. Flanagan, Jr. USA (Ret.), *Lightning: The 101st in the Gulf War* (London: Brassey's, Inc., 1994).

Fighting Columns. Perhaps most importantly, both infestation and air assault methodologies fail to capitalize on the inherent superiority of seabasing vice alternate means of power projection: the ability to quickly introduce heavy combat forces. Amphibious fighting columns overcome this dilemma. More than ninety percent of our nation's warfighting material gets to the fight by sea.¹³⁵ Airborne transports cannot move large units composed of heavy forces quickly. The Army's XVIII Airborne Corps maintains one company(-) armor team on twenty-two hours notice as part of its immediate response contingency force. This eighty-man team contains four M1A1 Abram tanks, four M2A2 Bradley IFVs, and nine support vehicles. It takes eight C-17s to move it into a secure airhead. The rest of the company team can flow into theater on follow-on aircraft, but XVIII Airborne Corps has no contingency plans to move armor units above the company level; any such formations that are big enough to fight independently are impractical to move by air.¹³⁶ It takes eight roll-on roll-off cargo ships, for instance, to transport the 123 tanks, 127 Bradleys, seventy-four helicopters, and hundreds of motorized support vehicles of the 3rd Armored Cavalry Regiment.¹³⁷

Unfortunately, current OMFTS thinking also steers away from heavy units ashore due to their logistic constraints. A vehicle-borne amphibious landing force depending on aerial and mobile surface resupply assets, however, becomes tactically viable and obviates the primary disadvantages inherent in infestation and air assault based OMFTS operations. I MEF demonstrated the power and flexibility inherent in fighting column

¹³⁵ HQMC, *Expeditionary Operations: Marine Corps Doctrinal Publication 3* (Washington: Department of the Navy, 1998), 39.

¹³⁶ Email correspondence with Major Avanus Smiley, USA and Captain William J. Hampton, USA. Hampton and Smiley are former and current Air Officers for First Ranger Battalion and collected this information from officers of 3rd Infantry Division (the 18th Abn Corps mechanized fly-away force) which is collocated with 1/75 at Hunter Army Airfield in Savannah, Georgia.

operations during exercise *Deep Strike* in August 1987. An operational maneuver element comprised primarily of LAVs conducted amphibious and air landings, made a seven hundred mile tactical movement, and enforced a two hundred mile long border exclusion zone. During the seven day exercise the nine hundred man, 322 vehicle task force was resupplied by air; more than twenty thousand gallons of JP5 were delivered by CH-53E and C-130 aircraft. Ten percent of the vehicles were damaged and evacuated throughout the operation. The only significant shortfall identified was the lack of high frequency (HF) and satellite communications (SATCOM) links that could be employed while on the move. *Deep Strike's* success underscored the utility of light armor battalions conducting operational level screening missions. It also suggests the great potential of battalion and brigade level amphibious forces conducting more significant combat operations several hundred miles inland.¹³⁸

Fighting columns promise the best combination of mobility, combat power, and sustainability of all the OMFTS options. Clearly fighting columns are not suited for every scenario, but the elements of a task organized and equipped amphibious fighting column can still be employed *sans* vehicles, or with only appropriate vehicles, in jungle, riverine, urban, or mountainous environments. In short, the three OMFTS systems are not mutually exclusive. Moreover, fighting columns could enhance the utility of infestation tactics by providing mobile firebases. Similarly, fighting columns may establish security for the initial entry of helicopters into FOBs or forward arming and refueling points (FARPs). Finally, both infestation teams and air assault units could

¹³⁷ Tom Clancy, *Armored Cav: A Guided Tour of an Armored Cavalry Regiment* (New York: Berkley Books, 1994), 268-269.

¹³⁸ Lieutenant Colonels Thomas B. Sward and Tommy L. Tyrrell, Jr., "Marine Light Armor and Deep Maneuver," *Marine Corps Gazette*, December 1997, 16-20.

complement the heavier combat power of a mobile battle group. The following chapter will establish the general characteristics of each element of a mobile fighting column.

Chapter 6

The MAGTF Fighting Column

I had hoped that we were hurling a wildcat onto the shore, but all we had got was a stranded whale.¹³⁹

— Winston Churchill on the failed Anzio invasion of 22 Jan 1944

The MAGTF provides a potent combined arms package uniquely suited to mobile operations. Historically Marine operations emphasize limited incursions from the sea. Each component of the MAGTF must modify its standard method of operation somewhat to reap the benefits conferred by a fully mobile landing force. Only a force organized, equipped, and trained to drive inland quickly can hope to emulate the wildcat rather than the whale.

Command Element

The OMFTS concept paper calls for C2 to remain at sea in order to minimize the logistic footprint and vulnerability of this vital node ashore. This idea is wrong on its merits if interpreted to mean that senior leaders are best situated to command from the ship. Commanders must be ashore and physically located at the point of friction or where their presence can best contribute to mission accomplishment. Information processing ability, on the other hand, may be left at sea and electronically transferred to the

commander at the front. Then if communications fail, the commander will not be isolated from his fighting forces and will at a minimum have the benefit of his own senses to assess the flow of the battle. Naturally the C2 element ashore must also have mobility equivalent to the maneuver force it controls.¹⁴⁰

A minimum of two C2 cells is required to support a MAGTF fighting column. This provides the flexibility for one to travel with each maneuver sub-element along separate routes of march. This precaution provides redundancy in the event of battle casualties and ensures a smooth continuation of the fight. The cells needed to control fighting columns are not the large forward, main, and rear echelons traditionally employed to direct battalions and brigades. Rather only small tactical headquarters are required. Huge staffs are counterproductive in mobile operations; their very size provides an inherent and unnecessary friction. A small staff, oriented on outward action rather than detailed analysis and self-synchronization, is the ideal. A cadre consisting of the S2, S3, S4, FSC, and ALO and carried in one or two vehicles is sufficient. There is no need for backup personnel in each HQ designed to enable twenty-four hour operations; control can be switched between the columns' two command posts if required.¹⁴¹

Mobile operations do not thrive on detailed orders. The C2 nodes need not produce the immense documents or colorful briefing slides that so frequently pass for sound analysis. Instead oral orders and brief written frag orders will be the rule. These products will be transmitted by radio, tactical fax, and messenger. The small size of the

¹³⁹ Heintz, 12.

¹⁴⁰ Simpkin, *Race to the Swift*, 234-237; Russel H.S. Stolfi, *German Battle Style in Ultra Mobile, High Intensity War: North African Desert 1941-42* (Monterey, Cal: U.S. Naval Postgraduate School, undated), 30-35.

¹⁴¹ Simpkin and Stolfi employ disparate analytical frameworks but derive similar conclusions concerning the relationship between staff size and operational efficiency. See *Race to the Swift*, 203, 239, 257-265,

staff contributes to the relative simplicity of the orders process and reaps the benefit of quicker turnaround time on the production and dissemination of required guidance.

Command configured HMMWVs similar to the light trucks employed by WWII German Panzer divisions HQs would suffice for fighting column command posts. The aggressive style of command demanded by mobile operations, however, suggests the advisability of some protection for the C2 node as it roams the battlefield. Light armor protection, such as the C2 LAV or AAAVC, is desirable. Moreover, a small combined arms escort should accompany the commander to protect him and serve as a tactical reserve available for him to commit to the fight at critical junctures.¹⁴²

The final aspect of effective C2 is an effective liaison team capability. These teams are extremely useful in coordinating with joint and combined forces. The 20 Brigade used LNO cells effectively in its dealings with UNITA. LNO teams require mobility and protection just like the fighting column command posts. Like the tactical headquarters, they also require just a few primary players, but their mission demands a robust communication package. The MEF's new Marine Liaison Element is designed to provide operational level LNOs to division and corps headquarters, but this is only part of the solution. With the demise of the active duty ANGLICOs, the Corps has lost the ready ability to team liaison personnel and universal observers with allied battalions and companies. LNOs providing this critical combat multiplying capability made all the difference during the North Vietnamese Easter Offensive of 1972. U.S. advisors at the

and Stolfi, *German Battle Style in Ultra Mobile, High Intensity War: North African Desert 1941-42*, chapter 5.

¹⁴² Major General Alfred Toppe, *Desert Warfare: German Experiences in World War II* (Fort Leavenworth, Kan: U.S. Army Command and General Staff College Combat Studies Institute, 1991), 40. In his North African campaigns, Rommel used a small combined arms reserve to guard his mobile CP and to commit to the local tactical fight when necessary. See Stolfi, *German Battle Style in Ultra Mobile, High Intensity War: North African Desert 1941-42*, 9-16.

brigade and battalion level controlled NSFS and CAS to stymie the communist invasion. Their efforts complemented and completed the critical ARVN liaison work done by more senior Army and Marine officers throughout the crisis.¹⁴³ Dedicated liaison/firepower control teams should be restored to the active Marine component to restore this capability at the tactical level.

Ground Combat Element

The key characteristic of fighting columns is tactical mobility once ashore, therefore all units must have vehicles. Historically, Marine formations have not enjoyed this flexibility. Current MEUs, for instance, contain many units, including the engineer platoon, recon platoon, air defense detachment, and one rifle company (normally associated with the boat raid mission) with no dedicated vehicles to quickly move the entire element long distances over land. This is true because Marine planners have not identified a requirement for the entire landing force to be fully mobile. Most amphibious missions transpire near the coast; operations such as *Provide Comfort* in northern Iraq (a tactical area of responsibility (TAOR) 450 miles from the port of debarkation) have been the exception rather than the rule. OMFTS challenges that paradigm.

The Commandant's OMFTS Working Group concluded that "...the current amphibious lift paradigm-1/3 vertical assault, 1/3 tracked vehicles, and 1/3 turnaround transport-is not compatible with OMFTS."¹⁴⁴ Accordingly, the group's number one recommendation for the ground combat element was "...developing a change in lift

¹⁴³ This story is best told in Colonel G.H. Turley, USMCR, *The Easter Offensive: The Last American Advisors Vietnam 1972* (Annapolis, Md: Naval Institute Press, 1985).

¹⁴⁴ "OMFTS Working Group Draft Final Report" (Quantico, Va: Marine Corps Combat Development Command, 11 December 1998), VI-2.

concepts to accomplish the projection of combat power inland."¹⁴⁵ In the past the ground transport shortfall has been remedied by several techniques including:

- shuttling vehicles or aircraft;
- borrowing sister service transport or contracting host nation assets (the *Provide Comfort* solution);
- using artillery or MSSG vehicles for troop transport rather than their for intended purpose;
- task organizing non-motorized elements of the force (attaching engineers or foot mobile Stinger teams to the AAV company, for example);
- or shrinking the landing force to match available ground transport capacity.

To maximize the combat power of the force in an OMFTS combat scenario, however, the transport deficiency must be cured by task equipping all ground elements with dedicated mobility assets.

There is no requirement for the GCE to be carried in a single type of vehicle. Some advocates of mobile battle groups stress the virtues of employing an AAV or LAV pure force. Such a force lacks the full power of the larger MAGTF combined arms team. Moreover, it is not necessary. As the Germans demonstrated in WW II, the key to effective mobile operations is not weapon-system-pure formations, but the blending of complementary capabilities.¹⁴⁶ Both wheeled and tracked vehicles are acceptable despite the disparity in their cross-country capabilities and top speeds. Even Army mechanized units include sizable wheeled combat service support elements. Therefore MAGTF fighting columns do not demand massive service investment in new types of vehicles; instead they require a sea change in the way Marines task equip and organize to fight.

One of the oft-heard fears of OMFTS advocates is that combat support and combat service support elements cannot keep up with M1A1 tanks and AAVs. This notion

¹⁴⁵ Ibid.

inspires visions of a drag race in which less capable vehicles are left far behind. Platform speed, however, enables individual vehicles to effectively seek cover, concealment, or advantageous firing positions far more frequently than it propels large units towards distant operational objectives. As Table 3 illustrates, historical rates of advance, even by mechanized units commonly associated with blitzkrieg campaigns, often do not exceed the daily mileage attained by experienced long distance backpackers. Indeed, sustaining a seventy-five kilometer per day rate of advance would double the speeds sustained by all but a handful of successful pursuit operations. The paucity of Marine tanks and the lack of sufficient AAVs to mechanize the entire landing force make relative speeds a moot point anyway. Even if enough amtracs were available, the question becomes whether such a force possesses sufficient organic combat power, including fire support and logistic capability, to win battles by itself.

Table 3: Historical Rates of Advance

Campaign/Battle	Date	Distance/day (km)	Remarks
Mongols	c. 1240	100	Genghis Khan
Ulm	1805	22	
Moscow	1812	14	
Marne	1914	20	
Megiddo	1918	56	Allenby's Cavalry
Flanders	1940	31	
Moscow	1941	10	
Vistula-Oder Campaign	1945	90	2 Guards Tank Army
Normandy Breakout	1944	28	
Korean UN Offensive	1951	19	
Sinai	1967	55	Gen Tal's Armor
Desert Storm	1991	75	3 rd Armor Division

Sources: Bailey, 315; Michael R. Gordon and General Bernard E. Trainor, *The General's War: The Inside Story of the Conflict in the Gulf* (Boston: Little, Brown, and Company, 1995), 378; Martin van Creveld, Steven L. Canby, and Kenneth S. Brower, *Air Power and Maneuver Warfare* (Montgomery, AL: Air University, 1994), 110; Leo de Hartog, *Genghis Khan: Conqueror of the World* (New York: St. Martin's Press, 1989), 49; Russel H.S. Stolfi, *A Bias For Action: The German 7th Panzer Division in France & Russia, 1940-1941* (Quantico, Va: Marine Corps Association, 1991), 43.

¹⁴⁶ Stolfi, *German Battle Style in Ultra Mobile, High Intensity War: North African Desert 1941-42*, 99-100.

In addition to a mix of vehicle types, another important characteristic of fighting columns is the capacity to operate simultaneously on separate axes of advance. This capability provides enormous tactical flexibility and enables the column to capitalize on identified gaps while avoiding defended surfaces during its movement towards the operational objective. If necessary, one column can serve as a holding force while the other conducts an envelopment or turning movement to leverage the enemy from a strong position. This dual avenue of approach capability requires both columns to possess the full spectrum of battlefield operational functions: C2, reconnaissance, maneuver forces, fire support, logistics, and air defense. The columns need not be mirror images of each other but they must possess the resources to operate independently when required.

Both columns must have the means to cross water obstacles swiftly. The ability to cross streams "in stride" enables the MAGTF to avoid dangerous chokepoints and defensive sites around key bridges. Moreover, such bridges will often be destroyed before they can be captured. River obstacles pose little difficulty for amphibious assets such as LAVs and AAVs, but wheeled vehicles require assistance in crossing such impediments. Assault support assets can contribute to this effort, but each column should be self-sufficient in river crossing without relying on scarce and perhaps unavailable CH-53E helicopters or MV-22s to assist. This requirement implies a robust organic rafting capacity.¹⁴⁷

The USMC OMFTS Working Group concluded that ground based fire support is another inherent weakness of OMFTS operations. The underlying assumption is that

¹⁴⁷ Stream crossing is a commonly overlooked tactical challenge. As an example, the 156 miles separating Petersburg, Virginia and Baltimore, Maryland contain nine rivers: the Appomattox, James, Anna, Pamunkey, Rapidan, Occoquan, Potomac, Patuxent, and Patapsco. Such a series of significant water barriers spaced twenty miles or less apart is a relatively common occurrence in many parts of the world.

towed artillery systems lack the mobility to keep up with maneuver forces and that the logistic load entailed in resupplying the guns is too onerous. The M777 lightweight 155mm howitzer in combination with the new medium truck prime mover is far more agile than the existing M198 artillery system. The improved mobility of the new truck/gun combination will enable it to support maneuver forces in the same way that towed guns supported German, British, and American blitzkrieg campaigns in France, Russia, and North Africa throughout WW II. The twenty-eight kilometer range of the M777's DPICM munitions require it to displace only four times per day to range a maneuver element advancing seventy-five kilometers per day. Ground based fire support is key to fielding a true all arms capability; Marine fighting columns need not only direct support tube artillery but also a general support rocket capability such as the truck borne HIMARs system to ensure sufficient preassault and counterfire capability. Heavy towed mortars such as those employed by the SADF in Angola should also be added to the fire support mix.

Aviation Combat Element

The fuel and ammunition required by fighting column vehicles mandate that the ACE dedicate much of its lift capacity to logistic duties. The advantage of fighting columns over foot mobile forces is that a mobile battle group's vehicles can carry much of its logistic requirements. Thus resupply runs by aircraft would not be required on a daily basis. In fact, the column's vehicles could carry forty percent of the fuel required and all of the food necessary for a two-week long, three-hundred-mile- deep mission. Additional fuel and ammunition would be delivered by a mix of Marine C-130, CH-53E, and MV-22 aircraft or by Air Mobility Command assets.

The tactical flexibility inherent in the marriage of operationally mobile fighting columns with aerial resupply capabilities is well illustrated by the 101st Air Assault Division's experience in Iraq. Helicopters were insufficient to carry both assault troops and the logistics to sustain them, so truck convoys carried the supplies to the forward operating base airheads. More than five thousand soldiers in six hundred vehicles, including forty-five HEMTT refuelers, covered the one hundred miles from the line of departure to FOB Cobra in twelve hours. On 26 February 1991 a *shamal* sandstorm grounded the CH-47 Chinooks while truck convoys continued to resupply Cobra. The bad weather also grounded the Blackhawk helicopters and stranded half of Third Brigade's assault force one hundred miles short of its first objective. Despite the storm a ground column composed of TOW HMMWVs and towed artillery drove to the new FOB from an intermediate landing zone. Had the primary means of transport been reversed, a powerful combined arms truck column with several days of organic logistic support could have proceeded to the target and awaited better flying weather before helicopters resupplied the unit. The lesson is apparent: several days of logistic self-sufficiency provide inherent tactical flexibility to motorized/mechanized forces.¹⁴⁸

MV-22, CH-53E, and C-130 aircraft can conduct aerial refueling, as required, to achieve desired station times at OMFTS distances, but AH-1W and UH-1N helicopters must land to rearm and refuel to sustain operations several hundred miles inland. Next generation rotary wing attack and utility platforms should incorporate in-flight refueling capabilities, but FARPS are the only viable solution at present. Fighting columns provide ideal protection for establishment of FARP sites; helicopters can land and replenish in

¹⁴⁸ Thomas Taylor, *Lightning in the Storm: The 101st Air Assault Division in the Gulf War* (New York: Hippocrene Books, 1994), 303, 313, 321, 349, 356, 370, 378; Flanagan, 194.

secure LZs. Historically helicopters have proven surprisingly survivable in combat. In Vietnam only one aircraft was destroyed for every 18,193 sorties flown. Of the 2,587 helicopters lost in action between 1965 and 1971, however, fully ninety-two percent were shot down by anti-aircraft guns or small arms.¹⁴⁹ Using CH-53Es and MV-22s primarily to conduct resupply into landing zones previously secured by fighting columns should therefore serve to increase the historical margin of safety. SADF battle groups conducting external operations deep in Angola sometimes refueled helicopters from the columns' organic fuel reserves; MAGTF fighting columns could perform this function as well. When required, air assault forces from the sea can also establish and secure FARP sites with fuel provided from bladders or other aircraft, but this technique is more risky because the initial entry into the landing zone is unprotected by ground forces.

Air superiority is a prerequisite for effective fighting column operations. Air Force and Navy assets would provide much of this air cover. Marine aircraft, primarily Joint Strike Fighters, would support fighting column operations in their normal fashion. In most cases it would be easier and more efficient to operate from naval ships at sea than from airstrips ashore. Nonetheless, Marine aircraft could operate from expeditionary airfields if required. Security concerns associated with defending an airfield suggest that this mode should be the exception rather than the rule.

Timely rotary wing close air support could be provided to fighting columns by adopting a technique employed by Army special operations aviators. The 160th Special Operations Aviation Regiment (SOAR) uses tiny one engine AH-6/MH-6 Little Bird aircraft to support U.S. Special Operations Command (USSOCOM) forces. These

¹⁴⁹Hohn Everett-Heath, *Helicopters in Combat: The First Fifty Years* (London: Arms and Armour Press, 1992), 111-112.

forward looking infrared radar (FLIR) equipped aircraft come in two versions: close air support and troop lift. The AH-6 attack version can carry guns and either rockets or missiles. Each plane can mount 7.62mm Miniguns, .50 Cal machine guns, or 40mm MK 19 machine guns. It can also simultaneously carry either seven or nineteen round pods of 2.75" rockets or four Hellfire missiles. The AH-6 can be carried on the back of a medium tactical vehicle replacement (MTVR) truck and be airborne in less than ten minutes to respond to calls for fire. The utility version can carry six lightly equipped men on planks above the skids; it is useful for scouting, aerial observation, insertion of small blocking elements, and message service. Four attack and two utility helicopters represent a standard package in support of one Army ranger battalion.¹⁵⁰ A similar package for a MEU size-fighting column would require eight trucks (six for helicopters and three for ammo and equipment) but provide immediate CAS until more formidable aviation support could arrive. A cadre of qualified USMC Little Bird pilots already exists as a result of an ongoing exchange program between the Corps and 160th SOAR.

The addition of AH-6 CAS support to fighting columns provides an added dimension to the potential of existing Huey and Cobra aviation assets. The latter could be used to perform shaping operations as an independent maneuver element in line with current Army aviation doctrine and Marine emphasis on aviation as a maneuver element. Huey/Cobra hunter-killer teams could be flown from secure FARP sites at night as part of scheduled fires in designated engagement areas and kill boxes. Shaping operations, flank security, reserve missions, and escort of aerial resupply runs could be more readily

¹⁵⁰ Joint Special Operations Forces Institute, *Special Operations Forces Reference Manual* (Fayetteville, NC: Cubic Applications, Inc., 1998),3-19 to 3-23; also drawn from the author's personal experience as assistant fire support coordinator for the U.S. Army's 75th Ranger Regiment in Fort Benning, Georgia.

assigned to these forces because the Little Bird aircraft collocated with the maneuver columns would handle immediate CAS requests.

Combat Service Support Element

Basing much of the logistic train at sea is a fundamental premise of OMFTS/STOM. This principle supports the notion that static supply depots established ashore inside the force beachhead line take too long to build and are too vulnerable to enemy attack. Ground resupply from the beach to the maneuver force inland is assumed to be impracticable due to unsecured LOCs. Application of the sea-basing concept therefore results in one of two possible logistic methodologies. Either a significant mobile CSSE accompanies the maneuver element or aviation supplies the required logistic support. Fighting columns employ both solutions.

The key to effective logistic support for fighting columns is equivalent mobility for the CSSE element. The CSSE trains comprise mostly wheeled vehicles, but they must accompany the maneuver element and operate as an organic piece of the column's movement. WWII experience taught that the maximum effective radius for trucks to shuttle from forward supply depots to the front in resupply missions was two hundred miles. The Germans and Italians conducting this style of long haul resupply in North Africa, however, lost more than fifty percent of their resupply vehicles to special forces raiding their vulnerable lines of supply.¹⁵¹ The fighting column concept obviates this threat by using its log train as a mobile supply depot; aircraft periodically shuttle new material forward to the combat trains as their holdings are distributed.

Despite the fact that supply columns will not range long distances in an unsupported fashion, organic security is still a must for the vulnerable trains customarily located near the rear of the column. The CSSE requires protection against infantry, armor, and air threats. An effective Vietnam era concept that could be resurrected to assist in the protection of logistic trains is the gun truck. These were regular trucks protected by homemade armor and equipped with a variety of automatic weapons including 7.62 miniguns, dual .50 cal machine guns, and 30mm aircraft cannon. These makeshift escort vehicles proved particularly effective in breaking up Viet Cong ambushes.¹⁵²

Fuel is the biggest logistic constraint inherent in OMFTS operations. Most military vehicles have a three hundred-mile range on one tank of gas. For planning purposes a military force traverses two miles for every mile gained towards the target, so an operational objective three hundred miles inland would require four refuelings (see Table 4). This amount of fuel, coupled with full tanks initially, provides enough range to travel three hundred miles to and from the target and another three hundred miles in and around the objective. The extra fuel also provides a contingency hedge for high consumption

Table 4: Refueling Plan

# of Refuelings	Source of Fuel Resupply	Location at Time of Resupply	Operational Distance Traveled	Total Distance Traveled	Remarks
Initial tank	Navy	Ship	0 miles	0 miles	Near Full at LPP
Refueling #1	Air Delivery	150 miles inland	150 miles	300 miles	Enroute to Obj
Refueling #2	Air Delivery	300 miles inland	300 miles	600 miles	Action on Obj
Refueling #3	Air Delivery	300 miles inland	450 miles	900 miles	Mssn Complete
Refueling #4	Organic CSSD	150 miles inland	600 miles	1200 miles	Enroute LPP
Final tank	Navy	Ship	750 miles	1500 miles	Near Empty at LPP

¹⁵¹ Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge: Cambridge University Press, 1977), 184; Stolfi, *German Battle Style in Ultra Mobile, High Intensity War: North African Desert 1941-42*, 80-81.

of fuel driven by rough terrain or losses due to enemy action. The column log train carries enough gas to refuel the task force once, so an objective three hundred miles deep would mandate three aerial refuelings sometime during the operation. Significantly, the 175-mile threshold range outlined in the STOM concept papers would require only one aerial refueling during the mission. Either way, the goal would be to keep the CSSE's organic refuelers filled to fifty percent capacity, much like Navy ships strive to maintain eighty percent fuel capacity, to preserve operational flexibility.

Next to fuel, ammunition is the biggest logistic challenge. The problem in terms of planning is that, unlike fuel, ammunition usage is entirely dependent on the enemy situation. Small arms carrying capacity is fairly easy; clearly HMG, antitank, tank, mortar, and artillery munitions present the biggest weight and cube handling difficulties. Each mobile CSSE should carry one basic allowance of ammunition (BA) in order to replenish the maneuver forces' organic BA as required. Aviation assets then backfill the combat trains' ammunition trucks.

Finally, in terms of maintenance, mobile columns demand a mix of forward based and sea-based capabilities. SADF mobile columns were able to replace engines and conduct other significant repairs in the field. USMC fighting columns should be manned and equipped to perform similar field expedient maintenance. Air delivered contact teams would conduct more intensive repairs ashore. When necessary the equipment could be returned to sea based shops for refit much like the SADF replaced its artillery tubes at Mavinga. Wrecker service is another important tactical capability needed to recover

¹⁵² For the tactics and hardware associated with these improvised but extraordinarily effective weapons, see Timothy J. Kutta, *Gun Trucks* (Carrollton, Tex: Squadron/Signal Publications, Inc., 1996).

damaged vehicles to the mobile repair shops or evacuation LZs. Effective salvage operations help sustain the overall combat power of the force throughout a campaign.

Similarly, medical support is a critical component of deep battle group operations. Shock trauma units must be equipped with ambulances and mobile operating rooms as well as sufficient air transport to evacuate casualties to sea-based hospital facilities in a timely fashion. Given the potential distances involved in OMFTS operations, however, the emphasis must be on mobile surgical facilities equipped to stabilize serious casualties prior to aerial evacuation. This organic capability enables on-site medical personnel to take advantage of the "golden hour", the period immediately following receipt of the wound during which treatment is most effective and critical to long-term recovery.

Conclusion. This chapter has identified some of the peculiar requirements associated with MAGTF fighting columns. Three capabilities are critical: (1) a fully mobile GCE capable of advancing simultaneously on two axes; (2) an ACE that can perform shaping operations, close air support, air assault, and resupply missions concurrently; and (3) mobile CSSDs robust enough to support the GCE for several days at a time without aerial resupply. The following chapter applies these general characteristics to the Marine Expeditionary Unit.

Chapter 7

The MEU Fighting Column

Our cards were speed and time, not hitting power...Range is more to strategy than force.¹⁵³

— T.E.Lawrence

The Marine Expeditionary Unit, as the MAGTF most routinely deployed, is a logical candidate to conduct OMFTS fighting column operations. While its combat power is certainly limited, it is nearly equivalent to that employed by the SADF in Operation *Modular*. Under appropriate conditions MEUs, whether operating independently or as an enabling force for follow-on MEBs or MEFs, can conduct operationally significant campaigns. Robust C2, carefully task organized maneuver forces, mobile logistics, and close cooperation with the Navy are necessary if MEUs are to successfully move mobile battle groups deep inland.

Command and Control. Two C2 nodes ashore, one with each axis of advance, are required. One should be the BLT command post while the other should be the MEU command element. Fighting columns presume the bulk of the MEU's ground combat power operating ashore; accordingly, it is fitting that the MEU commander should be ashore also. This breaks with the standard OMFTS paradigm of C2 remaining at sea, but

there is simply no substitute for the commander being in a position to sense the flow of the battle and influence it directly.

This truth does not mean that much of the C2 and intelligence processing power should not remain at sea. The challenge is to funnel the fruits of these systems to the commander at the front so that he can enjoy the best of both worlds. One way to enhance the column's situational awareness is by tapping into theater and national level intelligence assets. Including a TSC-93A suite, known as the JTF enabler package, and a Trojan Spirit II communication system in the mobile command post would provide this reach back capability. The MEU C2 vehicles must have a robust communications capability including SATCOM voice and data links, high frequency nets, tactical fax, and the standard VHF/UHF control nets. The MEU commander needs these nets, and a degree of channel redundancy, to transmit critical information to HHQ in a timely fashion.

The MEU command element ashore should be particularly small: the CO, S2, S3 and FSC are the key players. The MEU XO should remain at sea and serve as the tertiary command post for operations ashore. The S4 and the bulk of the S2 shop should also remain aboard ship to coordinate the command's interface with outside agencies and supervise the intelligence and logistic support of the force ashore. A single vehicle such as a C2 LAV or several C2 HMMWVs, along with a small security team, are sufficient to carry the MEU primary staff. The focus of the MEU CE is to maintain the operational perspective while the principal role of the battalion staff is to fight the tactical battle. The battalion landing team (BLT) staff should operate from the C2 AAV to ensure that it

¹⁵³ Heintz, 325.

has mobility and protection equal to that of its subordinate maneuver elements. The chase AAV provides the command post additional security.

Task Organization. Figure 4 depicts a representative MEU task organization with its primary sub elements. The ACE component contains the standard mix of aircraft with the MV-22 and JSF replacing today's CH-46 and AV-8B, respectively. In addition, a detachment of six Little Birds is included. The GCE is fully motorized, as is the MSSG.

Organic intelligence is provided by several elements of the MEU. These include the

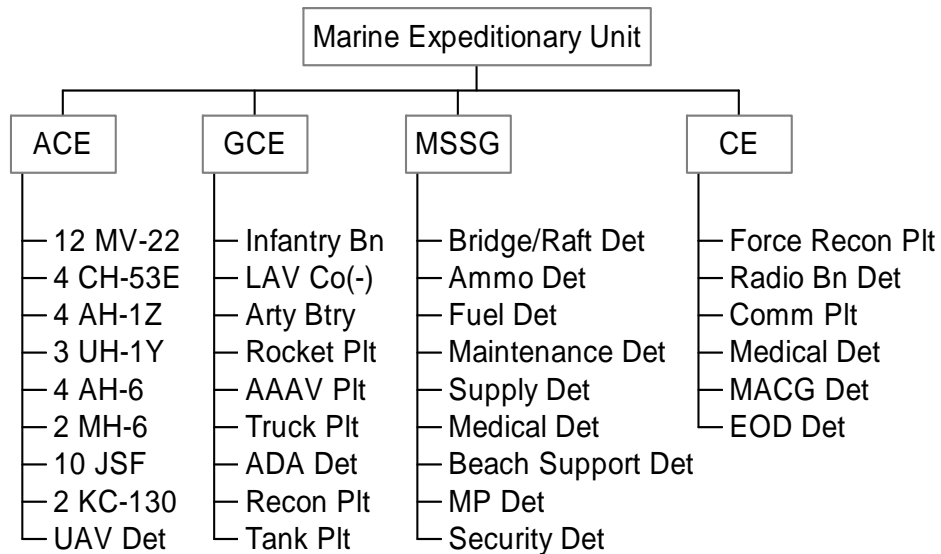


Figure 4

division recon platoon, the LAV company (-), and the radio battalion detachment. Deep reconnaissance is provided by the force reconnaissance detachment, which is primarily delivered by parachute or helicopter to its Named Areas of Interest (NAIs). The ARG SEAL platoon provides amphibious reconnaissance of landing beaches and river crossing

sites. National assets (accessed via the ship and mobile intelligence links) and the ACE contribute to the MEU commander's operational intelligence picture.

Table 5 depicts how the fighting column GCE might be divided on separate yet mutually supporting avenues of approach. The two rifle companies (one AAV and one HMMWV-borne) and the tank platoon furnish the columns' primary striking power. Combat engineers and antiarmor Javelin sections are task organized to reinforce each infantry company. The HMG and TOW platoons, united in a combined arms antiarmor team (CAAT), provide the BLT a responsive and flexible ground-based tactical reserve.

Table 5: MEU GCE Fighting Columns

Column # 1		Column # 2	
GCE Units	Vehicles	GCE Units	Vehicles
Div Recon Plt (-)	2 LSVs; 2 Cycles	Div Recon Plt (-)	2 LSVs; 2 Cycles
LAR Det (-)	8 LAVs : 4 gun, 1 AT, 1 mortar, 1 recovery, 1 log	LAR Det (-)	8 LAVs : 4 gun, 1 AT, 1 mortar, 1 recovery, 1 log
Mechanized Team	12 AAVs 4 M1A1s	Rifle Company	24 HMMWVs
CEB Platoon	4 HMMWVs; 2 M115 2 M9 ACE	CAAT Team	15 HMMWVs: 6 HMG; 8 TOW; 1 FO
120mm Battery (-)	9 HMMWVs: 4 tube, 4 ammo, 1 C2	81mm Platoon (-)	7 HMMWVs: 4 tube, 2 ammo, 1 C2
BLT CP (sec det from H& S Co)	1 AAACV 1 AAAPV	MEU CP (sec det from LAR Det)	1 LAV-C, 1 MEWSS, 2 LAV-25, 2 HMMWVs
Rocket Platoon (sec det fm parent btry)	3 MTVR: 2 HIMARs, 1 Crew 2 LVS ammo 6 HMMWV: 1 C2; 1 Avenger 2 HMG; 2 cargo 1 H2O Bull	LW 155mm Battery	6 LW 155mm guns 13 MTVR: 6 gun, 6 ammo 1 supply & maint. 10 HMMWVs: 9 Btry; 1 Avenger 1 H2O Bull
Total Vehicles	56	Total Vehicles	87

Ground based fire support is provided by a four tube BLT 81mm mortar platoon, a four gun MEU 120mm mortar battery(-), a six howitzer LW155mm battery, and a two

launcher HIMAR rocket section.¹⁵⁴ The MEU 120mm battery(-) supplements the cannon and rocket artillery and provides the column additional tactical flexibility. In addition to the strengthened array of indirect fires, the MEU's mobile electronic warfare support system (MEWSS) LAV and radio reconnaissance teams can conduct limited offensive electronic warfare.

The third rifle company is maintained aboard ship as an operational reserve poised to provide an air assault capability. The great value of a relatively light heliborne force lies in the speed and range the aircraft provide. Simpkin posited brigade level airmobile forces as the perfect operational complement to mechanized divisions; the latter conduct tactical turning movements while the former execute rapid pursuit or deep exploitation of the dislocated enemy.¹⁵⁵ At the MEU level the potential remains despite the relatively modest size of the force employed. The heliborne company is reinforced with a squad of combat engineers and a section of Javelin antiarmor gunners. In addition, the rifle company is augmented with four light strike vehicles (LSVs) bearing heavy machine guns, two LSV towed 120mm mortars, and a two tube 81mm mortar detachment to provide a more robust direct and indirect fire capability that may be tailored to support specific missions. The MV-22 company may also source TRAP, mass casualty, and FARP security missions as required.

MV-22s provide a variety of interesting new capabilities for the MEU. While many Osprey sorties would be needed to provide logistic support for the fighting columns, there

¹⁵⁴ The Corps has yet to commit to procurement of rocket artillery, but this capability is an absolute necessity to provide adequate counterfire and pre-assault fires for maneuver forces; it is probable that this long recognized deficiency will be addressed before 2014. Similarly, the 120mm mortars that proved so deadly in the *Modular* campaign will likely be added as a cost effective supplement to scanty Marine artillery support. A six gun 120mm towed battery could be added to each infantry regiment by cutting the battalion 81mm platoons down to six tubes and using the personnel savings to man the heavy mortar battery. These regimental batteries could then rotate through MEU deployments.

are a variety of other valuable applications as well. The nature of MV-22 support is of course situation dependent, but a typical MEU detachment might conduct missions as outlined below during the course of OMFTS operations:

- Assault Support / Deception Operations
- Insertion of Reconnaissance Teams
- Casualty Evacuation
- Logistic Resupply of Ground Forces / ACE FARP Support
- Command & Control / Radio Relay / Courier Service
- Visual, Photo, IR Reconnaissance / Collection of Signals Intelligence
- Fire Support / Electronic Warfare / Psychological Operations Support

The last two bullets in the list incorporate missions not currently envisioned for Marine MV-22s, but the flexibility of the platform make these capabilities desirable additions to future models of the Osprey. In addition to the tilt-rotor package, a UAV detachment operates from the ship to provide the columns route reconnaissance, NAI surveillance, target location, and battle damage assessment (BDA). Hueys and Cobras provide escort and conduct hunter-killer missions as required. Little Birds furnish CAS and move leaders, recon teams, and small blocking forces. The MEU JSF detachment provides offensive air support in the form of CAS and interdiction missions. Carrier and/or Air Force fighter aircraft furnish additional CAS and interdiction sorties, counter-air capability and combat air patrol coverage over the mobile battle group.

Logistics. Supply sufficiency determines the viability of modern battle groups just as it did that of nineteenth century flying columns. Vehicles confer significant advantages in terms of operational mobility, but they incur equally significant costs in terms of provisions and maintenance. Thus far most OMFTS analysts have concluded that the

¹⁵⁵ Simpkin, *Race to the Swift*, see chapter 7 "The Rotary Wing Revolution."

costs outweigh the benefits. The SADF experience, as well as a host of blitzkrieg campaigns in WWII and the Middle Eastern wars, suggests that this may not be true.

If fighting columns are to generate and sustain credible combat power, then they must be supported by mobile CSSDs that are task organized and equipped to provide the full spectrum of combat service support. Table 6 illustrates a sample MSSG broken into two logistics task forces to enable independent operation along separate axes. The two columns contain twenty-eight LVSs, eighteen MTVRs, sixteen HMMWVs, twelve MABs and eight LARC-V amphibious trucks. The CSSD supporting the mechanized team is augmented with AAV and tank recovery vehicles. Each of these mobile CSSDs provides a high degree of logistic flexibility to the force.

Table 6: MEU Fighting Column Mobile CSSDs

Column # 1		Column # 2	
CSSD Dets	Vehicles	CSSD Dets	Vehicles
C2	2 MRC HMMWVs	C2	2 MRC HMMWVs
Provisional Rifle Plt (BLT H&S Co)	2 MTRV gun trucks 4 HMMWVs: 2 HMG; 2 Cargo	Provisional Rifle Plt (MP Det)	2 MTRV gun trucks 4 HMMWVs: 2 HMG; 2 Cargo
Ammo Det	6 LVSs	Ammo Det	6 LVSs
Maint Det	1 MTRV van	Maint Det	1 MTRV van
Fuel Det	6 LVS SIXCONs	Fuel Det	4 LVS SIXCONs
Class I	1 MTRV (MRE); 1 M149 1 LVS H2O SIXCON	Class I	1 MTRV (MRE); 1 M149 1 LVS H2O SIXCON
Medical Det	1 MTRV Surgical truck; 1 HMMWV ambulance	Medical Det	1 MTRV Surgical truck; 1 HMMWV ambulance
Raft Det	8 MABs 2 LARC-Vs	Raft Det	4 MABs 6 LARC-Vs
Little Bird Det	4 MTRVs: 2 AH-6 / 1 MH-6 1 crew MTRV; 1 M149 1 LVS (ammo)	Little Bird Det	4 MTRVs: 2 AH-6 / 1 MH-6 1 crew MTRV; 1 M149 1 LVS (ammo)
Landing Spt Det	1 HMMWV	Landing Spt Det	1 HMMWV
Recovery Det	1 M88 1 AAVR	Recovery Det	2 LVS wrecker
Total Vehicles	43	Total Vehicles	41

Fuel is the primary concern of a logistician planning a three hundred-mile movement. The occurrence and intensity of combat may be unpredictable, but the heavy logistic demands of a long motor march cannot be denied. The 227 vehicles shown in the MEU fighting column require twenty-three thousand gallons of fuel to refill every vehicle one time. This equates to the fuel capacity of ten CH-53E or twelve MV-22 sorties.¹⁵⁶ LVS SIXCON refuelers carry 2,700 gallons of POL; ten of these fuel trucks accompany the MSSG log train. At a seventy-five kilometers per day rate of advance (3rd Armor Division's rate during Desert Storm and twice that of the German Panzers in May 1940), it would require one week to reach an objective three hundred miles away and another week to return. In accordance with the planning factors developed in the last chapter, aerial resupply of fuel would be required three times during this fourteen-day period.

Ammunition requirements are a function of the intensity and duration of combat encountered. MEUs carry fifteen days of sustainment, but this class V allotment does not equal a fifteen day basic allowance (BA) of ammunition. A BA, or combat load in DOD parlance, is defined as the ammunition recommended to be carried within the means normally available to an FMF unit embarking for combat. MCO 8010.1E (15 April 1997) provides planning data for ammunition consumption at assault or sustained rates. Unfortunately, each DODIC's basic allowance equates to varying numbers of days at the projected assault or sustained rates. It is difficult, then, to say how many days of combat a MEU's basic allowance could be expected to support. Regardless, the fighting column modeled in this chapter carries two BAs of ammunition: one in the vehicles of the ground combat element and another in the mobile CSSD. One BA for the MEU is approximately

¹⁵⁶ MV-22 Ospreys carry 2,000 gallons internally. CH-53E Sea Stallions carry 2,400 gallons, with a capacity to dispense it quickly when fitted with the Tactical Bulk Fuel Delivery System (TBFDS). C-130

ninety tons of ammunition. The MSSG log train can carry 140 tons of ammo. The ACE must deliver additional munitions required during the two-week period. This sustainment would require eighteen MV-22 loads for each subsequent BA delivered.¹⁵⁷

Maintenance is another important aspect of the MSSG's work. Vehicles break down through rough use and enemy action. Many of them can be repaired and salvaged in the field, if wreckers and mechanics are available. Each column will contain a maintenance van and wrecker support. Contact teams from the ARG may also be dispatched by air to repair weapons and equipment when required. Vehicles and equipment that cannot be repaired may be destroyed in place or lifted out by C-130, C-17, or helicopter for further work at an intermediate support base or aboard ship.

Providing medical support for the fighting column is a major part of the MSSG's role. Unit corpsmen provide first line treatment, but column casualty and evacuation centers reside in the combat trains. Each CSSD contains an ambulance and a medical truck in which advanced lifesaving trauma care is available.¹⁵⁸ Treatment is provided by a combination of BLT, MSSG and MEU medical personnel. Stabilized patients are moved via aircraft to operating rooms and hospital facilities aboard ship for further treatment.

Much of the sustainment that must be ferried by helicopter to air assault infantry units is not required for mobile battle groups. Vehicles can easily carry a one-week food supply for their occupants; the rest of the rations for the 1,250 Marine landing force

"Bladder Birds" carry 6,000 gallons.

¹⁵⁷ MEU fighting column ammunition estimates were derived from a combination of MCO 8010.1E, USA ST 101-6, and FM 101-10-1/2 data.

¹⁵⁸ This surgical truck is a capability that doesn't currently exist in the US inventory, though other countries have it. Since *Modular*, for example, the SADF has developed a fully mobile forty ton surgical post mounted on the chassis of a SAMIL-100 mine protected truck. Davies interview, 5 April 2000.

would require five MV-22 sorties over a fifteen day period.¹⁵⁹ Water may be procured from local sources when available; this method is preferable to carrying or flying in this bulky commodity. The vehicle column carries enough water organically (in four 5-gallon cans per vehicle, six 400-gallon water bulls, and two LVS water six-cons) to provide two gallons per day per man for three days even in desert climates where water is not readily available. The rest of the water supply in such extreme conditions would have to be provided by air with approximately two MV-22 sorties per day. This per capita consumption rate is only forty percent of that called for by contemporary logistic planning guides, but it is twice the amount used in both summer and winter by British and German armies in North Africa in WW II.¹⁶⁰ The current planning guide figure is extravagant for personal requirements and should be reevaluated; unchallenged, such high-end estimates drive logisticians to stockpile and distribute excessive tonnage of all classes of supply.¹⁶¹ Under normal circumstances, this is a useful hedge against unforeseen circumstances. The cost of logistic largesse, however, is measured in more vehicles, aircraft sorties, and personnel. This is a luxury OMFTS operations cannot afford.

Another important capability the MSSG provides is a means to build and operate bridges or rafts. Eighty percent of the rolling stock of the MEU fighting column is

¹⁵⁹ MREs are a bulky and heavy, if convenient, source of nutrition. Consider that hikers routinely carry as much as ten days food, mostly dehydrated, on expeditions. This could not be done using MREs.

¹⁶⁰ Generalleutnant s.D. Fritz Hermann Bayerlein and Dr. Siegismund Kienow, *FMFRP 12-96-SUPP, German Experiences in Desert Warfare During World War II* (Washington: Department of the Navy, 1990), 2-1 to 2-2. Desert Guide; for anecdotal verification from the American experience on Sicily see Ernie Pyle, *Brave Men* (New York: Henry Holt and Company, 1944), 41-42.

¹⁶¹ This is not a new or a strictly American problem. "The British Army, ever since the terrible lesson of the Crimea, had tended to stress supply at the expense of mobility. The static conditions of World War I, followed by fast-rising standards of living, inevitable increased this bias. In many theatres of World War II, the complexity of equipment, the growth of specialized organizations, the expansion of staffs, and the elaboration of communications still further increased the ration of administrative to fighting strengths and

wheeled vehicles with no amphibious capability. The presence of seventy-ton M1A1 main battle tanks (MBTs) and heavy LVS wheeled vehicles mandates the use of quick and efficient rafting such as the Mobile Assault Bridge/Raft. This is a wheeled amphibious truck that can be joined with three other such vehicles to form a MBT capable raft. The design needs to be upgraded to handle MLC 70 loads, but otherwise is suitable for swift crossing of water obstacles.¹⁶² LARC-Vs can ferry HMMWVs; the wrecker cranes lift the light trucks in and out of the LARC cargo bay much as artillery units carried 105mm howitzers ashore in WWII. The combined ferry assets could transfer five tanks, ninety-three HMMWVs, thirty-four MTRVs, thirty LVSs, and six howitzers across a four-hundred meter wide river in roughly four hours.¹⁶³

The final consideration for MSSG support is organic security. The log train is the Achilles Heel of the fighting column. If it is destroyed the sustained combat power of the force is sapped. Four MTRV gun trucks, four HMG HMMWVs, four C2 HMMWVs with radio links to column mortars and artillery, and two provisional rifle platoons (sourced from BLT H&S company and the MSSG MP detachment) guard the log train. In addition, the trucks bearing the Little Bird attack helicopters would travel with the mobile MSSG detachment.

swelled the amount of transport required." Field Marshal the Viscount Slim, *Defeat Into Victory* (New York: David McKay Company, Inc., 1961), 448-449.

¹⁶² The Israeli IMI two-tank ferry, Russian GSP heavy amphibious ferry, German EWK M3 ferry, and Japanese Type 70 SP pontoon bridge are variations on the theme. All provide armor and heavy vehicles the ability to cross streams quickly in order to maintain the momentum of an attack. The existing alternative, ribbon bridging, is not suitable for use by mobile columns.

¹⁶³ TC 5-210 and MCWP 3-17.1 explain considerations affecting rafting operations. The LARC V would be more useful for vehicle ferry operations if its stern lowered into a ramp like that of the Russian PTS-2 tracked amphibious vehicle. This feature obviates the requirement for hoisting HMMWVs into the LARC's cargo bay and greatly speeds up the rafting process.

Amphibious Considerations. If OMFTS is to be viable, it must be executable within the framework of existing amphibious shipping. For the MEU sized fighting column, this means that the vehicle footprint must fit on a standard three ship amphibious ready group (ARG). A *Wasp* class LHD, *Whidbey Island* class LSD, and *San Antonio* class LPD comprise the ARG used in the model. The ARG template provides 57,500 square feet of vehicular cargo space. The vehicles identified in the MEU fighting column model, including a twenty percent broken stowage factor around the rolling stock, fill this embarkation footprint. This load plan leaves no space for quad con containers and unit cargo storage in designated vehicle stowage spaces.

The mix of landing craft employed typically includes three air cushion landing craft (LCACs) aboard the LHD, two LCACs on the LSD (plus the AAV detachment), and one utility landing craft (LCU) on the LPD. Studies show that the LCAC is more efficient at delivering cargo at distances beyond ten nautical miles offshore while the LCU is equally effective at shorter distances. Moreover, the LCU provides additional capability in that it provides a unique platform capable of serving as a long-term picket vessel, radio relay, fire support vessel, and riverine support craft.

A sample landing plan is shown in Appendix C. It envisions the LPD coming within ten nautical miles of shore to launch the LCU. The LSD and LHD would launch their aircraft, AAVs, and LCACs from twenty-five miles off shore. The two hundred plus vehicles of the MEU fighting column land in five surface waves using a mixture of AAV self-deployment, LCAC, and LCU delivery. MV-22 and CH-53E aircraft shuttle ashore ten times in order to deliver the rest of the landing force vehicles. Together the surface and aerial delivery assets take approximately twelve hours to land the landing

force. Decreasing the ARG's distance off shore from twenty-five to twelve miles cuts the debarkation time to nine hours. Bringing the ships to within three miles of the beach decreases offload time to about six hours.

The intensity of resupply required by forces ashore drives the number and duration of air sorties required throughout an OMFTS campaign. This factor also influences the distance at which the fleet may remain offshore in order to sustain the air effort required. Lieutenant Mark Beddoes, USN, conducted research on the logistic sustainability of OMFTS operations based primarily on MV-22 and CH-53E sustainment. Modeling much smaller MEU landing forces than outlined here, he calculated that up to thirty Osprey sorties per day would be required to sustain the force, and concluded that adequate supply throughput would become problematic at OMFTS ranges for an operation of several weeks duration. The difference in the scenarios Beddoes analyzed and the model proposed in this study is that the fighting columns are more self-sufficient in class I, III, and V. This organic logistic capacity greatly diminishes the strain placed on the ACE to support OMFTS operations. A corollary benefit of the decreased aviation support for logistic purposes is that the fleet can remain further offshore and still generate the required sortie rate for longer periods.¹⁶⁴

Conclusion. The MEU fighting column represents a balanced combined arms team with significant combat, combat support, and combat service support elements. Each of the columns' two task forces is organized and equipped to maneuver, fight, and sustain itself independently when necessary. Of course the MEU fighting column is not strong

¹⁶⁴ Lieutenant Mark W Beddoes, USN, "Logistical Implications of Operational Maneuver From the Sea" (MS Thesis, Naval Postgraduate School, 1997).

enough by itself to engage in sustained combat against division size conventional opponents. It can, however, slip ashore at night, move several hundred miles inland, sustain itself by mobile CSSDs and aerial resupply, and put a fully mobile reinforced infantry battalion on an objective. The MEU's organic combat power, when augmented by joint air assets, long range NSFS, and allied forces already on the ground may well be sufficient to defeat Third World adversaries of division strength, just as 20 Brigade and UNITA combined to wreck FAPLA's four brigade offensive in 1987. The next chapter will examine the similar characteristics but expanded capabilities of a MEB-size fighting column.

Chapter 8

The MEB Fighting Column

*The amphibious landing is the most powerful tool we have.*¹⁶⁵

— Douglas MacArthur
23 August 1950

The Marine Expeditionary Brigade is a fifteen thousand man strong MAGTF based around a Regimental Landing Team, a Marine Air Group, and a Brigade Service Support Group. Using fighting column concepts, a MEB is capable of projecting significantly stronger combat power than a MEU to the same three hundred-mile radius of action. The MEB may deploy independently or it may augment a forward-deployed MEU. The brigade's organic supplies sustain combat operations for at least thirty days. Given its enhanced mobility, a MEB fighting column is not only a powerful tool, but also one with significant operational reach once ashore.

Command and control. Like the MEU commander, the MEB commander should deploy ashore to lead the assault force. This not only provides him the advantages of on scene operational control, but also provides an alternate CP to assist the RLT staff in

¹⁶⁵ Heintz, 12.

directing the tactical fight when necessary.¹⁶⁶ Each of the two GCE columns will be under the immediate tactical control of its own infantry battalion headquarters. The brigade service support group (BSSG) commander is ashore to facilitate the prompt support of the log train, while his XO remains aboard ship to coordinate subsequent aerial resupply efforts. The ACE commander stays at sea with the preponderance of his aircraft.

The MEB XO should also remain at sea to provide the critical link between the MEB commander and the Navy amphibious group commander. The MEB C2 element aboard ship works with the Navy command element to provide HHQ updated information on operations ashore. The MEB command element frees the regimental CP from dealing with HHQ and enables it to concentrate primarily on the tactical fight. Much of the C4I data processing capacity and intelligence throughput must be transferred electronically from the ships to the CP ashore.

If this electronic link is established and reliable, the MEB C2 node ashore can be as small and mobile as its MEU counterpart. Several vehicles should be sufficient to transport the MEB command post. The staff need only comprise elements of the G2 and G3 shop with appropriate communications support; most admin, intelligence, and logistics planners can operate more effectively aboard ship. The 20 Brigade's tactical CP operated out of one command configured Buffel APC.¹⁶⁷ Rommel's CP to control the Afrika Corps was similarly small: its primary staff comprised one Brigadier General, one Lieutenant Colonel, and three Majors. Similarly sized U.S. Army forces would entail

¹⁶⁶ Both the BLT and the RLT have the structure to form alternate CPs, but both would be better served leaving those backup staffs aboard ship to coordinate with joint and other naval supporting elements. Replacements for battle casualties could be flown in as required. The watchwords for staffs and C2 ashore, like everything else in the fighting column, are flexibility and frugality.

eight general officers and an immediate staff of roughly one hundred officers. The German 15th Panzer Division, with a 14,000 man, 140 tank table of organization, rated two Majors, three Captains, and four Lieutenants.¹⁶⁸ There is no credible reason for a MEB fighting column CP to be any larger. Moreover, five of these nine positions on a Marine staff (representing personnel and backup operations, intelligence, and logistics functions) should stay aboard ship under the fighting column system.

Task organization. Figure 5 depicts the units and major equipment associated with each of the four components of the amphibious MEB. These elements provide sufficient combat power to furnish three composite BLTs: two surface strike columns and one vertical assault unit. The MEB command element provides overarching C2 and

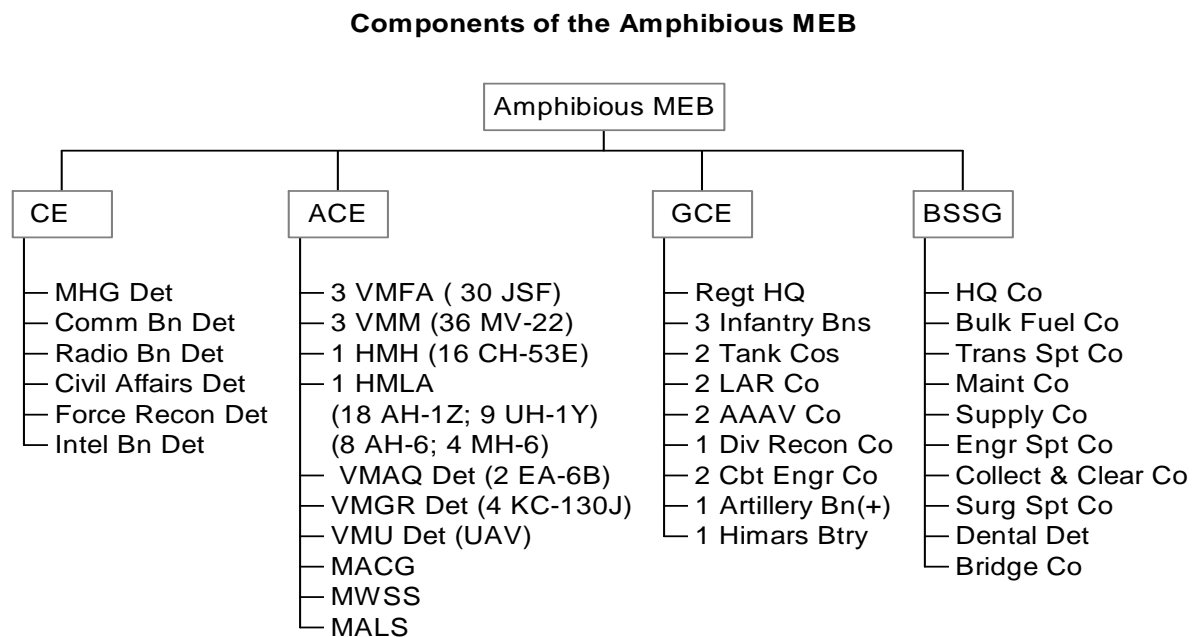


Figure 5

¹⁶⁷ Heitman, *War in Angola*, 106; Bridgland, 179. The 32 Battalion commander also operated out of a single vehicle, either a Buffel or a Ratel-90 with appropriate communications gear. Bridgland, 39, 65.

significant intelligence support, including civil affairs, radio battalion, intelligence battalion, and force reconnaissance detachments.

The composite Marine Air Group (MAG) provides the six functions of Marine expeditionary air operations: offensive air warfare, anti-air warfare, assault support, air reconnaissance, electronic warfare, and control of aircraft and missiles. MAG aircraft will operate off carrier and amphibious platforms; Huey and Cobras will rearm and refuel at FOBs ashore when the mobile group's distance from the sea exceeds their combat range. From these forward bases RW CAS can conduct shaping operations, screening missions, and armed reconnaissance for the fighting columns. Little Birds provide immediate CAS to the battle groups with their miniguns, rockets, and Hellfire missiles. Joint Strike Fighter squadrons will operate off of Navy carriers or out of friendly airfields ashore. As with the MEU, CH-53E and MV-22 aircraft will provide assault support and move food, fuel, and ammo to the surface columns as required.

The GCE's two BLT-strength columns may be organized as shown in Table 7. The model MEB's GCE is intentionally heavier than normal in light armor, tanks, and artillery. All the elements of the two surface battalions are completely mobile. A division reconnaissance platoon, on light strike vehicles and motorcycles, conducts distant reconnaissance along the routes of each battalion task force or screens their flanks. Two LAR companies provide a security element with sufficient combat power to develop the situation for each column's main body. Both mechanized task forces feature two AAV-borne reinforced rifle companies, one tank company, a platoon of combat engineers, and a CAAT team. An additional company of combat engineers provides general support

¹⁶⁸ Stolfi, *German Battle Style in Ultra Mobile, High Intensity War: North African Desert 1941-42*, 86-98.

mobility, countermobility, and breaching capability to the entire RLT. Each infantry battalion provides one reinforced motorized rifle company to provide security to the two mobile CSSDs. A reinforced artillery battalion comprised of four lightweight howitzer batteries provides fire support. In addition, a battery of six HIMARS rocket launchers furnishes general support fires and an organic counterfire capability.

Table 7: MEB GCE Fighting Columns

Column # 1		Column # 2	
Units	Vehicles	Units	Vehicles
Div Recon Plt	4 LSV; 4 Cycles	Div Recon Plt	4 LSV; 4 Cycles
LAR Co	24 LAVs: 1 C2 14 25mm 4 TOW 2 Mortar 2 Log 1 Recovery	LAR Co	24 LAVs: 1 C2 14 25mm 4 TOW 2 Mortar 2 Log 1 Recovery
Mech Bn Task Force	33 AAVs: 24 P (2 x rifle co) 4 Mortar Plt 3 Engr Plt 2 C2 14 M1A1s 2 AVLB	Mech Bn Task Force	33 AAVs: 24 P (2 x rifle co) 4 Mortar Plt 3 Engr Plt 2 C2 14 M1A1s 2 AVLB
CAAT Team	15 HMMWVs: 8 TOW 6 HMG 1 FO	CAAT Team	15 HMMWVs: 8 TOW 6 HMG 1 FO
Arty Bn (-) REIN	12 LW 155mm 30 MTRVs 30 HMMWVs 1 Q-36; 3 H2O Bulls	Arty Bn (-) REIN	12 LW 155mm 30 MTRVs 30 HMMWVs 1 Q-36; 3 H2O Bulls
G/S Cbt Engr	4 M9 ACE 10 MTRVs 10 HMMWVs 12 M159 line charges 2 H2O Bulls	MRL Btry	6 HIMARs 6 ammo LVSS 9 HMMWVs 2 Btry C2; 2 HMG 5 Sec: Rifle Plt (+)
RLT CP	4 AAVs: 2 AAACV 2 AAAPV 1 MEWSS Sec: Rifle Plt (+)	MEB CP	6 LAVs: 2 C2 2 LAV-25 1 Log 1 MEWSS Sec: Prov. Rifle Sqd
Total Vehicles:	185	Total Vehicles:	183

Whereas the MEU fighting column maintained one company as an air assault force and tactical reserve, the MEB designates an entire battalion as an air assault reserve. This force possesses the command structure to operate independently from the rest of the brigade when required and to conduct multiple missions simultaneously. It can exploit success by blocking enemy retreat routes, seize the initiative by establishing bridgeheads in the initial amphibious assault and on subsequent river crossings, or assist the forward passage of the mobile battle groups by picketing key terrain along the route of march. The MV-22 battalion is also capable of providing FARP security, TRAP services, mass casualty recovery, deception operations, or raids in support of the main effort. One of the BLT's rifle companies is provided with twenty-five LSVs to give it additional mobility once it lands. Elements of the weapons company, including HMGs, TOWs and mortars, could supplement this rifle company's organic firepower. The six-gun RCT heavy mortar battery provides fire support to augment the heliborne BLT's organic light and medium mortars.

Logistics. The viability of fighting columns has always been determined by their logistic sustainability. In the days when the columns were moved by horse and wagon, this phenomenon was known as the "feed to speed" ratio. In simple terms, the formation could only move a certain distance before the men and animals would consume their mobile food and water reserves. The larger the unit, the larger the mobile supply depot had to be. But the bigger log train added more men and animals to the total and therefore further drained the supply reserve. In short, the bigger the unit grew, the less operationally mobile it became due to logistic constraints. For every campaign, there is a

tradeoff between size and mobility: the force must possess enough combat power to accomplish its mission without becoming so large that its supply trains deny it operational range.¹⁶⁹

The same concept applies to modern fighting columns fueled by diesel rather than fodder. While the additional combat power of the MEB makes it more useful across the spectrum of conflict, its increased size makes its logistic support correspondingly more difficult. Nonetheless, the same general concepts of supply used to support the MEU may be applied to the MEB. Each fighting column log train must carry enough gas for one complete refueling and a one-day basic allowance of ammunition. The remainder of the force's needs must be supplied by air. Table 8 illustrates the components of such a

Table 8: MEB Fighting Column Mobile CSSDs

Column # 1		Column # 2	
CSSD Units	Vehicles	CSSD Units	Vehicles
C2	4 MRC HMMWVs	C2	4 MRC HMMWVs
Security (Rifle Co-)	20 HMMWVs	Security (Rifle Co-)	20 HMMWVs
	4 MTRV gun trucks		4 MTRV gun trucks
Amphib Trucks	8 LARC (ferry HMMWVs)	Amphib Trucks	8 LARC (ferry HMMWVs)
Raft	16 MABs	Raft	16 MABs
Class I	2 LVS (Chow)	Class I	2 LVS (Chow)
	2 LVS (H2O)		2 LVS (H2O)
Class V	13 LVS (Ammo)	Class V	13 LVS (Ammo)
Maintenance	2 MTRV; 2 HMMWV 1 H2O Bull	Maintenance	2 MTRV; 2 HMMWV 1 H2O Bull
Medical	4 ambulance; 4 MTRV	Medical	4 ambulance; 4 MTRV
Class III	15 LVS refuelers	Class III	15 LVS refuelers
Recovery	2 AA AVR, 2 M88, 2 LVS wreckers	Recovery	2 AA AVR, 2 M88, 2 LVS wreckers
RW Det	4 AH-6 MTRV	RW Det	4 AH-6 MTRV
	2 MH-6 MTRV		2 MH-6 MTRV
	2 Ammo LVS		2 Ammo LVS
	2 MTRV (Crew)		2 MTRV (Crew)
	1 H2O Bull		1 H2O Bull
	2 LST HMMWV		2 LST HMMWV
Total Vehicles:	114	Total Vehicles:	114

¹⁶⁹ The classic discussion of the "feed to speed" ratio is contained in Donald W. Engels, *Alexander the Great and the Logistics of the Macedonian Army* (Berkeley: University of California Press, 1978). The basic principles that constrained the operational movements of the largely foot-mobile Greeks still apply to motorized and mechanized armies.

mobile CSSD. It is divided to provide similar support to each of the two BLT surface groups operating on independent axes of advance. It can also be further subdivided to support four maneuver axes of advance when required.

The MEB fighting column model totals nearly six hundred vehicles. When broken down into two battle groups, this is approximately sixty percent of the number of vehicles which experienced armor commanders believe can be handled effectively by one tactical headquarters.¹⁷⁰ One refueling of this fleet of vehicles would require thirty LVS SIXCON 2,700-gallon fuel trucks. The relative vulnerability of these vehicles and the CH-53E refuelers implies that additional means of hauling fuel must be on hand as a backup. Large fuel bladders such as the five-hundred gallon GTA Mini Tank or Super Drum that can be air delivered or carried/towed by MTRV trucks should be procured. In a pinch every vehicle and aircraft can then be employed as a refueler of some capacity. This is the kind of operational flexibility that both the Russian and American armor forces adopted out of necessity in WWII. Air delivered fuel can come via KC-130, CH-53E, and MV-22. Fourteen Hercules airplanes carry enough fuel to replenish all 572 vehicles. Thirty-four CH-53E or forty-one MV-22 sorties would be required to gas the entire column. A combination of sixteen Sea Stallion and twenty-two Osprey sorties would replenish the sample MEB fighting column once. This amount of fuel provides the battle groups three hundred miles of total range and a 150-mile combat range for planning purposes. This aerial refueling effort would be required only three times during a thirty-day mission of 1,500-miles total length. In addition to its one organic refuel capacity, the logistic train also carries sufficient fuel to fly the columns' twelve Little

¹⁷⁰ Simpkin, *Race to the Swift*, 45.

Birds for two 2-hour sorties per day for three days. Every third day two CH-53Es would have to replenish the Little Birds' refuelers with 4,680 gallons of aviation gasoline.

Ammunition usage is more difficult to calculate than fuel consumption. The goal is to carry a one-day basic allowance of ammo in the organic combat trains. Artillery and mortar shells, tank rounds, antitank rockets, and 25/30mm rounds consume the lion's share of the GCE's ammunition loads: they are the most difficult DODICs to transport in terms of both weight and cube. A one-day allowance of the ammunition required by the heavy weapons of the two surface BLTs totals approximately 267 tons. More than half of this total is artillery ammunition for the reinforced artillery battalion. For most of these DODICs one basic allowance equals somewhere between three and thirty days of supply at the projected assault rate. Since the assault rates bare little resemblance to historical usage data, it is more reasonable to plan resupply requirements in terms of the basic allowance. Once half the fighting columns' five hundred plus tons of organic ammunition is used, it would take fifty-four MV-22 sorties to replace the depleted basic allowance.

The MEB fighting column is heavy in firepower but relatively light in terms of manpower. Only 3,100 Marines are required on the ground to fight and sustain the columns' two mobile battle groups. This figure reflects ninety-percent strength across the existing or projected tables of organization. It is, however, only about seventy-five percent of the total personnel normally taken ashore for sustained operations by GCEs of equivalent strength. The difference is the large tooth-to-tail ratio made possible by smaller staffs and much of the housekeeping and logistics support structure operating from the sea base. The 3,100 Marines require 139,500 MREs for fifteen days. Each of

the column's trucks carries twelve MRE cases. The other 43.6 tons of Class I is carried in four MK-48/14 LVS trucks in the mobile CSSDs. The rest of the food required for a thirty-day operation would necessitate twenty-one MV-22 sorties. The mobile CSSDs also contain four LVS water SIXCONs carrying 10,800 gallons of water. This reservoir, coupled with twelve 400-gallon water bulls and twenty gallons per vehicle, equals enough water to provide the entire landing force two gallons per man per day for four days. If water cannot be obtained and purified in the operational area, then five MV-22 sorties per day would be required to sustain the force.

A well-developed maintenance capability is necessary to support the number of vehicles ashore in a MEB fighting column. Second echelon support should be ashore, while higher levels remain at sea. Contact teams fly in while disabled vehicles are lifted out by CH-53E or fixed wing transport aircraft when required. Each column contains wrecker support to recover mobility kills from the battlefield to rear areas where mechanics can repair the vehicles.

Medical support for fighting columns is more robust than that available to helicopter-borne forces. In addition to unit corpsmen and battalion aid stations, each battle group boasts two mobile medical units with advanced lifesaving trauma capabilities and ambulance support to move casualties from company collection stations to the surgeons. The mobile CSSD medical stations consist of two surgical platoons and two shock trauma platoons. Air medevacs to the hospitals aboard ship complete the organic casualty flow route. The ready presence of more robust trauma capability within the columns significantly enhances wounded Marines' chances of survival.

Rivers make natural defensive barriers and MAGTF fighting columns must be able to breach them "in stride" in order to sustain superior tempo vis-à-vis the enemy. Therefore each column in the MEB formation must possess the ability to cross water obstacles on its own. This could mean four separate crossing sites operational at the same time. If sub-columns are on the same route, then two different rivers could be crossed simultaneously. The goal, like that of the initial amphibious landing, should be to transit the danger zone with the whole force in less than one cycle of darkness. It would take the MEB fighting column approximately six hours to raft all 596 vehicles across a four hundred meter wide river using its LARCs and MABs.

Security considerations are just as vital for the MEB log trains as they are for those of the MEU. It is shortsighted and ultimately counterproductive to assume that the Brigade Service Support Group (BSSG) can fully protect itself. In recognition of the vital significance of the supply trains, combat power must be dedicated to its protection from the beginning. Even if the MEB fighting column is deployed along four separate avenues of approach, the distance from the head of one of the columns to its tail, assuming fifty meter intervals between vehicles, is more than four miles. At least one reinforced company of infantry should be attached to each of the two log trains to supplement the BSSG's organic security forces. In addition, gun trucks, Little Birds, and the columns' indirect fire assets are available to augment the BSSG's organic security measures.

Amphibious Considerations. The Navy is scheduled to maintain only thirty-six amphibious ships for the foreseeable future. This equates to 2.5 MEBs worth of lift.

Given the relative scarcity of shipping, amphibious MEBs cannot be forward deployed on a routine basis. Instead, they will be formed and sent to crisis areas when required. For purposes of the illustrative model, a representative twelve ship amphibious group will be used. It contains three LHDs, one LHA, three LSD-41's, one LSD-49, and four LPD-17s. This mix of shipping provides sufficient vehicle stowage to carry the 596 vehicles of the MEB fighting column plus the fifty-two vehicles of the heliborne BLT. The embarkation footprint of these vehicles occupies less than seventy-five percent of the vehicle square footage available in the twelve ships. Unit cargo, quad cons, maintenance vans, and replacement vehicles may fill the remainder of the space.

The twelve ships carry thirty-one LCACs and four LCUs. The LCAC enables the Navy to stay somewhat further out to sea and away from coastal antiship cruise missiles or littoral minefields. The LCUs, despite the more restrictive landing beach parameters they demand, provide flexibility in the means to move heavy equipment and remain on station as relay sites, rescue craft, or floating supply depots in a riverine environment. The sample landing plan (see Appendix D) envisions the amphibious group remaining twenty-five miles off shore to launch AAVs and MV-22s; the LCUs are launched from twelve miles off shore.

The tactical requirement in the initial landing is for the MEB to have gained a secure foothold ashore in less than one cycle of darkness. The operating concepts associated with STOM envision the landing force moving inland towards its objectives as soon as appropriate combat power assembles ashore. Still it takes a significant amount of time to move a RLT-size force ashore, whether by surface or helicopter means. Using eight MV-22 and two CH-53E squadrons, planners envision moving a three thousand man

regimental landing team (RLT) to two landing zones (170 and 250 nautical miles away, respectively) in approximately five hours and twenty-five minutes.¹⁷¹ A typical MEB ACE, however, will embark only half that number of aircraft and consequently take roughly twice as long to move a landing force similar in size to the surface columns modeled in this chapter. In comparison, the MEB's assault landing plan requires five waves over two beaches and two HLZ sites and takes twelve hours to complete. Moving the ships in to twelve miles off shore cuts the landing time down to eight hours. The increased capacity of the LCU's successor, the LC-X, may also speed up the landing process, but the two critical factors remain distance off shore and number of landing craft available.

The daily tonnage of class III (fuel) and V (ammunition) required by the landing force influences the distance at which the fleet can remain offshore for purposes of aerial resupply. In the fighting column model, this constraint is lessened because the landing force carries such a robust CSSE. If the total aerial resupply tonnage required over a postulated thirty day operation were concentrated in time at a sortie generation rate of two per aircraft per day, it would take the ACE only five days to move the MEB's projected Class I, III, and V requirements. Factoring expected loss ratios into the equation does not exceed the tonnage or sortie rates that the MV-22s available can manage. The bigger challenge is supporting the force when it is more than two hundred miles inland, as this requires aerial refueling of the Ospreys and Sea Stallions or use of internal fuel tanks that curtails their internal cargo carrying capacity.

¹⁷¹ MCCDC Draft MV-22 Concept of Employment Document, 10-1 to 11-2.

Conclusion. The proposed MEB fighting column features two BLT-size battle groups. Each contains a small C2 node, a company size security force, a mechanized team, robust fire support, and a mobile CSSD. Organic fires are sufficient to support the maneuver elements, weight the main effort, and wage the counterfire fight. The CSSDs carry sufficient Class I, III, and V to last for several weeks at a time. MEB reconnaissance assets provide hydrographic, close, distant, and deep coverage. Three squadrons of attack aircraft provide CAS and interdiction; four squadrons of assault support aircraft resupply the mobile CSSDs as required. An air assault battalion, as MEB reserve, is available to reinforce the surface columns, seize key terrain ahead of the columns, or provide security for ACE FARP sites. Naval support is sufficient to land the force quickly across multiple beaches and landing zones.

A MEB with these capabilities could serve in a variety of roles at the operational level. Potential missions might include serving as:

- an enabling force to seize an airhead or port in support of follow on operations
- a cover force such as 20 Brigade provided in Phase I of Operation *Modular*
- a raid force such as the SADF mechanized columns in Operation *Askari*
- an exploitation force similar to the Japanese landing forces that conducted multiple envelopments versus the retreating British in Malaya in 1941
- a "fire brigade" reinforcing an ally's defense such as 5th Marines did in the Pusan Perimeter in 1950
- an assault force to facilitate an operational turning movement similar to that conducted by 1st 5th, and 7th Marines in the 1950 Inchon/Seoul campaign
- a NEO force akin to the combined relief expedition that moved one hundred miles inland to rescue Westerners in the besieged Peking legations during the 1900 Boxer Rebellion
- a humanitarian assistance force used to provide disaster relief similar to 4th MEB's Operation *Sea Angel* in Bangladesh in 1991
- a security force such as 22 MEU during Operation *Provide Comfort* in northern Iraq
- a foreign internal defense force conducting counterinsurgency operations such as those conducted by the French *Group Mobiles* in Vietnam or
- a flexible deterrent option force deployed to convince potential aggressors not to initiate hostilities with allies such as Kuwait

Most importantly, an OMFTS capable amphibious MEB can perform such missions three hundred miles inland. This is a quantum leap over current amphibious capability and a very useful warfighting capability for the CINCs. The final chapter will summarize the changes required to make this kind of STOM capability a reality.

Chapter 9

Building an OMFTS Capability

Prejudice against innovation is a typical characteristic of an Officer Corps which has grown up in a well-tried and proven system.¹⁷²

— Field Marshal Erwin Rommel

The first step in creating an OMFTS/STOM force is to recognize that some of the fundamental tenets of the concept are potentially flawed. Emphasizing sea-based C2, fire support, and logistics increases the GCE's mobility while depriving it of organic strength. This tradeoff puts the landing force at greater risk if links to the sea base are broken even temporarily due to weather, enemy action, or communications failure. An alternative approach is to bring more C2, fires, and sustainment ashore and make these combat multipliers as mobile as their maneuver counterparts to augment the power of the MAGTF. Combat power can not be generated from the ether. Infestation teams and air assault forces can be projected and supported 175 miles inland, but their ability to successfully engage mobile combined arms teams is severely constrained unless they are defending very restrictive terrain and maintain constant access to decisive air and naval surface fires. The fighting column provides a way for MEU and MEB size units to project more combat power at operationally significant distances. Realizing this new capability requires additions to MAGTF doctrine, organization, equipment, and training.

¹⁷² Heintz, 190.

Doctrine. Marines do not customarily think of fighting in highly mobile combined arms task forces three hundred miles from the beach. The OMFTS/STOM concept papers mention both surface and vertical maneuver forces, but the emphasis is clearly on the "leaner, lighter, more effective" nature of the landing force due to its miniscule combat support and service support tail.¹⁷³ This is a dubious way to solve the problem of putting combat power on an objective 175 miles inland. Rather than discerning the capabilities required to win the fight and then deriving ways to move the necessary units and equipment, the existing STOM concept suggests moving the forces that can be supported and then trusting developing technology to enable that smaller force to win.

OMFTS/STOM concepts blend nicely with Joint Vision 2010's tenets of information superiority, dominant maneuver, and precision logistics, but these notions are platitudes in search of supporting doctrine, organization, equipment, and training. Certainly no one opposes in principle such worthy goals. The Army's vision of a non-fossil fuel twenty ton wheeled vehicle with the lethality and survivability of an Abrams tank, for instance, is enticing. Until such advanced weapons actually come to fruition, however, the Corps would be better served figuring out more efficient ways to move the fuel and ammunition required to gas and arm its existing tanks and artillery.

If doctrine details how a service expects to fight, then clearly the first step is to broaden the OMFTS/STOM concept to incorporate a different, perhaps somewhat more traditional, way of accomplishing deep maneuver from the sea. Fighting columns are one way to achieve that goal. Certainly they are not the only solution to the challenge.

¹⁷³ Marine Corps Concepts Development Command Concepts Division, "Ship to Objective Maneuver," *United States Marine Corps Warfighting Concepts for the 21st Century* (Quantico, Va: Marine Corps Combat Development Command, 1997), II-14.

Infestation or air assault may be preferable in a given set of conditions. Some combination of all three techniques may be desirable as well; the tactics are not mutually exclusive.

The MEU and MEB OMFTS formations outlined in the preceding chapters rely on air-delivered forces to protect FARP operations, establish bridgeheads, control chokepoints, and exploit success. The ability to use air assault forces selectively maximizes their combat potential, decreases the number of vehicles and associated logistics required ashore, and complements the more robust strength of the fighting columns. The synergistic effect of the combination is the key to success. While the bulk of the combat power is carried in the surface battle groups, the range and speed of the air delivered company and battalion enable the MEU and MEB to pose a more credible multi-dimensional threat.

Fighting column doctrine should examine the operational reach, plausible METL tasks, and logistic constraints associated with each MAGTF echelon. For combat operations, Marines must share a common vision of what mobile battle groups can achieve in the forced-entry phase, the close combat phase, the exploitation phase, and the post-conflict stability phase. Similarly, Marines must assess the fighting column's utility in operations other than war to include counterinsurgency, humanitarian assistance, drug interdiction, noncombatant evacuation operations, and peacekeeping operations. Fighting columns give the Corps a vastly expanded operational reach and thus much greater potential utility for the theater CINCs. Doctrine is the engine that will expand the operational outlook of the commanders who will wield this enhanced capability.

Organization. Every fighting unit possesses some ratio of tooth to tail that is most efficient in optimizing its combat power over a given range. The key to the potential of fighting columns lies in determining what that ratio is. Available amphibious lift largely defines the parameters of just how many vehicles of each type can be deployed. Shipping also determines how many landing craft are available to put the force ashore and how many aircraft are available to sustain it once it drives far inland. The ingredients necessary to give the landing force both mobility and lethality are not new; what is new for the Corps is the provision of a larger, yet mobile CSSE to sustain the force so far inland and reliance on air to replenish the moving supply depots. Further modeling and operational experience will refine the initial logistic trains to determine the optimum size and constitution of CSSE assets. The MEU and MEB columns outlined here are merely a proposal to initiate the debate.¹⁷⁴

Regardless of what version proves to be most effective, it is certain that the columns must be logistically frugal. The planning factors for consumption of water, for example, may have to be curtailed or self-imposed supply prolificacy will quickly exceed the carrying capacity of both vehicles and aircraft. In the case of water, landing forces must rely on locally available supplies whenever possible to decrease the strain on aerial resupply efforts. The injunction of Field Marshal Rommel to "watch closely the

¹⁷⁴ By way of comparison, the mobile CSSE associated with a 15,000 man German armor division in North Africa carried four hundred tons of supplies; the 3,000 man MEB fighting column sketched in chapter 8 carries 1,340 tons of supplies. Stolfi, *German Battle Style in Ultra Mobile, High Intensity War: North African Desert 1941-42*, 78-80. Only thorough testing will determine the most efficient tooth-to-tail ratio. Too many vehicles can be as dangerous as too few. Slim discovered this in Burma: "As we removed vehicles from units and formations which joined us on European establishments, they found to their surprise that they could move farther and faster without them. The fewer vehicles on the roads or tracks, the quicker they traveled....Unless they are constantly watched and ruthlessly cut down, vehicles and staffs will multiply until they bog down movement." Slim, 449.

quartermasters" is particularly apt in an inherently tenuous OMFTS logistic environment.¹⁷⁵

The MEU and MEB task organizations outlined previously are not prescriptive in nature. The intent is simply to sketch representative MAGTFs with the means to implement STOM operations. The composition of the security forces, main bodies, and CSSDs could be tailored in a variety of ways to support a particular mission. It is, however, naïve to dismiss the challenges inherent in creating an OMFTS force by suggesting that existing formations can accomplish such missions when required by a simple reorganization of units. No Marine unit has ever projected a full MEU- or MEB-size combined arms capability several hundred miles inland. Planners wrestling with the prospect were forced to rely on commercial assistance during Operation *Provide Comfort* in northern Turkey and Operation *Joint Guardian* in Kosovo.¹⁷⁶ Clearly GCE and CSSE units intended to generate and sustain significant operational mobility must be carefully tailored prior to deployment.

Training. The concept of the fighting column is an alien one to most Marines; they will accept it and become enthusiastic about its potential only after thorough field-testing. Fighting columns lend themselves to virtually every existing exercise and evaluation. Special operations certification exercises (SOCEXs) , emergency deployment readiness

¹⁷⁵ "As the commander usually pays great attention to his quartermaster and allows the latter's estimate of the supply possibilities to determine his strategic plan, it has become the habit for quartermaster staffs to complain at every difficulty, instead of getting on with the job.... The best thing is for the commander himself to have a clear picture of the real potentialities of his supply organization and base all his demands on his own estimate. This will force the supply staffs to...produce many times what they would have done left to themselves." B.H. Liddell Hart,, ed., *The Rommel Papers* (New York: Da Capo Press, Inc., 1953), 96-97.

¹⁷⁶ USMC, Marine Corps Lessons Learned System (MCCLS) #80342-97837; Maj Edward W. Bligh, USMC, "Logistics," *Marine Corps Gazette*, November 1999, 62.

exercises (EDREs), combined arms exercises (CAXs), and joint/combined exercises can all employ mobile battle groups. The biggest challenge is to find enough land to properly stress the scope and scale of the formations. Landing forces could land, for instance, at Savannah and fight at Fort Benning, or Cape Canaveral and Eglin AFB, or Mobile and Fort Polk, or Camp Lejeune and Fort Picket, or Camp Pendleton and Fort Irwin. The operations required would resemble the 1941 Louisiana, and Carolina maneuvers more than any existing exercise.

These vast Army force-on-force exercises took place just prior to America's entry into WWII. They covered four hundred square miles in the Carolinas and more than four times that amount of ground in Louisiana. Some 750,000 men, representing three armies, twenty-seven divisions, and nine air groups participated in the maneuvers. Officers such as George Patton, Omar Bradley, and Dwight Eisenhower gained practical experience in the art of operational level maneuver against equally talented and well-equipped opponents. The exercises also served as a proving ground for doctrine development.¹⁷⁷ This kind of large-scale exercise is exactly the type of testing ground needed to refine the application of mobile battle group tactics. Existing training centers provide enough ground to exercise brigade size fighting columns, but the long tactical approach march must be added to accurately simulate the challenges of STOM operations.

The concepts undergirding fighting columns are in consonance with the tenets of maneuver warfare. Both officers and men must demonstrate the flexibility, initiative, and daring stressed in Marine Corps Doctrinal Publication 1. Small staffs will devise and execute hasty plans to seize the initiative and interrupt the enemy's OODA loop.

¹⁷⁷ Christopher R. Gabel, *The U.S. Army GHQ Maneuvers of 1941* (Washington: U.S. Army Center of Military History, 1991), 185-194.

Carefully refined battlefield synchronization will be eschewed for the greater promise of flexible combined arms cooperation. Fast paced mobile operations place a premium on the basics of soldiering: fitness, weapons proficiency, and small unit battle drills.

The normal peacetime constraints of maintenance woes, limited time, and restricted maneuver space make fighting column operations particularly difficult to exercise. Much of the mechanics can be practiced in tactical exercises without troops (TEWTs), command post exercises (CPXs), and simulations. But the friction inherent in real operations, particularly the maintenance challenges of moving large numbers of vehicles long distances, must be experienced to be appreciated. More importantly, these very real difficulties must be overcome in training to validate the concept's utility in the minds of both the Marines who will execute it and the civilian and military leaders who will order it.

Equipment. Task equipping an OMFTS force is no less important than properly task organizing it. Table 9 highlights equipment shortfalls based on the representative

Table 9: Equipment Shortfalls

Equipment	Comment
HMMWVs and MTRVs	Available in the MEF, but must be reallocated to support surface maneuver elements lacking organic mobility.
Mobile Assault Bridges/Ferries	More efficient than existing ribbon bridges.
LARCs	Useful for ferrying HMMWVs.
Surgical truck	Mobile to move with the CSSDs.
120mm mortar	Simple, effective, light system. Manpower & expertise available; ammo costly but precision guided munition (PGM) capability make it worth pursuing.
HIMARs	MLRS on a truck; necessary for adequate artillery support. Army MLRS Memo Of Agreement (MOA) expired. Not programmed.
AH-6 / MH-6	Multiple applications in OMFTS & special operations.
Long Range RPV	Must have 350-mile radius; alternative is short-range system travelling with the columns. Complements more robust fire support capability.

MAGTFs proposed in this paper. The OMFTS/STOM concept is expected to become operationally feasible NLT 2014 with the full fielding of the AAV and the MV-22. The Osprey is definitely required to fully support the concept, because its extended range obviates the CH-46's need for multiple FARPS enroute to 175-mile deep targets

The AAV, though eagerly anticipated by Marine operating forces, is less critical to the success of the OMFTS concept. The high transit speed from ship to shore is a useful improvement, but the size of the engine required to lift the vehicle onto plane actually decreases the usable space inside the craft. This means the vehicles can carry less supplies and equipment than existing models. The expensive new AAV is a far superior APC than the renovated Bradley chassis AAV, but it has less flexibility to develop new versions such as mortar, assault gun, logistics, or EW variants due to its limited internal space.

While the Osprey and AAV will greatly enhance the capabilities of the force, there are other enhancements that must also be incorporated. It is highly probable that maneuver forces transiting several hundred miles to an inland objective will have to cross water obstacles enroute. Bridges that are undefended and heavy enough to support tanks may not be available. Rafting is therefore a key requirement for a maneuver force that does not have a fully amphibious vehicle fleet. Ribbon bridges are inadequate; a mechanized force with a significant logistics train requires a more efficient rafting system. Fielding upgraded MAB and MARC-V equivalents would be ideal, but the problem is not widely recognized and there are no existing or projected Marine Corps programs to remedy the rafting deficiency.

Mines are still a problem both at sea and ashore. OMFTS/STOM is untenable if naval vessels and landing craft cannot safely transit maritime avenues of approach. Similarly, ground vehicles need far more capable protection from mines; currently the SADF fields the world's most advanced fleet of mine protected vehicles. The South Africans learned in Angola and Namibia the human and material cost of neglecting this force protection measure. Enhanced mobile medical facilities are also needed to support deep maneuver operations.

Finally, general support artillery systems are required to provide maneuver forces with long range, high volume preassault and counterfire capabilities. The South African experience suggests the power of mobile artillery and rocket fires. Ground forces may be able to employ long range NSFS versus some targets, but the columns should be able to generate their own mass fires as well. Indirect fire and RW CAS generate much of the killing power of the mobile columns. In some scenarios the role of the infantry may simply be to provide close protection for these indirect fire weapons systems. assessment The improved firepower systems deserve a long range RPV to facilitate more efficient target acquisition and battle damage assessment processing. Better communication systems to provide reliable voice and digital message traffic while on the move are also needed to link fighting columns to their sea-based fires and logistics.

It is important to remember that while all of the equipment improvements outlined above would enhance the capability of a mobile battle group, only one is necessary to actually move existing MAGTFs the designated 175-mile distance to an operational target. The single deficiency is the lack of sufficient ground transport to lift the "turn-around" third of the GCE. Dedicating a MTRV or HMMWV truck detachment to this

purpose and clearing the embarkation space for it on amphibious shipping will solve the problem in a straightforward fashion. This simple fact suggests that the real OMFTS challenges reside in doctrine, organization, and training rather than equipment.

Conclusion. The vision of OMFTS implementation outlined in this paper is not new. There are many historical examples of battalion to army level motorized and mechanized battle groups making blitzkrieg-style attacks with mobile ground and aerial logistic resupply of their assault formations. The wrinkle OMFTS introduces is launching such a blitzkrieg from the sea. In the fighting column construct, once the MAGTF is ashore its method of operation resembles that employed by German panzer divisions in the 1941 encirclement campaigns or SADF battle groups ranging deep into Angola during the 1980s. It is facetious, however, to expect to generate strong combat power without equipping the landing force with the heavy equipment necessary to fight and win a mobile campaign. In this sense the OMFTS/STOM concept papers seemingly seeks something for nothing - a lethal yet light force with no significant logistic tail.

A more useful approach is to craft a heavier amphibious force with sufficient logistic support to enable it to attain operational depths. To that end, some of the ideas outlined in this paper constitute a fundamental challenge to traditional Marine operational style. These changes, grouped by warfighting function, are captured below.

C2: MEU & MEB commanders ashore
Small staffs in mobile CPs
Reliance on simpler oral and matrix frag orders

Intelligence: Long range RPV
Motorized division recon
Ability to share 'reach back' intell products between ship and shore

- Maneuver:** All column GCE units fully motorized or mechanized
Employment of tanks
Organic rafting capability
- Fires:** Employment of LW 155 (towed artillery can keep up)
Add towed 120mm mortar
Add HIMARs MRL
Add Little Bird attack helicopters
Use Cobras as a maneuver element
Develop a MV-22 gunship variant
- Logistics:** Employ mobile CSSDs carrying one Class V basic allowance
Carry one Class III refueling
Carry one to two weeks worth of Class I
Remainder Class I, III, & V delivered by air
Develop mobile surgical vehicles
- Protection:** Organic security for C2, critical fire support, & CSSDs
Employ gun trucks to augment mobile CSSD security
Develop mine-protected vehicles

All of these recommendations are designed to facilitate the implementation of OMFTS capabilities. None of the shifts constitute a significant change in the way Marines fight; instead they suggest new ways of augmenting firepower, reaching a distant fight and sustaining the battle once it occurs. The MEU and MEB models outlined here possess the capability to move and fight at more than twice the threshold distance called for in the OMFTS concept. This expanded operational reach underscores the logistic feasibility of STOM theory and the continued validity of the colonial era flying column construct. The crux of the argument is that larger, yet mobile surface logistic trains increase rather than decrease the power and flexibility of combat units. In essence, the Corps must return to its Small Wars roots and readopt proven fighting column concepts if Marines are to exploit the revolutionary warfighting potential inherent in OMFTS.

APPENDIX A SADF EQUIPMENTⁱ

Blesbok. A mine-protected SADF five-ton truck based on the Casspir hull; it carries twin 7.62 machine guns sited above the cab and operated remotely.

Bosbok. A two-seat piston engine SAAF spotter aircraft with a ceiling of 8,400 meters and a range of almost 650 miles. Carries smoke rockets to mark targets for other aircraft. Can take off and land in eighty-five and sixty-six meters, respectively.

Buccaneer S Mk 50. A low-level SAAF interdiction and maritime strike aircraft, the Buccaneer is old but still effective. Carries eight tons of ordnance, including bombs, rockets, and missiles, to an operational range of nearly six hundred miles.

Buffel. Standard SADF infantry APC, it has a V-shaped hull to deflect mine blast and troop harnesses to prevent its ten soldiers from being thrown out by the explosion. It weighs six tons and has a range of 620 miles.

C-130 B Hercules. One of two transport aircraft operated by the SAAF, the "Herc" carries 22.5 tons of payload to a range of 2,200 miles. It can carry either ninety troops or sixty-four paratroopers.

C-160 Transall. The other SAAF medium transport plane, the Transall has less leg and capacity than the Hercules, but it can off load cargo quicker on the ground due to its organic cargo-handling systems. Carries sixteen tons of supplies, ninety-three troops, or eighty-one paratroopers to a range of 1,147 miles.

Cactus SAM. Automatic, all-weather, low-level SADF SAM system with a max range of 8.5 kilometers and a ceiling of 4.5 kilometers. The thirty-three pound warhead is guided by an infra-red proximity fuse. The system requires a three-man crew while the truck weighs 14.5 tons, carries four missiles, and has a road range of 310 miles.

Casspir. A mine-protected APC developed for police South African COIN units. The vehicle carries one medium and one heavy machine gun (or 20mm cannon) and seats twelve soldiers. A V-shaped hull, small arms proof armor, and individual troop harnesses provide superior force protection in a LIC environment. The Casspir weighs almost eleven tons and has a range of 477 miles; it is noted for its excellent mechanical reliability and cross-country mobility.

G-5 155mm Gun-Howitzer. Fires a base-bleed projectile out to 39,000 meters. Its eight man crew can fire three rounds per minute for fifteen minutes and then two rounds a minute for another hour. A heavy piece, the fourteen ton SADF G-5 is 12,000 pounds heavier than the Marine M198 howitzer. It is towed by a ten-ton truck.

G-6 155mm Self-Propelled Gun-Howitzer. The same cannon as the G-5 mounted on a self-propelled six wheeled chassis. This version requires only a five man crew and carries forty-seven rounds aboard the mount. The early models used in *Modular* had a four round per minute rate of fire. The G-6 is a huge weapon: nine meters long, three meters wide, and three meters tall; it weighs thirty-seven tons. South Africa exports both the towed and self-propelled versions of this weapon.

M-5 120mm Mortar. This system weighs only 770 pounds, but fires a high explosive round with more punch than American 105mm howitzers. Maximum range is only 6,250 meters, but can fire further with rocket assisted projectiles. The M-5 is towed by a two-ton truck or carried in larger vehicles; its five-man crew can sustain five rounds a minute or surge ten rounds per minute. Used by 20 Brigade, but similar systems were employed by UNITA and FAPLA.

Mirage F-1AZ. The primary SAAF ground attack platform. It carries four to eight 250 or 500 pound bombs, unguided rockets, and AS-30 air-to-surface rockets.

Mirage F-1CZ. The primary fighter of the South African Air Force. Carries the V3B of infrared homing air-to-air missile, two 30mm cannon, and a variety of other weapons. The F-1CZ has a ceiling of 18.5 kilometers and a combat radius of approximately 500 miles depending on weapons load out.

Mirage III RZ and R2Z. The primary photo recce aircraft of the SAAF. They carry two 30mm cannons and two V3B missiles to protect themselves and a variety of cameras in the nose to capture tactical intelligence. Each variant has an operational range of nearly 750 miles.

Olifant. A reworked Centurion Mk V main battle tank. Features an upgraded fire control system and a 105mm gun with seventy-two rounds on board. A medium tank, the SADF Olifant weighs fifty-six tons and has an operational range of 155 miles.

Puma. The primary transport helicopter of the SAAF; ferries troops, supplies, casualties, and downed pilots. Carries sixteen men or 6,600 pounds of stores at 182 miles per hour to a range of 310 miles.

Ratel-20. A wheeled infantry fighting vehicle, the SADF Ratel mounts a 20mm cannon with 1200 rounds and two medium machine guns, one co-axially mounted and the other facing aft. The vehicle carries a three-man crew and a nine-man infantry squad. It weighs 18.5 tons and has a range of 620 miles.

Ratel-81. The indirect fire variant carries an 81mm mortar on a center turntable. The five-man crew can also employ the gun in a ground-mounted role. The vehicle carries 148 rounds of ammunition and two medium machine guns for self-protection.

Ratel-90. The assault gun variant sports a 90mm gun with seventy-two rounds. It weighs 1100 pounds more than the IFV, but otherwise its characteristics are similar.

Rinkhals. Standard SADF armored and mine-protected ambulance. Designed to carry both litter and ambulatory patients and provide first line medical treatment during ground evacuation. The vehicle has a range of 558 miles.

Samil-100 Kwevoel. A SADF mine-protected truck with a nine-ton cargo capacity. The vehicle itself weighs twenty-one tons and has a range of 620 miles.

Seeker. A SAAF RPV used in reconnaissance. Carries an eighty-eight pound camera and video relay system payload to a range of 125 miles from its base with a station time of two-and-a-half hours. The Seeker is 4.2 meters long and has a six-meter wing span.

Stinger. A man-portable SAM that the CIA provided to UNITA. Some of these found their way into the possession of the SADF. UNITA Stinger teams regularly deployed with elements of 20 Brigade to provide enhanced air defense coverage.

Twin 35mm AA Gun. A more capable system than the Ystervark, this SADF weapon incorporates a fifty kilometer range surveillance radar and a forty kilometer range tracking radar. The gun has a four kilometer vertical range, weighs 6.7 tons, and requires a three man crew. It is towed by a Samil-100 truck; the tracking radar is towed by a separate prime mover.

Valkyrie 127mm Multiple Rocket Launcher. Based on a BM-21 captured during Operation *Savannah*, this SADF weapon carries 24 rocket pods on a Unimog truck chassis. The rockets can be fired individually, as a variable sized group, or as a full salvo. Each 132-pound warhead contains 8,500 steel balls that cover more than a grid square. Minimum and maximum ranges, respectively, are seven and twenty-two kilometers. The system weighs only 6.5 tons and enjoyed excellent mobility in the Angolan bush.

Withings. A mine-protected recovery truck used by the SADF.

Ystervark AA Gun. This relatively unsophisticated SADF system features a single barrel 20mm anti-aircraft gun carried on the bed of a Samil-20 truck. The mine-protected vehicle weighs 7.7 tons, carries a crew of three men, and has a road range of 589 miles.

APPENDIX B FAPLA EQUIPMENTⁱⁱ

AGS-17 30mm Automatic Grenade Launcher. The first of its type, this Russian weapon system resembles the Marine MK-19. The AGS-17 was first encountered in Angola when South African forces recovered an intact sample from FAPLA on an external operation. It weighs 117 pounds in its tripod-mounted ground fire role, and fires sixty-five rounds per minute to an effective range of one thousand meters.

BM-10 82mm AT Gun. A Soviet-made, 200 pound, wheeled, recoilless AT gun normally carried in a truck. Fires an eight pound warhead five hundred meters and can penetrate almost eight inches of homogeneous steel. Rate of fire is six rounds per minute.

BM-14 140mm MRL. A sixteen pod MRL mounted on a trailer towed behind a light truck. The rockets, though larger in caliber than those of the BM-21, are only half the warhead weight and range out to only ten kilometers.

BM-21 122mm MRL. A forty pod, truck-borne MRL that fires a 172 pound rocket more than twenty kilometers. The 11.5 ton truck has a range of 372 miles. SADF MRLs were based on this Soviet system, which the South Africans captured from FAPLA in 1976.

BMP-1. A lightly armored, fourteen ton, amphibious infantry fighting vehicle. Armed with a 73mm main gun, a co-axial medium machine gun, and rail-launched AT missiles. The BMP-1 is designed to allow its six man infantry squad to fight from within the vehicle through gun ports arranged along the side of the vehicle. Operational range is 217 miles.

BRDM-2. A seven-ton, amphibious, lightly armored, wheeled scout vehicle with a 434 mile range. This vehicle is armed with heavy and light machine guns and has excellent mobility over rough ground.

BTR-60. A ten ton, wheeled, amphibious APC armed with two machine guns and capable of transporting eight soldiers a distance of 310 miles.

D-30 122mm Howitzer. Excellent direct support Soviet artillery piece. Weighs just three tons, so it is quick to emplace and displace; also has an unusual 360 degree traverse capability along with a HEAT round that makes it particularly useful in an antitank role. Fires a forty-eight pound projectile fifteen kilometers at a rate of six rounds per minute. (Same range and twice the rate of fire of the M198 firing white bag propellant.)

M-46 130mm Gun. A towed gun with long range and excellent accuracy. The Soviet M-46 weighs almost eight tons and fires a seventy-four pound projectile out to a range of 27,000 meters at a rate of six rounds per minute.

- Mi-24/25/35.** Variations of the basic Soviet attack helicopter, these aircraft can carry rockets, missiles, and bombs as well as eight combat troops. Also armed with a quadruple 12.7mm machine gun or twin 23mm cannon in a nose turret. Operational radius is approximately one hundred miles.
- Mi-8/17.** Soviet medium transport helicopters used by FAPLA. The Mi-8 has a three hundred mile radius and can ferry twenty-eight troops or 4.4 tons of cargo. These helicopters can also be fitted with rockets and AT missiles to serve in a fire support role.
- MiG-21 MF.** Used by the Angolan Air Force in the fighter-bomber role, this aircraft is armed with twin 23mm cannon and can carry missiles, bombs, and rockets to a radius of 682 miles.
- MiG-23.** The main fighter in the inventory of the Angolan Air Force. Carries a 23 mm cannon, six air-to-air missiles, and a variety of air-to-ground ordnance. Has an operational range of up to eight hundred miles depending on load out.
- PT-76.** An amphibious tank designed to support reconnaissance missions. Large and light to allow it to swim, the PT-76 weighs fourteen tons, carries a 76mm main gun, and takes a crew of three men. Operational range is approximately 160 miles.
- PTSM Ferry.** A simple, robust amphibious ferry based on the T-55 chassis. The self-propelled PTSM carries seventy troops, five tons of cargo on land or ten tons of supplies on water. Averages nine miles per hour in the water.
- SA-13 Gopher.** The Gopher is a product improvement to the SA-9, with superior tracking and homing capabilities. It is mounted on a PT-76 chassis and ranges eight kilometers out and four kilometers up.
- SA-14.** An improved version of the SA-7, with a maximum range of four kilometers.
- SA-2 Guideline.** A radio guided SAM with a forty-kilometer range and a twenty-four kilometer ceiling. Usually deployed in batteries of six launchers.
- SA-3 Goa.** A medium-altitude semi-active terminal homing SAM deployed on twin launcher trucks to protect rear areas. Has a range of twenty-nine kilometers and a ceiling of fifteen kilometers.
- SA-6 Gainful.** A ramjet powered, radar guided, terminal homing SAM with a twenty-four kilometer range and a twelve kilometer ceiling. The missile's 176 pound warhead is fired from a triple launcher mounted on a PT-76 chassis. The Straight Flush tracking and guidance radar is similarly mounted.
- SA-7 Strella.** A man-portable infra-red homing SAM with a 3.5 kilometer range and a ceiling of two kilometers. Used by FAPLA, SWAPO, UNITA, and the SADF.

SA-8 Gecko. A wheeled, amphibious system mounting four to six missiles, a acquisition radar, and a tracking radar on the same platform. The SA-8 can guide two missiles at the same time to targets at maximum ranges of fifteen kilometers and ceilings of twelve kilometers.

SA-9 Gaskin. Mounted on a BRDM-2 chassis, this infra-red homing SAM system carries four missiles and can range targets at maximum ranges of seven kilometers and altitudes of four kilometers. The Gaskin is intended to provide air defense to front line mechanized units.

Sagger. An early Soviet wire-guided AT missile similar to the Milan. Sagger has a range of two thousand meters and an ability to penetrate almost twenty inches of steel.

Su-22. A fighter-bomber armed with twin 30mm cannon, this plane can carry up to 4.4 tons of bombs and rockets out to a range of over four hundred miles.

T-54/T-55. A second generation (after the T-34) Soviet main battle tank. These vehicles weigh thirty-six tons, have a 100mm main gun, and have an operational range of 185 miles. Its armor is vulnerable to modern western AT weapons.

TMM Bridge. A truck-mounted scissors bridge normally employed in groups of four. Each bridge section spans a ten meter gap (for a total of forty meters per detachment), sustains traffic by sixty ton vehicles, and can be emplaced in about ten minutes. FAPLA employed these bridges to cross the Lomba River.

ZU-23-2 Twim 23mm AA Gun. Excellent Soviet manufactured AA gun in wide use with FAPLA, SWAPO, UNITA, and the SADF. Each barrel fires two hundred rounds per minute to a vertical range of 2,500 meters. The weapon has a 360-degree traverse and is deadly in a ground fire role as well.

ZU-23-4 Shilka. A quadruple 23mm gun mount, surveillance radar, and tracking radar mounted on a PT-76 chassis. Typically employed alongside SA-9 or SA-13 missile systems with forward units. Has a four man crew, 161 mile road range, and a firing rate of one thousand rounds per minute per gun. Also very dangerous in a ground fire role.

APPENDIX C

MEU Fighting Column Assault Landing Plan

The sample landing plan that follows is based on the following premises:

1. There are beaches sufficient to land the elements of each column's wave simultaneously. For simplicity, very large red and blue beaches are assumed, but a number of smaller colored beaches could be used. If insufficient landing sites were available to land all the craft in a near simultaneous manner, then timings would slow down while subsequent craft waited to transit the penetration point. Only five of the thirteen waves include surface landing craft. Column one lands over blue beach. Column two lands on red beach.
2. Similarly, red and blue HLZs are assumed to be large enough to land all the aircraft in a given wave simultaneously. The same "size vs turnaround timing" issue applies to the HLZs. The HLZs are not deep inland but rather close to the beach to facilitate a swift turnaround of assets. All thirteen waves include helicopter assets. Column one vehicles land on HLZ Blue. Column two assets use HLZ Red.
3. For planning purposes, the LHD and LSD were stationed twenty-five nm off shore. The LPD with the LCU(X) was stationed at twelve nautical miles off the beach.
4. The landing plan shows all assets (five LCACs, ten of twelve MV-22s, and three of four CH-53Es) operational for the entire offload. This is unlikely given maintenance or battle damage. Given fewer landing craft and aircraft, one must either decrease the standoff distance from the beach to maintain the same timeline or extend the amount of time to land the force.
5. The twelve hour timespan to offload the two fighting columns with their mobile CSSDs seems excessive, but it is roughly the same amount of time it currently takes a squadron of twelve CH-46s to shuttle, in nine waves, a 975 Marine infantry battalion to an objective seventy-five miles away.* In both instances, it takes time to phase combat power ashore. To shorten the projected landing timeline, planners must either add additional landing craft or move the amphibious ships closer ashore in order to cut the cycle time.
6. The following planning factors were employed:**
 - a. Planning speed for LCACs = 30 knots
 - b. LCAC offload time = 15 minutes. Reload time = 45 minutes.
 - c. LCU offload/reload time = 2x that of an LCAC.
 - d. Planning speed for LCU = 12 knots.

* Major Roy Osborn, USMC, "MV-22 MAGTF and OMFTS Employment Brief," HQMC (APP-32), 14 March 2000.

**United States Marine Corps, *MEF Planner's Reference Manual* (Quantico, VA: Marine Corps Combat Development Command, 1999), 2-24, 2-25.

LF Unit	Load	Assault Craft	Landing Time	Destination
Wave 1				
Div Recon	2 LSV; 2 Cycles	1 CH-53E	H-Hour	HLZ Red
	2 LSV; 2 Cycles	1 CH-53E		HLZ Blue
LAR Det (-)	8 LAV	2 LCAC		Red Beach
	8 LAV	2 LCAC		Blue Beach
MEU CP (-)	4 LAV	1 LCAC		Red Beach
Mechanized Team	12 AAAVP 2 M1A1	Self Deploy 1 LCU		Blue Beach
Rifle Co (-)	10 HMMWV	10 MV-22		HLZ Red
Prov Rifle Plt (-)	1 MTVR gun truck	1 CH-53E		HLZ Red
BLT CP	1 AAAVC 1 AAAVP	Self Deploy		Blue Beach
Recovery Det (-)	1 AAAVR	Self Deploy		Blue Beach
Raft Det	2 LARC-V	Self Deploy		Blue Beach
	6 LARC-V	Self Deploy		Red Beach
Wave 2				
120mm Btry (-)	9 HMMWV	9 MV-22	H + 1:00	HLZ Blue
MRL Btry (-)	1 Avenger	1 MV-22		HLZ Blue
CAAT Team (-)	2 HMMWV	2 CH-53E		HLZ Red
Prov Rifle Plt (-)	1 MTVR gun truck	1 CH-53E		HLZ Red
Wave 3				
81mm Plt (-)	2 HMMWV	2 CH-53E		HLZ Red
Prov Rifle Plt (-)	1 MTVR gun truck	1 CH-53E		HLZ Blue
CAAT Team (-)	2 HMMWV	2 MV-22	H + 2:00	HLZ Red
Rifle Company (-)	8 HMMWV	8 MV-22		HLZ Red
Wave 4				
Mech Team (-)	2 M1A1	1 LCU	H + 3:00	Blue Beach
Ammo Det (-)	4 LVS	2 LCAC		Red Beach
	4 LVS	2 LCAC		Blue Beach
MRL Btry	2 LVS (ammo)	1 LCAC		Blue Beach
Rifle Co (-)	6 HMMWV	6 MV-22		HLZ Red
81mm plt (-)	4 HMMWV	4 MV-22		HLZ Red
	1 HMMWV	1 CH-53E		HLZ Red
Arty Btry (-)	1 Avenger	1 CH-53E		HLZ Red
Prov Rifle Plt (-)	1 MTVR gun truck	1 CH-53E		HLZ Blue
Wave 5				
CAAT Team (-)	10 HMMWV 1 HMMWV	10 MV-22 1 CH-53E	H + 4:00	HLZ Red
Arty Btry (-)	1 MTVR	1 CH-53E		HLZ Red
Med Det (-)	1 Surgical MTVR	1 CH-53E		HLZ Red

LF Unit	Load	Assault Craft	Landing Time	Destination
Wave 6				
Arty Btry (-)	8 HMMWV 2 LW 155 2 MTR	8 MV-22 2 MV-22 2 CH-53E	H + 5:00	HLZ Red
Med Det (-)	1 Surgical MTR	1 CH-53E		HLZ Blue
Wave 7				
Little Bird Det (-)	1 MVTR (AH-6)	1 CH-53E	H + 6:00	HLZ Red
CEB Plt	4 HMMWV	4 MV-22		HLZ Blue
Arty Btry (-)	1 HMMWV 4 LW 155 1 H2O Bull 2 MTR	1 MV-22 4 MV-22 1 MV-22 2 CH-53E		HLZ Red
Arty Btry (-)	8 MTR	1 LCU		Red Beach
Ammo Det	2 LVS 2 LVS	1 LCAC 1 LCAC		Red Beach Blue Beach
Class I Det (-)	1 LVS (H2O)	1 LCAC		Red Beach
Little Bird Det (-)	1 LVS (ammo)			
Class I Det (-)	1 LVS (H2O)	1 LCAC		Blue Beach
Little Bird Det (-)	1 LVS (ammo)			
Recovery Det	2 LVS wrecker	1 LCAC		Red Beach
Wave 8				
CEB Plt	2 M115	2 MV-22	H + 7:00	HLZ Blue
MRL Btry (-)	6 HMMWV 1 H2O Bull 2 HIMARS	6 MV-22 1 MV-22 2 CH-53E		HLZ Blue
MSSG C2	1 HMMWV	1 MV-22		HLZ Red
Little Bird Det (-)	1 MVTR (AH-6)	1 CH-53E		HLZ Red
Wave 9				
MRL Btry (-)	1 MTR	1 CH-53E	H + 8:00	HLZ Blue
Maint Det	1 MTR	1 CH-53E		HLZ Red
Little Bird Det (-)	1 MVTR (AH-6)	1 CH-53E		HLZ Blue
MSSG C2	1 HMMWV	1 MV-22		HLZ Red
MSSG C2	2 HMMWV	2 MV-22		HLZ Blue
Prov Rifle Plt (-)	4 HMMWV	4 MV-22		HLZ Red
Prov Rifle Plt (-)	3 HMMWV	3 MV-22		HLZ Blue

LF Unit	Load	Assault Craft	Landing Time	Destination
Wave 10				
Recovery Det CEB Plt	1 M88 2 M9 ACE	1 LCU	H + 9:00	Blue Beach
Fuel Det (-)	6 LVS	3 LCAC		Blue Beach
Fuel Det (-)	4 LVS	2 LCAC		Red Beach
Class I Det (-)	1 MTR (MRE) 1 MTR (MRE)	1 CH-53E 1 CH-53E		HLZ Red HLZ Blue
Little Bird Det (-)	1 MVTR (AH-6)	1 CH-53E		HLZ Blue
Prov Rifle Plt (-)	1 HMMWV	1 MV-22		HLZ Blue
MEU CP(-)	2 HMMWV	2 MV-22		HLZ Red
Med Det (-)	1 HMMWV 1 HMMWV	1 MV-22 1 MV-22		HLZ Red HLZ Blue
Landing Spt Det	1 HMMWV 1 HMMWV	1 MV-22 1 MV-22		HLZ Red HLZ Blue
Class I Det	1 H2O Bull 1 H2O Bull	1 MV-22 1 MV-22		HLZ Red HLZ Blue
Wave 11				
Little Bird Det (-)	1 MVTR (MH-6)	1 CH-53E	H+10:00	HLZ Red
Little Bird Det (-)	1 H2O Bull 1 H2O Bull	1 MV-22 1 MV-22		HLZ Red HLZ Blue
Wave 12				
Little Bird Det (-)	1 MVTR (MH-6) 1 MVTR (Crew)	2 CH-53E	H+11:00	HLZ Blue
Wave 13				
Little Bird Det (-)	1 MVTR (Crew)	1 CH-53E	H + 12:00	HLZ Red
Maint Det	1 MTR	1 CH-53E		HLZ Blue
Raft Det (-)	2 MABs	1 LCU		Red Beach
	2 MABs	1 LCAC		Red Beach
	8 MABs	4 LCAC		Blue Beach

APPENDIX D

MEB Fighting Column Assault Landing Plan

The sample landing plan that follows is based on the following premises:

6. There are beaches sufficient to land the elements of each column's wave simultaneously. For simplicity, very large red and blue beaches are indicated, but a number of smaller colored beaches could be used. If insufficient landing sites were available to land all the craft in a near simultaneous manner, then timings would slow down while subsequent craft waited to transit the penetration point.
7. Similarly, red and blue HLZs are assumed to be large enough to land all the aircraft in a given wave simultaneously. The same "size vs turnaround timing" issue applies to the HLZs. The HLZs are not deep inland but rather close to the beach to facilitate a swift turnaround of assets.
8. For planning purposes, all ships were stationed 25 nautical miles off shore {including the LHA carrying the four LCU(X)s, but they must depart earlier than the LCACs to hit the beach at H-Hour}. The exception is the vessel(s) carrying the eight MABs, which close(s) to 12 nautical miles for two brief windows to reload the LCU(X)s.
9. The landing plan shows all 31 LCACs operational for the entire offload. This is not likely given maintenance or battle damage. Two options exist to provide more flexibility IOT cover this contingency.
 - a. Employ aircraft to lift more MTRVs in waves 3-5 IOT cut down on the LCAC deck space required.
 - b. Run a 6th scheduled wave; this would land at H+13:20.
10. The following planning factors were employed: ♦
 - e. Planning speed for LCACs = 30 knots
 - f. LCAC offload time = 15 minutes. Reload time = 45 minutes.
 - g. LCU offload/reload time = 2x that of an LCAC.
 - h. Planning speed for LCU = 12 knots.
11. The RLT 120mm mortar battery is moved ashore early to help provide additional fire support until the MEB's cannon and rocket artillery get ashore. At this point the heavy mortars reembark IOT support the heliborne BLT in follow-on operations.

The 12-hour timespan to offload two BLTs with their mobile CSSDs seems long, but it is roughly the same amount of time planners envision it will take to transport a 3,000 man, 200 vehicle RLT 175 miles inland using 3 squadrons of Ospreys and one squadron of Sea

♦ United States Marine Corps, *MEF Planner's Reference Manual* (Quantico, VA: Marine Corps Combat Development Command, 1999), 2-24, 2-25.

tallions. • In both instances, it takes time to phase combat power ashore. Only very light formations will be able to deploy immediately, though there is no reason why the robust elements of the first wave {2 LAR Companies and 2 Mechanized Task Forces (-) could not immediately push inland towards initial objectives. The entire MEB surface GCE, including artillery and engineer support, is ashore 5:20 after the initial landing. BSSG assets comprise the final two waves. To shorten the landing timeline, one must either add additional landing craft or move the amphibious ships closer ashore in order to cut the cycle time. It is also interesting to note that the nearly six hundred vehicles of the MEB's two BLT-size fighting columns, if lined up single file at 100 meter intervals and then driven forward at 20 mph, would take nearly three hours to pass a stationary observer. The column would stretch almost 60 kilometers from head to tail.

• Derived from figures contained in Concepts Division, "Draft MV-22 Concept of Employment" (Quantico, VA: Marine Corps Combat Development Command, 2000), 10-1 to 11-2.

LF Unit	Load	Assault Craft	Landing Time	Destination
	Column # 1	WAVE # 1		
GCE				
Div Recon Plt	4 LSV; 4 Cycles	10 MV-22	H-Hour	HLZ Red
LAR Company	24 LAV	6 LCAC	H-Hour	Red Beach
Mech Bn TF(-)	33 AAV; 2 AAAR 8 M1A1; 1 AVLB	Self Deploy 8 LCAC	H-Hour	Red Beach Red Beach
CAAT Team	15 HMMWV	1 LCU	H-Hour	Red Beach
Hvy Mortar Btry	9 HMMWV; 6 120mm	9 CH-53E	H-Hour	HLZ Red
RLT CP	4 AAV 1 MEWSS	Self Deploy 1 CH-53E	H-Hour	HLZ Red
CSSE				
BSSG C2	2 MRC HMMWV	2 MV-22	H-Hour	HLZ Red
Rifle Co(-)	10 HMMWV	10 MV-22	H-Hour	HLZ Red
LARC Det	8 LARV-V	Self Deploy	H-Hour	Red Beach
Tk Retriever Det	2 M88	1 LCU	H-Hour	Red Beach
Ammo Det	1 LVS	1 LCAC	H-Hour	Red Beach
	Column # 2	WAVE # 1		
GCE				
Div Recon Plt	4 LSV; 4 Cycles	10 MV-22	H-Hour	HLZ Blue
LAR Company	24 LAV	6 LCAC	H-Hour	Blue Beach
Mech Bn TF(-)	33 AAV; 2 AAAR 8 M1A1; 1 AVLB	Self Deploy 8 LCAC	H-Hour	Blue Beach Blue Beach
CAAT Team	15 HMMWV	1 LCU	H-Hour	Blue Beach
MEB CP	2 LAV C2; 2 LAV25 1 LAV L; 1 MEWSS	1 LCAC 2 CH-53E	H-Hour	Blue Beach HLZ Blue
CSSE				
BSSG C2	2 MRC HMMWV	2 MV-22	H-Hour	HLZ Blue
Rifle Co(-)	10 HMMWV	10 MV-22	H-Hour	HLZ Blue
LARC Det	8 LARV-V	Self Deploy	H-Hour	Blue Beach
Tk Retriever Det	2 M88	1 LCU	H-Hour	Blue Beach
Ammo Det	1 LVS	1 LCAC	H-Hour	Blue Beach

LF Unit	Load	Assault Craft	Landing Time	Destination
	Column # 1	WAVE # 2		
GCE				
Arty Bn (-)	12 LW 155; 12 MTVR	6 LCAC	H +2:40	Red Beach
	18 MTVR; 3 M149; 1 HMMWV	6LCAC	H +2:40	Red Beach
	23 HMMWV 1 Q-36	2 LCAC	H +2:40	Red Beach
	6 HMMWV	6 MV-22	H +2:00	HLZ Red
G/S Engr Co	2 M9 ACE	2 LCAC	H +2:40	Red Beach
CSSE				
BSSG C2 (-)	2 MRC HMMWV	2 MV-22	H +2:00	HLZ Red
Rifle Co (-)	10 HMMWV	10 MV-22	H +2:00	HLZ Red
	Column # 2	WAVE # 2		
GCE				
Arty Bn (-)	12 LW 155; 12 MTVR	6 LCAC	H +2:40	Blue Beach
	18 MTVR; 3 M149; 1 HMMWV	6 LCAC	H +2:40	Blue Beach
	23 HMMWV 1 Q-36	2 LCAC	H +2:40	Blue Beach
	6 HMMWV	6 MV-22	H +2:00	HLZ Blue
CSSE				
BSSG C2 (-)	2 MRC HMMWV	2 MV-22	H +2:00	HLZ Blue
Rifle Co (-)	10 HMMWV	10 MV-22	H +2:00	HLZ Blue
Ammo Det	1 LVS	1 LCAC	H +2:40	Blue Beach

LF Unit	Load	Assault Craft	Landing Time	Destination
	Column # 1	WAVE # 3		
GCE				
G/S Cbt Engr Co	10 MTRV; 6 M159	3 LCAC	H +5:20	Red Beach
	2 M9 ACE	2 LCAC	H +5:20	Red Beach
	10 HMMWV 6 M159 2 H2O Bull	18 MV-22	H+ 4:00	HLZ Red
CSSE				
Maint Det	2 HMMWV 2 MTRV	1 LCAC	H +5:20	Red Beach
Med Det	4 Ambulance 4 MTRV	4 MV-22 1 LCAC	H+ 4:00 H +5:20	HLZ Red Red Beach
LST Det	2 HMMWV	2 MV-22	H+ 4:00	HLZ Red
Supply Det	2 H2O Bull	2 MV-22	H+ 4:00	HLZ Red
Security Det	4 MTRV gun trucks	1LCAC	H +5:20	Red Beach
Raft Det	4 MABs	2 LCU	H +5:20	Red Beach
RW Det	2 MTRV (crew) 2 MTRV (MH-6) 4 MTRV (AH-6) 2 LVS (ammo)	4 LCAC	H +5:20	Red Beach
Recovery Det	2 LVS Wrecker	2 LCAC	H +5:20	Red Beach
	Column # 2	WAVE # 3		
GCE				
MRL Btry	6 HIMARs 6 HMMWV	2 LCAC	H +5:20	Blue Beach
	3 HMMWV	3 MV-22	H+ 4:00	HLZ Blue
	6 LVS (ammo)	6 LCAC	H +5:20	Blue Beach
CSSE				
Maint Det	2 HMMWV 2 MTRV	1 LCAC	H +5:20	Blue Beach
Med Det	4 Ambulance 4 MTRV	4 MV-22 1 LCAC	H+ 4:00 H +5:20	HLZ Blue Blue Beach
LST Det	2 HMMWV	2 MV-22	H+ 4:00	HLZ Blue
Supply Det	2 H2O Bulls	2 MV-22	H+ 4:00	HLZ Blue
Security Det	4 MTRV gun trucks	1LCAC	H +5:20	Blue Beach
Raft Det	4 MABs	2 LCU	H +5:20	Blue Beach
RW Det	2 MTRV (crew) 2 MTRV (MH-6) 4 MTRV (AH-6) 2 LVS (ammo)	4 LCAC	H +5:20	Blue Beach
Recovery Det	2 LVS Wrecker	2 LCAC	H +5:20	Blue Beach

LF Unit	Load	Assault Craft	Landing Time	Destination
	Column # 1	WAVE # 4		
CSSE				
Ammo Det	11 LVS	11 LCAC	H +8:00	Red Beach
POL Det	4 LVS	4 LCAC	H +8:00	Red Beach
Raft Det	4 MABs	2 LCAC	H+ 8:00	Red Beach
	Column # 2	WAVE # 4		
CSSE				
Ammo Det	12 LVS	12 LCAC	H +8:00	Blue Beach
POL Det	4 LVS	4 LCAC	H +8:00	Blue Beach
Raft Det	4 MABs	2 LCAC	H+8:00	Blue Beach
	Column # 1	WAVE # 5		
CSSE				
POL Det	11 LVS	11 LCAC	H +10:40	Red Beach
Class I Det	4 LVS (2 food / 2 H2O)	4 LCAC	H +10:40	Red Beach
Raft Det	4 MABs	2 LCAC	H +10:40	Red Beach
	4 MABs	2 LCU	H +10:00	Red Beach
	Column # 2	WAVE # 5		
CSSE				
POL Det	11 LVS	11 LCAC	H +10:40	Blue Beach
Class I Det	4 LVS (2 food / 2 H2O)	4 LCAC	H +10:40	Blue Beach
Raft Det	4 MABs	2 LCAC	H + 10:40	Blue Beach
	4 MABs	2 LCU	H +10:00	Blue Beach

Appendix E ACRONYMS

AA	Anti-aircraft
AAA	Anti-aircraft artillery
AAAV	Advanced amphibious assault vehicle
ACE	Aviation combat element
ADA	Air defense artillery
ALO	Air liaison officer
ANGLICO	Air Naval Gunfire Liaison Company
APC	Armored personnel carrier
ASP	Ammunition supply point
AT	Antitank
BLT	Battalion landing team
BN	Battalion
CAS	Close air support
CE	Command element
CIA	Central Intelligence Agency
CO	Commanding officer
COIN	Counterinsurgency
CONUS	Continental United States
CP	Command Post
CSS	Combat service support
CSSE	Combat service support element
C2	Command and control
DOD	Department of Defense
ELINT	Electronic intelligence
EW	Electronic warfare
FAC	Forward air controller
FAPLA	People's Armed Forces for the Liberation of Angola
FLIR	Forward looking infrared radar
FNLA	National Liberation Front of Angola
FO	Forward observer
FSC	Fire support coordination center
FOB	Forward Operating Base
GCE	Ground combat element
G.M.	<i>Group Mobile</i>
HEAT	High explosive antitank
HMG	Heavy machine gun
HQ	Headquarters
HUMINT	Human intelligence
IFV	Infantry fighting vehicle
KIA	Killed in action
LAV	Light armored vehicle
LIC	Low intensity conflict

LNO	Liaison officer
LOC	Line(s) of communication
MAGTF	Marine Air Ground Task Force
MAOT	Mobile Air Operations Team
MBT	Main battle tank
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
MEWSS	Mobile electronic warfare support system
MPLA	Popular Movement for the Liberation of Angola
MRL	Multiple rocket launcher
OMFTS	Operational Maneuver from the Sea
OMG	Operational maneuver group
OODA	Orient, Observe, Decide, and Assess
PLAN	Peoples Liberation Army of Namibia
PLT	Platoon
POW	Prisoner of War
PSYOP	Psychological Operations
RPV	Remotely Piloted Vehicle
RR	Railroad
SA	South Africa(n)
SAAF	South African Air Force
SADF	South African Defense Force
SAI	South African Infantry
SAM	Surface to air missile
SIGINT	Signals intelligence
SOAR	Special Operations Aviation Regiment
SOF	Special operations forces
SOP	Standard operational procedure
SP	Self-propelled
SQDN	Squadron
SWA	Southwest Africa
SWAPO	South-West African People's Organization
TAC	Tactical
TAOR	Tactical area of responsibility
TF	Task force
UNITA	Union for the Total Independence of Angola
USMC	United States Marine Corps
USSOCOM	United States Special Operations Command
VHF	Very high frequency
WIA	Wounded in action

BIBLIOGRAPHY

SADF Mobile Operations in Angola

- "Angola 1987-88: the battles." *Armed Forces* (May 1988): 8-12.
- Barber, Simon. "How Castro's Leadership Saved Cuba in Angola." *Defense & Foreign Affairs* 17 (September 1989): 40-42.
- "Castro explains why Angola lost battle against SADF." *Paratus* 40 (September 1989): 16-17.
- Breytenbach, Colonel Jan, SADF. *They Live by the Sword: 32 'Buffalo' Battalion - South Africa's Foreign Legion*. Alberton, SA: Lemur Books (Pty) Ltd, 1990.
- Bridgland, Fred. *The War for Africa: Twelve Months that Transformed a Continent*. Gibraltar: Ashanti Publishing Limited, 1990.
- Clayton, Anthony. *Frontiersmen: Warfare in Africa Since 1950*. London: UCL Press Limited, 1999.
- Crocker, Chester A. *High Noon in Southern Africa: Making Peace in a Rough Neighborhood*. New York: W.W. Norton & Company, 1992.
- Dale, Richard. "Melding War and Politics in Namibia: South Africa's Counterinsurgency Campaign, 1966-1989." *Armed Forces and Society* 20 (Fall 1993): 7-24.
- DePalo, William A., Jr. "Cuban Internationalism: The Angola Experience, 1975-1988." *Parameters* 23 (Autumn 1993):61-74.
- de Vries, Colonel Roland, SADF. *Mobile Warfare: A Perspective for South Africa*. Menlopark, South Africa: F.J.N. Harman Uitgewers, 1987.
- Geldenhuis, Jannie. *A General's Story: From an Era of War and Peace*. Johannesburg: Jonathan Ball Publishers, 1995.
- Heitman, Helmoed-Romer. *Modern African Wars 3: South-West Africa*. London: Osprey Publishing, Ltd, 1991.
- *South African Armed Forces*. Cape Town: Buffalo Publications, 1990.
- "UNITA surrounds vital base of Cuito Cuanavale." *Jane's Defence Weekly*. 9 (30 January 1988): 161.

- *War in Angola: The Final South African Phase*. Gibraltar: Ashanti Publishing, Ltd. 1990.
- Leonard, Richard. *South Africa at War: White Power and the Crisis in Southern Africa*. Westprt, Cn: Lawrence Hill & Company, 1983.
- Norval, Morgan. *Death in the Desert: The Namibian Tragedy*. Washington, D.C.: Selous Foundation Press, 1989.
- Roherty, James M. *State Security in South Africa: Civil-Military Relations Under P.W. Botha*. Armonk, NY: M.E. Sharpe, Inc., 1992.
- "SADF involvement in Angola: Fapla forces thwarted." *Paratus* 39 (May 1988): 34-43.
- Steenkamp, Willem. *South Africa's Border War: 1966-1989*. Gibraltar: Ashanti Publishing Limited, 1989.
- Uys, Ian. *Bushman Soldiers. Their Alpha and Omega*. Germiston, SA: Fortress Publishers (Pty) Ltd, 1993.
- Venter, Al J. *Challenge: Southern Africa within the African Revolutionary Context - An Overview*. Gibraltar: Ashanti Publishing Limited, 1989.
- . "Seige at Cuito Cuanavale." *Soldier of Fortune Magazine*. 13 (May 1988): 36-81.
- . "The Angolan cauldron overflows into its second decade." *International Defense Review* 2 (1988): 121-124.
- . *The Chopper Boys: Helicopter Warfare in Africa*. Gibraltar: Ashanti Publishing Ltd, 1994.

Interviews

- Davies, Mark. SADF operations medic (Namibia and Angola, 1986-1988) and Operational Planning Officer, Medical Support Wing, 1989-1996. Interview by author, 04,05,10 April 2000, Quantico, VA. Email.
- Duvenhage, Lieutenant Marcus, SADF (ret). Service in Namibia and Angola, 1987-1988) Interview by author, 28 December 1999, Quantico, VA. Email.
- Kirkman, Derek. Sharpshooter, Alpha Company, 7 South African Infantry Battalion (posted with 32 Battalion in Angola during *Modular*). Interview by author, 31 December 1999, Quantico, VA. Email.

Background Literature

- Abbott, Peter and Manuel Ribeiro Rodrigues. *Modern African Wars (2): Angola and Mozambique 1961-1974*. London: Osprey, 1988.
- Albright, David E., ed. *Communism in Africa*. Bloomington, IN: Indiana University Press, 1980.
- Beckett, Ian F.W. and John Pimlott, ed. *Armed Forces and Modern Counter-Insurgency*. New York: St. Marten's Press, 1985.
- Cann, John P. *Counterinsurgency in Africa: The Portuguese Way of War, 1961-1974*. Westport, CT: Greenwood Press, 1997.
- Coker, Christopher. *South Africa's Security Dilemmas*. The Washington Papers/126. New York: Praeger, 1987.
- Combat and Survival: What It Takes to Fight and Win*. Vol. 12, "Bush Fighting with the Ratel." Westport, CT: H.S. Stuttman, Inc., 1991.
- Copson, Raymond W. *Africa's Wars and Prospects for Peace*. New York: M.E. Sharpe, Inc., 1994.
- Crocker, Chester. *South Africa's Defense Posture: Coping with Vulnerability*. London: Sage Publications, LTD, 1981.
- Davidson, Basil. *The People's Cause: A History of Guerrillas in Africa*. Essex, England: Longman Group Limited, 1981.
- Dostert, Pierre Etienne. *Africa 1997*. Harper's Ferry, WV: Stryker-Post Publications, 1997.
- Durch, William J. *Revolution from a F.A.R.: The Cuban Armed Forces in Africa and the Middle East*. Arlington, VA: Center for Naval Analyses, 1977.
- Fannell, Jeff and Robert Pitta. *South African Special Forces*. London: Osprey Publishing, Ltd., 1993.
- Fernando Andresen Guimaraes. *The Origins of the Angolan Civil War: Foreign Intervention and Domestic Political Conflict*. London: Macmillan Press Ltd, 1998.
- Harding, Jeremy. *The Fate of Africa: Trial by Fire*. New York: Simon & Schuster, 1993.
- Hooper, Jim. *Beneath the Visiting Moon: Images of Combat in Southern Africa*. Lexington, MA: Lexington Books, 1990.

- Jumbaraci, Arslan and Nicole Muchnik. *Portugal's African Wars*. New York: Joseph Okpaku Publishing Company, Inc., 1974.
- Kaela, Laurent C. *The Question of Namibia*. London: Macmillan Press Ltd, 1996.
- Klinghoffer, Arthur Jay. *The Angolan War: A Study in Soviet Policy in the Third World*. Boulder, CO.: Westview Press, 1980.
- Legum, Colin and Tony Hodges. *After Angola: The War Over Southern Africa*. London: Rex Collings Ltd., 1976.
- Lloyd, Mark. *Modern Combat Uniforms*. Carrollton, TX: Squadron/Signal Publications Inc, 1988.
- Menaul, Air Vice Marshal Stewart W.B., RAF. *The Border Wars: South Africa's Response*. Conflict Studies # 52. London: Institute for the Study of Conflict, 1983.
- O'Neill, Bard E. *Insurgency and Terrorism: Inside Modern Revolutionary Warfare*. Washington: Brassey's, Inc. 1990.
- Owen, Major Robert C., USAF, "Counterrevolution in Namibia." In *Shadow War: Special Operations and Low Intensity Conflict*, LtCol H.T. Hayden, USMC, 187-195. Vista, CA: Pacific Aero Press, 1992.
- Smock, David R., ed. *Making War and Waging Peace: Foreign Intervention in Africa*. Washington: U.S. Institute of Peace Press, 1993.
- Sonderling, Stefan. *Bushwar*. Windhoek, Namibia: Eyes Publishing, 1980.
- Stiff, Peter. *Nine Days of War: Namibia - before, during and after*. Alberton, SA: Lemur Books (Pty) Ltd, 1989.
- Turner, John W. *Continent Ablaze: The Insurgency Wars in Africa 1960 to the Present*. London: Arms and Armour Press, 1998.
- Van Der Waals, W.S. *Portugal's War in Angola: 1961-1974*. Rivonia: Ashanti Publishing Limited, 1993.
- Von Clausewitz, Carl. *On War*. Edited and Translated by Michael Howard and Peter Paret. Princeton: Princeton University Press, 1976.

OMFTS

- Alexander, Colonel James H., USMC. "Roots of Deployment - Vera Cruz, 1914." In *Assault from the Sea: Essays on the History of Amphibious Warfare*, ed. Lieutenant Colonel Merrill L. Bartlett, USMC, 133-141. Annapolis, MD: Naval Institute Press, 1983.
- Anderson, Colonel Gary W., USMC. "Capable Warrior: Toward a STOM Capability." *Marine Corps Gazette*, February 2000, 53-55.
- _____. "Implementing OMFTS." *Marine Corps Gazette*, April 1995, 57-60.
- _____. "Infestation Tactics and Operational Maneuver From the Sea: Where Do We Go From Here?" *Marine Corps Gazette*, September 1997, 70-75.
- _____. "Maneuver From the Sea and Post-Industrial Warfare." *Marine Corps Gazette*, July 1993, 28-30.
- Bailey, J.B.A. *Field Artillery and Firepower*. Oxford: The Military Press, 1989.
- Bancroft, Major Bruce K., USMC. "Sea Based Logistics in Operational Maneuver from the Sea." Joint Military Operations Department Paper, Naval War College, Newport, RI, 1996.
- Bauer, K. Jack. *The Mexican War: 1846-1848*. New York: Macmillan Publishing Co., Inc. 1974.
- Beckett, Ian F., ed. *The Roots of Counter-Insurgency: Armies and Guerrilla Warfare, 1900-1945*. London: Blandford Press, 1988.
- Beddoes, Lieutenant Mark W., USN. "Logistical Implications of Operational Maneuver From the Sea." MA Thesis, Naval Postgraduate School, Monterey, CA, 1997.
- Bevilacqua, Major Allan C., USMC. "Reinventing Amphibious Operations." *Marine Corps Gazette*, December 1989, 16-17.
- Bierly, Lieutenant Colonel Jerome F. and Major Thomas E. Seal, USMC. "Over-the-Horizon Amphibious Operations." *Marine Corps Gazette*, July 1991, 41-42.
- Bligh, Major Edward W., USMC. "Logistics." *Marine Corps Gazette*, November 1999, 62-63.
- Broderick, Colonel Matthew E., USMC "MEU(SOC)--Once a Threat, Now Threatened." *Marine Corps Gazette*, March 1994, 33.

- Callwell, Major General Sir Charles E., RA. *Small Wars: Their Principles and Practice*. Lincoln, NE: University of Nebraska Press, 1996.
- Calvano, Charles N. "The Maritime Preposition Force Ship 2010." Mechanical Engineering Department Report, Naval Postgraduate School, Monterey, CA, 1997.
- Cancian, Colonel Mark F., USMC. "Where is OMFTS Going." *Marine Corps Gazette*, June 1999, 22-24.
- Chandler, Captain Thomas E., USMC. "Artillery Ammunition Resupply in OMFTS." *Marine Corps Gazette*, Feb 1999, 55-62.
- Clancy, Tom. *Armored Cav: A Guided Tour of an Armored Cavalry Regiment*. New York: Berkley Books, 1994.
- Close, Bradley C., Captain. "Electronic Warfare: The Critical Vulnerability of OMFTS." *Marine Corps Gazette*, August 1996, 31-32.
- "Commentary on OMFTS." *Marine Corps Gazette*, July 1996, 13-15.
- Concepts Division, MCCDC. "Operational Maneuver from the Sea (OMFTS) Implementation Study (1996-2016). Volume II." Quantico, VA, 1997.
- Croizat, Colonel V.J., USMC. *A Translation From the French: Lessons of the War in Indochina Volume 2*. Santa Monica, CA: The Rand Corporation, 1967.
- Davis, Major Jeffrey P., USMC. "Ship-to-Objective Maneuver: Will This Dog Hunt?" *U.S. Naval Institute Proceedings*, August 1998, 31-34.
- Deichert, Captain Martin K., USMC. "Artillery and OMFTS" *Marine Corps Gazette*, July 1997, 38-39.
- Dowling, Captain David J, USMC. "Tactical Bulk Fuel Delivery System: Experience From the Field." *Marine Corps Gazette*, January 1997, 50-52.
- Engels, Donald W. *Alexander the Great and the Logistics of the Macedonian Army*. Berkeley: University of California Press, 1978.
- Estes, Lieutenant Colonel Kenneth W., USMC. "Future Amphibious Landings: From the Pages of the Gazette to OMFTS." *Marine Corps Gazette*, December 1999, 64-68.
- _____. "Implications of STOM for armored forces." *Marine Corps Gazette*, March 1999, 53-57.
- Evans, Colonel Michael H.H., RM. "Amphibious Operations: The Projection of Sea Power Ashore." *Marine Corps Gazette*, February 1992, 89-90.

- Everett-Heath, John. *Helicopters in Combat: The First Fifty Years*. London: Arms and Armour Press, 1992.
- Fall, Bernard B. *Street Without Joy*. New York: Schocken Books, 1961.
- Flanagan, Lieutenant General Edward M., Jr., USA. *Lightning: The 101st in the Gulf War*. Washington: Brassey's, Inc., 1994.
- "Framing OMFTS: An Evolution to a Revolution." *Marine Corps Gazette*, January 1999, 72-76.
- Gabel, Christopher R. *The U.S. Army GHQ Maneuvers of 1941*. Washington: United States Army Center of Military History, 1991.
- Glantz, Lieutenant Colonel David M., USA. *August Storm: Soviet Tactical and Operational Combat in Manchuria, 1945*. Fort Leavenworth, KS: Combat Studies Institute, 1983.
- Greenwood, Colonel John E., USMC. "Editorial: Watching the Army." *Marine Corps Gazette*, March 2000, 4.
- Gresham, Major William F.P., USMC. "OMFTS and the Single Battle Concept." *Marine Corps Gazette*, June 1996, 39-40.
- Hammes, Colonel Thomas X., USMC. "Polishing the Crown Jewels." *Marine Corps Gazette*, March 1998, 18-20.
- Hartog, Leo de. *Genghis Khan: Conqueror of the World*. New York: St. Martin's Press, 1989.
- Harley, Colonel William, USMC. "OTHAC2 (Over-the-Horizon Amphibious Assault Command and Control System) Combines Best Features of GPS and PLRS." *Marine Corps Gazette*, December 1991, 66-67.
- Heinl, Colonel Robert Debs, Jr., USMC. *Dictionary of Military and Naval Quotations*. Annapolis, MD: United States Naval Institute, 1966.
- Hoffman, Major F.G., USMC. "Amphibious Dilemma." *Marine Corps Gazette*, February 1993, 53-54.
- Hoffman, Major Jon T., USMC. "Counterinsurgency Along the Coco: Merritt Edson, Aviation, and Light Infantry Versus Sandino." In *Selected Papers from the 1992 (59th Annual) Meeting of the Society for Military History*, ed. Donald F. Bittner (Quantico, VA: Marine Corps Association, 1994), 133-150.
- _____. "Future of Forcible Entry." *Marine Corps Gazette*, April 1991, 28-32.

- _____. "High Cost of Reaching the Beach." *U.S. Naval Institute Proceedings*, November 1990, 66-71.
- Howard, Major General Patrick G and Lieutenant Colonel Len Blaisol, USMC. "OMFTS: Forging a Path to the Future of Amphibious Warfare." *Marine Corps Gazette*, June 1999, 18-21.
- Houston, Donald E. *Hell on Wheels: The 2d Armored Division*. Novato, CA: Presidio Press, 1977.
- Jackson, Major Timothy J., USMC. "Gator Streetfighter: An Under-The-Horizon Capability for the Marine Corps." *Marine Corps Gazette*, March 2000, 26-32.
- Joint Special Operations Forces Institute. *Special Operations Forces Reference Manual*. Fayetteville, NC: Cubic Applications, Inc., 1998.
- Johnson, Major Gary W., USMC and Shujie Chang. "Combat Service Support Challenge." *Marine Corps Gazette*, March 1996, 44-45.
- Krulak, General Charles C., USMC. "Operational Maneuver From the Sea." *U.S. Naval Institute Proceedings*, January 1997, 26-31.
- Kutta, Timothy J. *Gun Trucks*. Carrollton, TX: Squadron/Signal Publications, Inc., 1996.
- Labrecque, Commander Terrence P., USN. "Sea Based Logistics: Viable or Not?" *Marine Corps Gazette*, January 1990, 36-42.
- Lamont, Major R.W., USMC. "Armor in Support of OMFTS." *Armor*, November-December 1994, 23-25.
- Lanning, Michael Lee. *Inside the LRRPS: Rangers in Vietnam*. New York: Ivy Books, 1988.
- Liddell Hart, Basil H. "Marines and Strategy." *Marine Corps Gazette*, May 1990, 25-32.
- Macgregor, Colonel Douglas A., USA. *Breaking the Phalanx: A New Design for Landpower in the 21st Century*. Westport, CT: Praeger Publishers, 1997.
- MAGTF Staff Training Program. *MEF Planner's Reference Manual. (MSTP Pamphlet 5-0.3)*. Quantico, Va: Marine Corps Combat Development Command, 1999.
- Mason, Captain Douglas E., USMC and Captain Jason F. Phillips, USMC. "OMFTS: A Perspective." *Marine Corps Gazette*, August 1997, 56-60.

- Miller, Major Richard L., USMC. "Sea Based FARP Operations." *Marine Corps Gazette*, August 1994, 39-41.
- Mitchell, Lieutenant Commander Ross, USN. "Naval Fire Support: Ring of Fire." *U.S. Naval Institute Proceedings*, November 1997, 54-57.
- Moore, Lieutenant Colonel R. Scott, USMC. "Maneuver From the Sea...Maybe." *Marine Corps Gazette*, April 1996, 24-27.
- Morris, Major Michael F., USMC. "Flying Columns and OMFTS." *Marine Corps Gazette*, March 1998, 27-29.
- Osborn, Major Roy, USMC. "MV-22 MAGTF and OMFTS Employment Brief." HQMC (APP-32), 14 March 2000.
- Pagonis, Lieutenant General William G, USA. *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War*. Boston: Harvard Business School Press, 1992.
- Pakenham, Thomas. *The Boer War*. New York: The Hearst Corporation, 1979.
- Pierce, Commander Terry C., USN. "Obey the Iron Law (Unity of Command at Sea)." *U.S. Naval Institute Proceedings*, November 1997, 28-31.
- _____. "Operational Maneuver From the Sea." *U.S. Naval Institute Proceedings*, August 1994, 30-34.
- _____. "Taking Maneuver Warfare to Sea." *U.S. Naval Institute Proceedings*, April 1995, 74-77.
- Powers, Major Joel R., USMC. "Amphibious Lift Deficit: Is the Risk Necessary?" *Marine Corps Gazette*, March 1996, 16-18.
- Pugh, Lieutenant Colonel Paul F., USMC. "Operational Art and Amphibious Warfare." *Marine Corps Gazette*, July 1991, 80-85.
- Pyle, Ernie. *Brave Men*. New York: Henry Holt and Company, 1944.
- Reynolds, Major Stephen E., USMC. "Ship-to-Objective Combat Service Support." *Marine Corps Gazette*, June 1999, 31-33.
- Robertson, Lieutenant Colonel Blake J., USMC. "Ship-to-Shore Operations Gain Speed, Survivability." *National Defense*, September 1994, 26-27.
- Rogers, Major Kevin C., USMC. "Fires for Future Amphibious Operations: OMFTS." *Field Artillery*, January-February 1999, 25-27.

- Ruppenthal, Roland G. *Logistical Support of the Armies, Volume I: May 1941-September 1944*. United States Army in World War II series: The European Theater of Operations. Washington: U.S. Army Center of Military History, 1989; reprint, Washington: Government Printing Office, 1953.
- Russell, William H. "Maritime and Amphibious Alternatives." *Marine Corps Gazette*, December 1989, 13-16.
- Sayers, William A. "OMFTS Impact." *Marine Corps Gazette*, September 1999, 48-50.
- Shufelt, Jr., Major James W., USA. "Mobile Firepower for Contingency Operations: Emerging Concepts for U.S. Army Light Armor Forces." School of Advanced Military Studies Monograph, USAC&GSC, Fort Leavenworth, KS, 1993.
- Simpkin, Richard E. *Race to the Swift: Thought on Twenty-First Century Warfare*. London: Brassey's Defense Publishers Ltd., 1985.
- _____. *Red Armour*. London: Brassey's Defence Publishers, 1984.
- Skipper, Colonel Charles O., USMC. "Can we fuel OMFTS?" *Marine Corps Gazette*. Jan 1997, 47-49.
- Slim, Field Marshal the Viscount, *Defeat into Victory*. New York: David McKay Company, Inc, 1961.
- Smith, Captain Arthur M., MC, USNR. "Keeping the Human Pipeline Open: Amphibious Operations and Medical Support." *Marine Corps Gazette*, August 1993, 18-23.
- Stanton, Shelby L. *Rangers at War: Combat Recon in Vietnam*. New York: Orion Books, 1992.
- Stokes, Major Geoffrey W., USMC. "Sea Based Logistics: A Concept Just Over the Horizon." *Marine Corps Gazette*, April 1998, 60-65.
- Stolfi, Russel H. S., *A Bias for Action: The German 7th Panzer Division in France & Russia, 1940-1941*. Quantico, VA: The Marine Corps Association, 1991.
- _____. *German Battle Style in Ultra Mobile, High Intensity War: North African Desert*. Monterey, CA: U.S. Naval Postgraduate School, no date.
- Sward, Lieutenant Colonels Thomas B. and Tommy L. Tyrrell, Jr., USMC. "Marine Light Armor and Deep Maneuver." *Marine Corps Gazette*, Dec 1997, 16-20.
- Tailyour, Colonel R.S., RM. "Future of Amphibious Warfare." *RUSI Journal*, Spring 1991, 33-37.

- Taylor, Thomas. *Lighting in the Storm: The 101st Air Assault Division in the Gulf War*. New York: Hippocrene Books, 1994.
- Toppe, Major General Alfred Toppe. *Desert Warfare: German Experiences in World War II*. Fort Leavenworth, KS: Combat Studies Institute, 1991.
- Tosch, Major David F., USA. "Sustaining Tactical Maneuver on the AirLand Battlefield: Will the Current Support Concept for Supplying Fuel Provide the Means?" School of Advanced Military Studies Monograph, USAC&GSC, Fort Leavenworth, KS, 1986.
- Turley, Colonel G. H., USMCR (ret.). *The Easter Offensive: The Last American Advisors Vietnam, 1972*. Annapolis, MD: Naval Institute Press, 1985.
- United States Marine Corps. "Draft MV-22 Concept of Employment." Quantico, VA: Marine Corps Combat Development Center, 21 February 2000.
- United States Marine Corps. *MCO 8012.1E*. Washington: HQMC, 1997.
- United States Marine Corps. *MEF Planner's Reference Manual*. Quantico, VA: Marine Corps Combat Development Command, 1999.
- United States Marine Corps. "Operational Maneuver From the Sea Working Group Draft Final Report." Quantico, VA: Marine Corps Combat Development Command, 1998.
- United States Marine Corps. *Small Wars Manual*. Manhattan, Ks: Sunflower University Press, no date; reprint, Washington: U.S. Government Printing Office, 1940.
- United States Marine Corps. *United States Marine Corps Warfighting Concepts for the 21st Century*. Quantico, VA: Marine Corps Combat Development Command, 1998.
- Utley, Robert M. *Frontier Regulars: The United States Army and the Indian, 1866-1891*. Lincoln, NE: University of Nebraska Press, 1973.
- Van Creveld, Martin, Steven L. Canby and Kenneth S. Brower. *Air Power and Maneuver Warfare*. Montgomery, AL: U.S. Air Force Air War College, 1994.
- . *Supplying War: Logistics from Wallenstein to Patton*. Cambridge: Cambridge University Press, 1977.
- Vigor, P.H. *Soviet Blitzkrieg Theory*. New York: St. Martin's Press, 1983.
- Walker, Greg. *At the Hurricane's Eye: U.S. Special Operations Forces from Vietnam to Desert Storm*. New York: Ivy Books, 1994.
- West, F.J., Jr. "Ring of Fire - Ring of Smoke?" *U.S. Naval Institute Proceedings*, November 1998, 38-41.

White, Terry. *Swords of Lightning: Special Forces and the Changing Face of Warfare*. London: Brassey's, 1992.

Williams, Lieutenant Colonel Thomas W., USMC. "MEU(SOC): The Jewel in the Crown of Our Corps." *Marine Corps Gazette*, March 1994, 30-32.

Wilson, Colonel Gary I., USMC, Major Chris Yunker, USMC and Franklin C. Spinney. "OMFTS: Innovation, Deep Maneuver, and Aviation." *Marine Corps Gazette*, Dec 1997, 21-23.

Woulfe, Captain James B., USMC. "Achieving Ship-to-Objective Maneuver Before the 21st Century." *Marine Corps Gazette*, March 1998, 21-23.

Yunker, Major Chris, USMC. "Mobility Requirements and the 21st Century MAGTF." *Marine Corps Gazette*, December 1997, 24-26.

ⁱ Heitman, *War in Angola*, 348-356.

ⁱⁱ Heitman, *War in Angola*, 357-364.