U.S. Marines in the Persian Gulf, 1990-1991
MARINE COMMUNICATIONS IN DESERT SHIELD AND DESERT STORM

HISTORY AND MUSEUMS DIVISION
HEADQUARTERS, U.S. MARINE CORPS
WASHINGTON, D.C.

COVER: Two Command and Control variants of the light armored vehicle (LA V C2) outside a command post in northeastern Saudi Arabia during Operation Desert Storm. The LA V C2 was used as a mobile command post by LtGen Boomer and his subordinate division commanders during the war.

U.S. Marines in the Persian Gulf, 1990-1991

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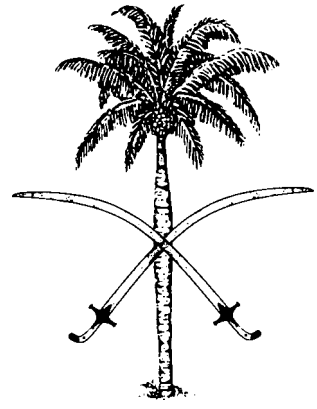

by

Major John T. Quinn II

U.S. Marine Corps

HISTORY AND MUSEUMS DIVISION
HEADQUARTERS, U.S. MARINE CORPS
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Foreword

This monograph is an account of the role of communications within the I Marine Expeditionary Force an the Marine Forces Afloat during the 1990-1991 Persian Gulf War. It is one of a series covering the operations of the I Marine Expeditionary Force; the 1st Marine Division; the 2d Marine Division; the 3d Marine Aircraft Wing; Marine Combat Service Support; Marine Forces Afloat; and Marines in Operation Provide Comfort.

Communications by its very nature is an elusive subject. The technology behind this specialty has changed rapidly in recent years, leaving the individual who comes into only occasional contact with it often perplexed and intimidated by its seeming complexity. This situation is made more difficult by the very nature of tactical communications, which cut across most of the other specialties in the Marine Corps. I is rarely a topic of separate study in military historical writing, except when its inadequacies are said to cause or to contribute to failures on the battlefield.

The author of this monograph, Major John T. Quinn II, USMC, served as a historical writer with the History and Museums Division from January 1994 to July 1996. A communications officer by military occupational specialty, he was struck by the lack of information about tactical communications during previous American military conflicts. He thus set out to capture the essence of the I MEF communications system during Operations Desert Shield and Desert Storm. He intends for it to benefit those who seek a greater understanding of the effort required to support a corps-sized Marine Expeditionary Force at war.

Major Quinn joined the Marine Platoon Leaders Class program in 1981. He graduated from the University of Delaware in 1984 and was commissioned in the Marine Corps. He attended the Basic School and Communications Officer School at Quantico, Virginia. Reporting to the 2d Marine Division in April 1985, he served his first Fleet Marine Force tour as the communications officer for the 2d Light Armored Vehicle Battalion. His next tour was on board the USS *Saipan* (LHA-2), where he served as the officer-in-charge of the Marine Communication Detachment. Transferred to the 3d Marine Aircraft Wing (MAW) in November 1989, he served in a variety of billets with Marine Wing Communication Squadron 38 until May 1992.

During his tour at the 3d MAW, Major Quinn deployed to the Persian Gulf region from August 1990 to March 1991, where he participated in Operations Desert Shield and Desert Storm. He subsequently earned a master's degree in national security affairs from the Naval Postgraduate School in Monterey, California. He joined the History and Museums Division in January 1994. Besides writing this monograph, Major Quinn served as the primary researcher for the planned single-volume history of Marines in the Gulf War, and he also deployed as a field historian during Operation Uphold Democracy

in Haiti in the fall of 1994.

Unless otherwise noted, the material in this monograph is based upon the command chronologies of Marine units participating in Operations Desert Shield and Desert Storm from July 1990 through June 1991. These chronologies are on file with the Archives Section, Marine Corps Historical Center, Washington Navy Yard, Washington, D.C. 20374. The other primary sources for this monograph are approximately two dozen taped oral history interviews conducted by the author with key Desert Storm participants between April 1994 and May 1995. These sources have been augmented by articles, after-action reports, and letters provided to the author by interested Marines. All are contained in the Desert Storm Communications folder on file at the Marine Corps Historical Center.

Marine Communications in Desert Shield and Desert Storm is the work of one officer who participated in the conflict with the 3d MAW. We invite comment, amplification, and correction.

M. F. MONIGAN
Colonel, U.S. Marine Corps
Director of Marine Corps History and Museums

Preface

On the morning of 2 August 1990, I heard about the Iraqi invasion of Kuwait from a radio broadcast during my commute from my home in Rancho Santa Margarita, California, to my place of duty at Marine Corps Air Station, El Toro. I had joined the 3d Marine Aircraft Wing there about eight months before as a newly minted captain. Temporarily serving as the operations officer of Marine Wing Communication Squadron 38 pending the arrival of an inbound major, I was struck by the business-as-usual approach that many there on base took upon hearing the news out of the Persian Gulf region.

I should not have been surprised. The U.S. Government's initial public reaction was one of condemnation, but the absence of an immediate military alert reflected Kuwait's uncertain status vis-a-vis the U.S. Kuwait and the U.S. had no codified defense arrangements, and by all appearances, the Kuwaitis expected that their independence from the world's two superpowers and their oil wealth would combine to protect their interests. By first light in California on 2 August, it was clear that they had badly miscalculated their security needs.

Although it regularly deployed many of its fixed- and rotary-wing squadrons on board ship or to the Western Pacific region and occasionally dispatched composite aircraft groups for overseas training exercises, the 3d MAW had not deployed as a unit from its Southern California home in many years. It seemed for a short while in early August that the invasion of Kuwait was not going to upset this track record. Within a few days, of course, this approach changed dramatically when President George Bush decided to dispatch the first group of what would eventually amount to nearly half a million American servicemen to the Persian Gulf region initially to protect Saudi Arabia and later to liberate Kuwait from Iraqi occupation.

I departed for Saudi Arabia just after daylight on 20 August 1990 on board a Boeing 747 with the initial detachment of my squadron. After my first two weeks in Bahrain, in early September I moved to Jubayl, Saudi Arabia, and took command of a communication unit located at the airfield nearby. For most of nearly seven months, I performed the duty of providing external communications links to the airfield and to its tenant units as well as serving as the communications officer for Marine Aircraft Group 16. After the 17 January 1991 commencement of Operation Desert Storm, I relocated my unit northward to Tanagib, Saudi Arabia, where MAG-16 and other units operated from until their March 1991 departure for the U.S. after the cease-fire agreement.

A little more than a year after my return from the Gulf War, I detached from the 3d MAW and reported to the History and Museums Division for duty as a historical writer. Since I had no formal training as a historian, the Director of the Division, Brigadier General Edwin H. Simmons, USMC (Ret), and the Chief Historian, Mr. Benis M. Frank, directed that I develop a small project from which

I could begin my research of Marine operations in the 1990-1991 Persian Gulf War while at the same time learning the fine points of the profession of military historian.

The topic that I chose for this small project was Marine communications during the Gulf War. Having spent the majority of Operations Desert Shield and Desert Storm in theater, I believed that there was an interesting story to tell. In the decade prior to the Gulf War the fields of communications, information systems, and electronics maintenance grew increasingly complex and interrelated thanks mainly to the widespread introduction of the microcomputer into tactical units in the U.S. military. I believed that an understanding of the expertise and equipment needed to facilitate the command and control of a corps-sized Marine force would be facilitated by a short and readable history.

My initial review of unit command chronologies from the period underscored my earlier impression that communications personnel do not often record their efforts in any great detail in prose. They tend to express their ideas in Communication Annexes supported by radio guard charts, bubble charts, and wire diagrams. Since I had experienced in reality only a small portion of the extraordinary communications network established by Marines during the conflict, this paucity of written material had the fortunate effect of forcing me to solicit interviews and accounts from Marines at all levels of communications staff and command positions during Desert Shield and Desert Storm.

My call for support for the project was answered with enthusiasm from my colleagues around the Marine Corps. Many officers provided extensive oral histories and then took additional time to answer repeated follow-up questions or to provide important documentation. Others continued in this vein by reviewing various drafts and providing meaningful clarifications and editorial advice. The efforts of Colonel Robert G. Hill, Colonel Timothy J. Himes, Colonel Glenn R. Williams, and Lieutenant Colonel Nicholas C. Petronzio were particularly helpful in this regard. Others who made substantial contributions to this work include Lieutenant Colonel Leslie A. Duer, Lieutenant Colonel Mateusz K. Jastrzebski, Lieutenant Colonel Lawrence E. Troffer, Lieutenant Colonel William S. Febuary, Major Timothy G. Learn, Major Gerald R. Boeke, Major Michael J. Smith, Major George P. Elsasser, Major Patrick C. Regan, Major John E. McKnight III, Captain David M. Salyer, and Captain Erik J. Knutila.

Within the History and Museums Division, Mr. Frank, Dr. Jack Shulimson, and Mr. Robert E. Struder encouraged me to use the active voice, express my thoughts in plain English where possible, and avoid splitting my infinitives. They also taught me many of the intangibles that combine to form the art of writing good operational histories. Mr. Charles R. Smith contributed important advice and prepared the index. Colonel Michael F. Monigan, Lieutenant Colonel Dave Beasley, Jr., Captain David A. Dawson, Captain John T. Simpson, Mr. Frederick J. Graboske, Mr. W. Stephen Hill, and Ms. Evelyn A. Englander also made important contributions to this work through their invaluable support. Mrs. Catherine A. Kerns designed the volume and produced it through desktop

publishing techniques. Brigadier General Simmons, now retired from his long and fruitful stewardship of the Marine Corps Historical Program, has been an example to me of what a thoughtful and articulate gentleman can contribute to the Marine Corps and to the country over the course of a lifetime of service.

While I have a long way to go before I can claim the title of Marine historian, my apprenticeship in the field has been a highly rewarding experience thanks to the men and women of the Marine Corps Historical Center. I am grateful for the chance to serve with them. Finally, I would like to thank the Marines of Unit A, MWCS-38. They took great pride in doing the most with the least for seven months while perched on the edge of the Arabian desert. This work is dedicated to their spirit and perseverence.

J. T. QUINN II
Major, U.S. Marine Corps

Table of Contents

Foreword iii
Preface v
Table of Contents ix

Opening Moves

Internal Look '90 and Early Desert Shield
July-October 1990

Warning Order: August 1990 1
July 1990: Business as Usual Exercise Internal Look '90 2
Around the Fleet Marine Force 6
August 1990: The Deployment of the 4th and 7th MEBS; Warning Order and Initial Embarkation 10
The 7th MEB Prepares to Deploy to Southwest Asia 11
The 4th MEB Mounts Out 12
I MEB Early Communications Planning 15
Early Joint Communications Support 15
The Movement of the 7th MEB to Southwest Asia 17
The Establishment of the 7th MEB Communication System 21
Late August: Expanding the 7th MEB Communication System 23
The Deployment of Elements of the 1st MEB 23
September 1990: From 7th MEB to I MEB; The 'Compositing' of the Staffs and Initial I MEF Organization 24
From MAG-70 to 3d MAW 25
From BSSG-7 to 1st FSSG 26
The 1st Marine Division Deploys to Saudi Arabia 26
Refining the I MEB Communications System 28
Forces Afloat: The 4th MEB and the 13th MEU(SOC) 30
October 1990: The Maturing I MEB Communications System; I MEB Looks to the Future 31
Joint Communications Issues in the `Maturing' Theater 32
The 1st Marine Division Leans Forward 34
The 3d MAW and Air Control Communications 35
The 1st FSSG Expands Outward from Jubay 37
Forces Afloat: The Start of the Sea Soldier Exercises 37
Period Summary 38

From Defense to Offense

Late Desert Shield: Reinforcement and Redeployment, November-December 1990

November 1990: `Imminent Thunder' and `Devil Dog' I

The I MEF Command Post Displacemen 39
The 3d MAW Looks Ahead 40
The 1st Marine Division Plans for the Offense 42
The 1st FSSG Repositions Forward 43
Forces Afloat 44
December 1990: The Reinforcement of I MEF 44
The Deployment of the 8th Communication Battalion 45
The I MEF Main Goes North 46
The 3d MAW Headquarters Shifts to Jubayl 47
The 1st Marine Division Moves Closer to Kuwait 49
The 2d Marine Division Deploys to Saudi Arabia 49
The Tiger Brigade and Mobile Subscriber Equipment 51
The Reinforcement of the 1st FSSG 52
Forces Afloat 53
Period Summary 54

Desert Storm and After, January-March 1991

January 1991: From Shield to Storm

I MEF Girds for Start of Desert Storm 56
The 3d MAW Positions for the Fight 57
The 1st Marine Division: Prelude to the Storm 59
The 2d Marine Division: From Jubayl to Kibrit 62
The Direct Support Command is Established at Kibrit 64
Forces Afloat: Reinforcement and Rehearsal 65
Early and Middle February: The Shift Further West and Final Assembly 66
I MEF Extends Westward to the Gravel Plain 66
The 1st Marine Division: Preassault Preparations 67
The 2d Marine Division: Preassault Preparations 69
The Direct Support Command: Movements to `Al Khanjar' 70
The 3d MAW: The Air War Continues 71
Forces Afloat: Waiting and Watching 72
Late February: The Ground Campaign 73
I MEF: Command from the Front 74
I MEF Mobile Command Post Operations 75
The I MEF Alternate Command Post 76
The 1st Marine Division: The Assault on the Right 76
The 2d Marine Division: The Assault on the Left 80

The 3d MAW: Forward into Kuwait 81
The Direct Support Command: Operations in Kuwait 82
Forces Afloat: Feints and Faylaka Island 83
Cease-Fire Operations: March-May 1991 84
Conclusion 86

Notes 89

Appendix A: The State of Fleet Marine Force
Communications Summer 1990 95
Appendix B: Glossary of Communications Equipment 111

Index 116

Marine Communications in Desert Shield and Desert Storm

Opening Moves
Internal Look `90 and Early Desert Shield
July - October 1990
Warning Order: August 1990

Although Colonel Robert G. ("Glenn") Hill was later to appreciate his situation, he found little time to do so in the hectic first weeks of August 1990. As for any career military officer, the opportunity to participate in a major contingency operation was already an exciting personal and professional prospect. For him to be intimately familiar with the circumstances and details of that operation well ahead of time was an extraordinary piece of good luck.

Prior to 1990, Colonel Hill's only direct experience in a full-blown contingency or combat environment had been in Vietnam, where he had served in a variety of communications billets with the 5th Communication Battalion and the III Marine Amphibious Force staff in 1967 and 1968. With more than 24 years of commissioned service, he now was presented the opportunity of a lifetime: to plan and oversee the development of what would become the largest tactical communications system that the Marine Corps had deployed in a generation.

First, though, he had to report in to the I Marine Expeditionary Force (I MEF) headquarters at Marine Corps Base, Camp Pendleton, California. He had just departed the Tampa, Florida-based U.S. Central Command (CentCom) on 31 July 1990, and on 2 August was on leave in eastern Texas enroute to I MEF when he heard news reports of the Iraqi invasion of Kuwait. Having spent the previous three years in CentCom's J-6 Directorate (responsible for communications and related areas), he recognized the seriousness of this situation and immediately attempted to contact the I MEF Chief of Staff to inform him of his status and whereabouts. Unable to do so on 2 August, he succeeded the next day, when he was advised that there was no need at that time for him to change his leave plans. On the evening of the 4th, however, the I MEF G-6 Operations Officer, Major Donald L. Waggett, Jr., called back and advised him that his presence was required as soon as possible at Camp Pendleton. Colonel Hill told Waggett that he should be able to finish his drive across the remainder of the country by the evening of the 6th, and thus within a few hours he was on the road heading west. Throughout southern California and Arizona on 2 August, Marines learned of the invasion of Kuwait through a variety of sources. Many of the officers and enlisted personnel of I MEF understood that this event could affect them directly, since

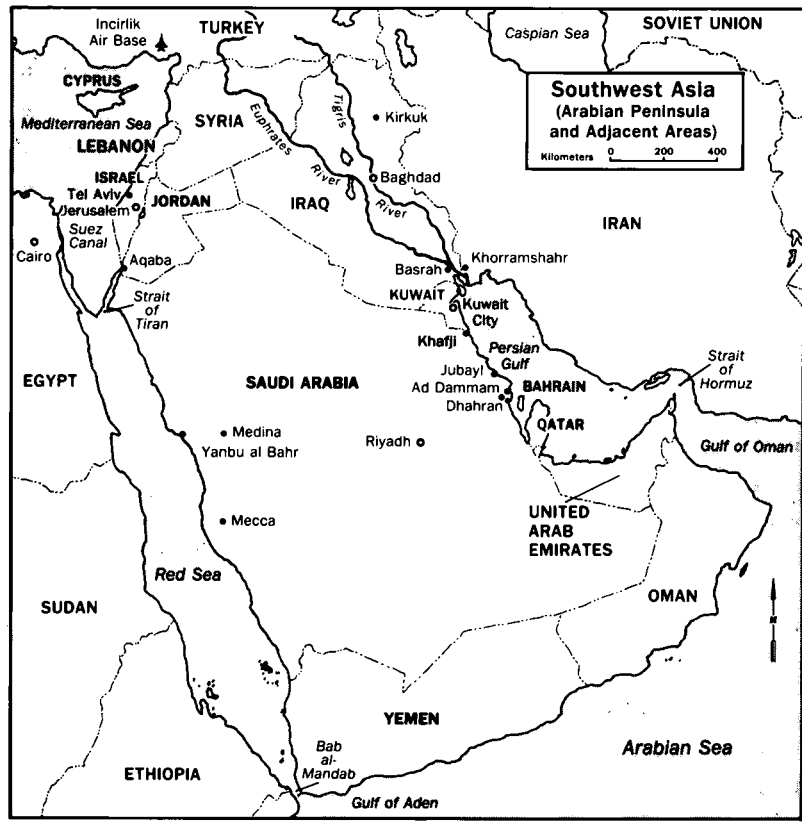
the Middle East was I MEF's primary area of responsibility (AOR). A select few I MEF Marines had even recently participated in a CentCom-sponsored war game (Exercise Internal Look `90) which had postulated a major deployment of U.S. forces to the region in response to an Iraqi move southward.

How this would unfold with respect to Marine command and control communications in the Persian Gulf region in the days and months ahead could not be foreseen, but as the contingency progressed there was a recognition by Colonel Hill and others that Joint and other Service communications support to I MEF would be essential from the outset. This was so because the Fleet Marine Force (FMF) had only recently begun a fundamental transition to more modern tactical communications means-a move that had been largely completed by the Corps' sister Services by the summer of 1990. This lag in the fielding of the newer generation of equipment by the Corps presented many obstacles to effective communications in a joint operations environment, and the only way to overcome them was through the cooperation of the other Services and the Joint Staff.

A second challenge confronting I MEF's new G-6 was a purely internal one. Having spent his last two tours on the staffs of unified commands (he was at the U.S. Atlantic Command prior to his time at CentCom), Colonel Hill's "hands on" experience with FMF communications was dated, and his personal knowledge of his subordinate communicators was limited. Hill's highly favorable initial impressions of some of I MEF's senior communications officers generated during a recent joint exercise helped cement a strong working relationship from the start, but a broader and deeper understanding of I MEF's internal conditions could only develop with time. Thus, from his arrival at Camp Pendleton, Colonel Hill concentrated on what he knew best joint communications-and relied on the judgement and experience of his assistants in the G-6 section and the senior leadership of the MEF's subordinate communication battalion to engineer the internal I MEF communications system.

July 1990: Business as Usual
Exercise Internal Look '90

The late spring and early summer of 1990 found I MEF personnel immersed in a progressive series of command post exercises (CPXs) directed by CentCom. These exercises had come about as a result of a reassessment by the Commander-in-Chief (CinC) of CentCom, General H. Norman Schwarzkopf, USA, of the nature of the threats facing the U.S. and its allies in his geographic AOR in wake of the cessation of the Iran-Iraq War and the demise of the Cold War. Encompassing a rough triangle of earth bounded by Egypt to the west, Pakistan to the east, and the Horn of Africa to the south, CentCom's AOR-known as the Middle East and Southwest Asia in Department of Defense parlance-was of great strategic interest to the United States primarily because of the presence there of much of the world's known proven reserves of oil and natural gas.



The capstone of CentCom's reassessment effort was a CPX at Eglin Air Force Base, Florida, in late July 1990 designed to test CentCom's ability to defend the Arabian Peninsula against an Iraqi invasion. As the designated Marine forces component commander for CentCom (MarForCent, normally shortened to MarCent), Major General John P. Monahan, the commanding general of I MEF, deployed to the Florida panhandle for this exercise-designated Internal Look '90-with a select staff and a small detachment from I MEF's 1st Surveillance, Reconnaissance, and Intelligence Group (1st SRIG). The 1st SRIG detachment was tasked to provide austere command and control communications and intelligence support for the I MEF commanding general during the exercise.

I MEF, as all major Marine combat forces, was configured to be a balanced ground, air, and combat service support team with a common commander. This tri-elemental structure-known as a Marine Air-Ground Task Force (MAGTF)-formed the standard package under which Marine Expeditionary Units (MEUs), Brigades (MEBs), and Forces (MEFs) trained, deployed, and fought. In the case of I MEF, its three major subordinate commands (MSCs) consisted of the 1st Marine Division (1st MarDiv), the 3d Marine Aircraft Wing (3d MAW), and the 1st Force Service Support Group (1st FSSG). In addition to his command of I MEF, General Monahan was also "dual-hatted" as the commanding general of the 1st MarDiv. Major General Royal N. Moore, Jr., commanded

the 3d MAW, and Brigadier General James A. Brabham, the 1st FSSG.

Within the FMF of mid-1990, the SRIG was a relatively new component of the MEF, having been formed by then-Commandant of the Marine Corps General Alfred M. Gray only in 1988. The SRIG did not have the status of a major subordinate command, as it was designed to serve as an "administrative" (or "type") vice "warfighting" command element for the various specialized "cats and dogs" units that supported the command and control function of each MEF headquarters location. These units included the Force Reconnaissance Company, Air and Naval Gunfire Liaison Company (ANGLICO), and Remotely Piloted Vehicle (RPV) Company, as well as the newly formed Intelligence Company. Although not mentioned in the group's title, the single largest subordinate unit of the SRIG was the communication battalion.

The detachment from the 1st SRIG supporting Exercise Internal Look `90 was commanded by Lieutenant Colonel Robert M. Shea, who had commanded the 9th Communication Battalion since 1989. Captain Timothy G. Learn, 9th Communication Battalion's operations officer, headed the battalion's exercise detachment, which consisted primarily of communications center and field wire personnel. Lieutenant Colonel John B. Hall was the I MEF G-6 during the exercise in wake of the recent departure of Colonel Sam C. McKee from the command.

The previous decade had seen a revolution in U.S. military communications driven largely by the spread of digital electronic technology. For most of the 20th century, communications devices were constructed based on analog electronic technology. The continuous wave signals on which analog electronics were based limited the speed and the precision with which information could be exchanged between machines. The "digitization" of continuous wave signals-whereby these signals are broken down into discrete bits of information-served to alter completely the basis of modern communications. These discrete, or digital, bits of information, when combined in a structured manner, formed information streams that could be processed, stored, and transmitted virtually instantaneously. The rise of digital information technology began to transform military communications at the national level in the 1970s, and by the 1980s it was being fielded in the theater and tactical systems of all the Services.

With the increasing emphasis on the development and procurement of interoperable systems throughout the Department of Defense, the Marine Corps in the 1980s joined the Army and Air Force in adopting the Tri-Service Tactical Communications System (TriTac) as its next-generation equipment. This system consisted of a range of compatible, digital, secure telephone switches and their associated radio equipment. At the center of this system would be a large-capacity (approximately 300 subscribers), digital, secure telephone switch, the TTC-39, and an equivalent message switch, the TYC-39. The Marine Corps purchased neither because of their high cost, complexity, and size, but opted instead for the intermediate (approximately 150 subscribers) switch, the TTC-42, and an automated message terminal, the MSC-63, for use at the MEF, division, aircraft wing, and FSSG headquarters levels. The Marine Corps also purchased a small (45 sub-

scribers) digital switch, the SB-3865, for use at the regimental and aircraft group-level headquarters.

As of the summer of 1990, none of this new equipment had been fielded with FMF units, but the 9th Communication Battalion did possess a small allocation of prototypes for field testing purposes. Thus, the FMF largely remained in the world of analog telephone communications at a time when the other services had nearly completed their leaps into digital communications. Although in designing the new equipment some allowances had been made for interoperability with the old, the net result of the Corps' budget-driven delay in the procurement and fielding of TriTac equipment was that it lagged far behind the Army and Air Force in terms of modem tactical communications capability.

For Internal Look `90, the 9th Communication Battalion employed a device called a remote multiplexer-combiner (RMC) to tie into the joint digital telephone network instead of its test bed TTC-42 or SB-3865 telephone switchboards. In field testing, both of these had proven to be incompatible with the TTC-39 switch normally operated by the Army, the Air Force, and the Joint Communications Support Element (JCSE) that provided the CinC's communications. Until this was corrected, the only feasible short-term solution was to work around this problem through the use of a RMC, which enabled eight digital telephones to be extended directly off a TTC-39 and over long-haul radio links to a remote site without the use of an intervening TTC-42 or SB-3865 switch. This technique of extending telephone service off a switch to a distant location was known as "remoting". As long as a digital-capable electronic path could be created between where the Marine headquarters was located and a TTC-39, the use

of several RMCs would provide limited digital secure-voice telephone service to the general and his staff.'

From the perspective of Colonel Hill, then on his last exercise as the operations officer for CentCom's J-6 Directorate before his scheduled transfer to I MEF, the use of this technique was absolutely essential in order for I MEF to be a full member of the joint warfighting team. In Hill's experience, previous exercises, most notably Gallant Eagle `88 in California, had "... clearly demonstrated that without this [joint] support the Marine Corps would not be an active participant in the joint digital network."[2] As a result, the CentCom J-6 had incorporated follow-on plans that the Marines would tie in with their RMCs to either the CinC's or one of the other services' TTC-39s via wire, microwave radio, or satellite communication means. Thus, for Internal Look `90, I MEF used the closest TTC-39 at the Duke Field site-the Ninth Air Force's-to tie in with the rest of the joint communication system.[3]

Just prior to the Internal Look `90 exercise, the 9th Communication Battalion undertook several initiatives in the area of Marine tactical communications. Adopting some of the new technical communications software employed by the JCSE, the battalion moved away from the Corps' dependence upon limited capacity teletype gear to a fully automated digital system through the use of custom computer cards (called TEQCOM cards) and software.* Prior to the exercise, the battalion made arrangements with the manufacturer of the cards for a 30-day test. With the assistance of Major Kevin A. Hoey, the CentCom automated message processing switch security officer (AMPSSO), the I MEF Marines learned to use the card and its associated software with the CentCom TYC-39 digital message switch. The TYC-39 automatically routed electronic messages to and from subordinate and senior switches or terminals. Quickly borrowing this technique, the 9th Communication Battalion then worked with the transition of the I MEF special security communication team (SSCT) to install similar computer software for its system.** Thus, by the start of Internal Look `90, the Marine Corps operated an automated communication center providing both general service (GenSer) and special intelligence (SI) messages in the field for the first time.

The exercise went as planned, but not without some anxious moments on the part of I MEF's communications personnel. A commercial base telephone cable running under the airstrip at Duke Field that carried telephones and data

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* The JCSE, based at MacDill AFB, Florida, was a specially configured communications unit under the direct control of the Joint Staff. Its mission was to provide contingency communications support to the unified commands.

** The Department of Defense's AUTODIN system connects to the various service automated message switches through what are termed Mode I or II terminations. Their use depends primarily on the available satellite bandwidth. A Mode I termination uses greater bandwidth, because its signal includes automated error correction and channel controls. A Mode II termination is absent these desirable features, but it makes available bandwidth for other uses.

lease lines to the Marine area was accidentally cut by a construction crew just before the start of the exercise. This cable could not be quickly repaired, forcing an extraordinary effort to reroute the MEF's lines around the airfield with 13-1/2 miles worth of special wire flown in at the last minute from California. Severe thunder storms in the area the day before the start of the exercise set off tornado-like wind gusts. During one such storm, high winds deposited neighboring Army tents and equipment on top of the I MEF system control and technical control (SysCon and TechCon) facility, virtually destroying it and delaying the MEF's full participation at the start of the exercise while the damage was repaired. In addition, severe lightning plagued the participants throughout the four days of the exercise, necessitating frequent repairs to cable and equipment. [4]

Internal Look `90 came to a close at the end of July, and the various service component communication units quickly tore down their field systems and returned to their home bases. While they were packing up, news and intelligence reports continued to highlight contentious negotiations between Iraq and Kuwait over repayment of war debts and charges of Kuwaiti "slant" drilling into the Iraqi side of an oil field that straddled their common border. Even so, few of the communications personnel involved in the exercise imagined that they would be working together again on the other side of the globe in a matter of weeks.

Around the Fleet Marine Force

Aside from activities surrounding Internal Look `90, the focus of much of I MEF was on preparation for the deployment of Major General John I. Hopkins' 7th Marine Expeditionary Brigade (7th MEB) to Turkey for NATO's Exercise Display Determination `90. Even as tension in the Persian Gulf region steadily increased, so too did the press of exercise planning and preparation throughout I MEF, since the main body of the brigade was to begin its deployment in just over a month. Extensive work had already been undertaken during the preceding months by the 7th MEB staff and those elements of the MEF that were to fall under the MEB for the exercise. For the 7th MEB G-6 and supporting communication units, these pre-deployment activities included site surveys and the early shipment of bulk equipment to save on exercise airlift costs.5

At the sprawling Marine Corps Air-Ground Combat Center at Twentynine Palms, California, the 7th MEB G-6 section under Major Gerald A. Boeke labored to put the finishing touches on the plan for Display Determination `90. This was an unusually complex task, in that NATO operations required a degree of coordination not normally encountered in stateside exercises. [6] Brigade-sized operations also presented challenges inherent in many task-organized Marine operations. In the case of the 7th MEB, two of its three subordinate commands-Marine Aircraft Group 70 (MAG-70) and Brigade Service Support Group 7 (BSSG-7)-were normally no more than "skeleton" staffs that required significant personnel augmentation to perform the wide range of functions expected of them during a major exercise. Their subordinate elements were attached to them from the 3d MAW

and the 1st FSSG on an as-required basis for exercises and deployments. Only the 7th Marines, also based at Twentynine Palms, possessed both a complete staff and the day-to-day command of the bulk of the forces that it needed to perform its wartime mission.

After a pre-Display Determination `90 CPX in mid-July encountered significant difficulties in the execution of the communication plan, General Hopkins decided to repeat the exercise late in the month in order to resolve the problems. The exercise attempted to replicate the distances involved amomg major 7th MEB sites in western Turkey, and these distances approached the maximum reliable operating range of the MEB's terrestrial multi-channel radio equipment. This equipment, known as the AN/GRC-201, combined multiple (12) channels of analog information onto one carrier wave (commonly referred to as multiplexing, or "mux") and transmitted this signal to another set up to 150 kilometers distant. The earlier CPX had witnessed some notable failures of this equipment, and perennial parts shortages already made the AN/GRC-201 somewhat difficult to keep in service. The additional CPX left little post-exercise "get well" time for the communications elements assigned to support the brigade, and thus it was a source of great concern in some I MEF units.

Working closely with the 7th MEB G-6 were the Marines of the 9th Communication Battalion. Major William S. Febuary, the new commander of the battalion's Company B, was the officer directly responsible for the provision of support to the 7th MEB command element. For Display Determination `90, Lieutenant Colonel Shea planned to attach to this company reinforcing teams from both the headquarters and support companies of the 9th Communication Battalion. Company B had been working in direct support of the 7th MEB for several years, while Company A had been paired up with the MEF's other MEB-the 5th-for a similar period.8

Located at Twentynine Palms with the 7th MEB headquarters was Brigade Service Support Group 7, the MEB's nucleus combat service support element. BSSG-7 did not have a standing G-6 section, so these duties were normally performed by a detachment from the parent 1st FSSG communication company headed by Major Christopher M. Weldon. Communication support for Display Determination `90 was to be provided by this detachment, which consisted of two platoons and a headquarters element from the communication company. BSSG-7 was commanded by Colonel Alexander W. Powell.

Just up Interstate 5 from Camp Pendleton was Marine Corps Air Station (MCAS) El Toro, the home of the 3d MAW. The slice of the 3d MAW that was to deploy with the 7th MEB in a contingency or for training had been designated Marine Aircraft Group 70 (MAG-70). MAG-70 was a composite aircraft group headquarters under the command of Colonel Manfred A. Rietsch, who also led the wing's fighter/attack group, MAG-11. The MAG-70 headquarters normally consisted only of a nucleus staff until its activation, at which time it was to be "fleshed out" with a variety of personnel from throughout the wing.

Communications support had been traditionally provided to MAG-70 from Detachment A, Marine Wing Communication Squadron 38 (MWCS-38),

whose commander served concurrently as the MAG communications-electronics officer. The commanding officer of this detachment's parent squadron, Lieutenant Colonel Timothy J. Himes, had only assumed his duties on 12 July, and thus was busily bringing himself "up to speed" on his unit's personnel, operations, and maintenance issues. Under the command of Captain Daniel A. Sarmiento, Detachment A was deeply immersed in the preparation for Display Determination `90. Its sister unit, Detachment B, under Captain William J. Weiss, focused on its role in support of an upcoming Weapons and Tactics Instructor's Course scheduled for September and October 1990 under the direction of Marine Aviation Weapons and Tactics Squadron I (MAWTS-1) at MCAS Yuma, Arizona.[9] Back at Twentynine Palms, the 7th Marines, which served as the 7th MEB's ground combat element, also geared up for the upcoming deployment to Turkey. The position of regimental communications officer was in a period of transition, with Major Darus G. Pelfrey in the process of relieving Captain Mitchell F. Halicki of that duty.[10] The regiment, commanded by Colonel Carlton W. Fulford, Jr., had moved from Camp Pendleton to Twentynine Palms earlier in the year. Because this shift was a permanent change of station move for the Marines of the regiment, only approximately half its personnel at Camp Pendleton were eligible to transfer to the high desert. Thus, the 7th Marines had a significant number of newly joined personnel in the summer of 1990.[11]

Across the country in Virginia and the Carolinas, units of Lieutenant General Carl E. Mundy, Jr.'s II MEF were undergoing a similar experience to that of their west coast brethren. Several thousand Marines from II MEF were soon to be given over to the operational control of the 4th Marine Expeditionary Brigade (4th MEB). Commanded by Major General Harry W. Jenkins, Jr., the 4th MEB also looked forward to an upcoming NATO exercise, although theirs was to take place on the opposite flank of 7th MEB's. Exercise Teamwork/Bold Guard `90, scheduled for the late fall of 1990 in Norway, Germany, and Denmark, would mark the annual return of the 4th MEB to NATO's northern latitudes.

The 4th MEB's command element, based at Naval Amphibious Base, Little Creek, Virginia, was organized along lines similar to those of the 7th MEB, and also did not exercise permanent command over any of its parent MEF's elements. The 4th MEB's G-6 section, under newly-arrived Lieutenant Colonel Glenn R. Williams as of 30 July, worked closely with Lieutenant Colonel Gary R. Bradley's 8th Communication Battalion in preparation for the exercise. The battalion's Company A, the 4th MEB's dedicated communications element, had in July been given over to the command of Captain Robert L. Rusch. Company A was slated to be reinforced by the battalion's other companies in anticipation of its deployment to NATO's northern flank.[12]

The exercise would be an ambitious one, requiring the employment of a wide variety of communications means over several phases of the operation. Even though the opportunity existed to place a heavy reliance on commercial systems, General Jenkins instructed Williams to use tactical equipment wherever possible and to limit host nation communications to exercise overhead requirements such as special flight safety circuits. General Jenkins made it clear to his

G-6 that he wanted the exercise to test fully 4th MEB's tactical communications capabilities. [13]

Based also at Camp Lejeune was the 2d Marines, the 4th MEB's ground combat element commanded by Colonel Thomas A. Hobbs. The 4th MEB's combat service support element-Brigade Service Support Group 4 (BSSG-4)-was garrisoned in the French Creek area of Camp Lejeune. Commanded by Colonel James J. Doyle, BSSG-4 was similar to BSSG-7 in that it consisted of a skeletal staff and thus relied on the communications expertise of its parent FSSG. The 2d FSSG's communications company under Major John F. Hand had prepared extensively for Teamwork/Bold Guard; the BSSG communications effort would be led by Captain Ken L. Rowe with a detachment of Marines from the communication company. [14]

Further up the coast of North Carolina lay MCAS Cherry Point, the home of MAG-40, the 4th MEB's composite aircraft group. Under the command of Colonel Glen F. Burgess, who was also "dual-hatted" as the commanding officer of MAG-14, the MAG-40 headquarters closely resembled that of the West Coast-based MAG-70 in organization and manning. MWCS-28, under the command of Lieutenant Colonel William X. Spencer since 28 June, provided communications support to the 2d MAW, with its Detachment A under Major Thomas S. Soroka dedicated to MAG-40 and Detachment B under Captain Stephen J. Weiss to MAG-60, the 6th MEB's dedicated aviation combat element. As was the case with MWCS-38, both MWCS-28's detachment commanders also served as their respective supported MAG communications-electronics officers.

August 1990: The Deployment of the 4th and 7th MEBs
Warning Order and Initial Embarkation

Iraq's 2 August 1990 invasion of Kuwait quickly altered the planned FMF activities on both coasts. After spending the weekend in a state of high expectation, both I MEF and II MEF received instructions to activate their respective MEBs and prepare them for immediate deployment to the Middle East. On the East Coast, the 4th MEB was to embark on board ships of the Norfolk-based Amphibious Group Two. In southern California, the call went out to the Marines of the 7th MEB. The forward-deployed 13th Marine Expeditionary Unit (Special Operations Capable) (13th MEU[SOCJ), in the Philippines for a scheduled port visit and liberty in the wake of training exercises and humanitarian assistance operations in northern Luzon, watched events unfolding in the Gulf but did not receive the expected call to steam. Instead, the MEU and Amphibious Squadron Five maintained an exercise and liberty schedule until late August, when, reinforced by elements of the 1st Battalion, 6th Marines,they sailed for the North Arabian Sea. [15]

On 8 August, a scheduled change of command took place at Camp Pendleton whereby Lieutenant General Walter E. Boomer relieved Major General John P. Monahan as Commanding General, I MEF. During the same ceremony,

Brigadier General James M. "Mike" Myatt assumed Monahan's duties as Commanding General, 1st Marine Division. Both generals took command in the midst of a hectic week as their staffs labored to coordinate the imminent departure of the 7th MEB for the Persian Gulf region.

The overall American military response to the invasion of Kuwait would be led by General Schwarzkopf from his forward headquarters in Riyadh, Saudi Arabia. He commanded those U.S. forces in the region assigned by the Secretary of Defense to the Central Command through his four service component commanders and his special operations forces commander. General Boomer served as MarCent from his 8 August assumption of command of I MEF. Lieutenant General Charles A. Homer, USAF, in his role as the commanding general of the Ninth Air Force, performed equivalent duties as Commander, U.S. Air Forces Central Command (CentAF). Lieutenant General John J. Yeosock, USA, the commanding general of the Third U.S. Army, was designated Commander, U.S. Army Forces Central Command (ArCent), while the U.S. Seventh Fleet commander, Vice Admiral Henry H. Mauz, USN, assumed the duty as Commander, U.S. Naval Forces, Central Command (NavCent). The 4th MEB and 13th MEU(SOC) would fall under the operational control of NavCent in theater, while the 7th MEB would be under MarCent.

The 7th MEB Prepares to Deploy to Southwest Asia

With the Middle East and Southwest Asia as his command's primary area of responsibility, General Hopkins anticipated the call for the 7th MEB and had actually begun informal deployment preparations before the weekend of 4-5 August.[16] For the 7th MEB, the means of transportation to the Gulf region would be via the Military Airlift Command's Lockheed C-5A and C-5B "Galaxys" and C-141B "Starlifters," McDonnel Douglas KC-10 "Extenders," and a variety of Civil Reserve Air Fleet (CRAF) aircraft departing from aerial ports of embarkation (APOE) throughout southern California and Arizona.

Upon their arrival in the Persian Gulf region, 7th MEB personnel would "marry up" with the bulk of their ground equipment at the Commercial Port of Al Jubayl, Saudi .Arabia, where it would be unloaded from the ships of the Diego Garcia Island-based Maritime Prepositioned Ship Squadron 2 (MPSRon-2). The 4th MEB would get to the theater via the more traditional method of loading up every available amphibious ship with Marines and their equipment and setting sail at best possible speed for the Gulf.

With sealift and airlift assets at a premium due to the massive force deployment, commanders on both coasts had to make certain tradeoffs regarding the composition and flow of units earmarked for the Gulf region. For the 7th MEB, the task of offloading a MPS squadron in the area of Jubayl, Saudi Arabia posed a particular challenge. With Iraqi dictator Saddam Hussein's forces consolidating their hold on Kuwait and seemingly poised to continue their march southward, the projected area of responsibility of the 7th MEB was perceived by General Hopkins to be ". . . a relatively non-permissive environment since the

The Commercial Port of Jubayl, Saudi Arabia, appears in a photo taken during Operation Desert Shield. Nearly all of I MEF's ground equipment entered through this massive pier

arrival ports and airfields were only 12 hours by road from the Kuwaiti border." Given CentCom's initial deployment guidance emphasizing the rapid buildup of ground combat power, General Hopkins accordingly reinforced the 7th MEB's ground combat element as much as possible and pushed it to the forefront of the expected flow of units into theater.1

In a normal or "permissive" MPS offload environment, the early flow of units into the aerial port of debarkation (APOD) would favor the MEB 's combat service support element, since it was charged with the offload, preparation, and allocation of equipment for the rest of the brigade. Ideally, the MPS squadron at Diego Garcia would have been dispatched toward the Gulf in the first hours of the contingency. With this action not being taken by the Pentagon for nearly a week, valuable time was already lost toward the full establishment of the brigade ashore. The front-loading of additional ground combat units at the expense of the build-up of logistics elements delayed this further, as the attendant reallocation of aircraft to support this shift would have significant consequences for the MEB's other elements.

The 4th MEB Mounts Out

For Major General Harry W. Jenkins' 4th MEB, the invasion of Kuwait did not represent an occurrence that at first look necessitated immediate action on its part. With Saudi Arabia and Kuwait in the I MEF AOR and General Jenkins already on notice to prepare to deploy a "suitcase" MEB headquarters to command the unfolding non-combatant evacuation operation (NEO) of American cit-

izens in Liberia (Operation Sharp Edge), it seemed unlikely that the 4th MEB would be committed to this new contingency. Lieutenant Colonel Williams, having served on the CentCom staff from 1985 to 1988, was sure that the Marine response to the invasion of Kuwait would be a "west coast" show. Within a few days he was disabused of this notion: the 4th MEB would deploy to the Middle East with all haste in the upcoming weeks.[18]

The problem of inadequate amphibious lift capacity for a full-fledged MEB deployment had been long-anticipated by Marines. The 4th MEB was forced to cram as much of a full-brigade's worth of equipment-which normally required a mix of approximately 25 to 30 amphibious ships-onto only half that number, with the rest to follow later in Military Sealift Command (MSC) ships or MSC- chartered commercial ships as they became available. This reduction in assault shipping entailed the administrative vice combat-loading of some of the MEB's equipment.

The sudden mount-out of the 4th MEB brought several long-simmering naval command and control disputes to the forefront. Lieutenant Colonel Williams, having spent the previous two years as the G-6 operations officer for Fleet Marine Force, Atlantic (FMFLant), had participated in the regular tug-of-war between his general and the Commander, U.S. Second Fleet, over the use by the latter of the USS *Mt. Whitney* (LCC-20) as a fleet flagship. Funded by the U.S. Congress as dedicated amphibious command ships, the LCCs combined an impressive suite of communications equipment with spacious staff working areas. The *Mt. Whitney* and her sister ship, the USS *Blue Ridge* (LCC-19) homeported in Japan, had nonetheless been taken over by their respective fleet commanders by 1990 to serve as their flagships. The Marines and their amphibious (or "gator") Navy partners had been relegated to amphibious assault ships (LHAs) which, although highly capable in general, were far inferior to LCCs in terms of their command and control facilities.

Thus, General Jenkins requested the *Mt. Whitney* for the 4th MEB and Amphibious Group Two flagship, but as in previous cases the use of the ship was denied to the amphibious forces. The *Mt. Whitney's* Marine Communication Detachment, however, was "cross-decked" to the 4th MEB, where its expertise in shipboard systems was highly valued. As expected, the USS *Nassau* (LHA-4) was assigned instead as the flagship of the amphibious task force. Although generally inadequate to the task in the eyes of Marines, the *Nassau* did possess one important virtue: its communication suite included a WSC-6 SHF SATCOM transceiver, which was normally found only on fleet and select carrier battle group flagships.

The WSC-6 SHF SATCOM offered several key capabilities not available through the WSC-3, which was the standard UHF SATCOM suite found on ships fleet-wide.* From Williams' perspective, the most important was that it allowed

* The WSC-3, an ultra high frequency (UHF) satellite communications transceiver, was normally used for ship-to-shore traffic such as the Common User Digital Information Exchange (CUDIX), the Fleet Broadcast (FBCST) net, but it could also carry the Fleet Secure Voice Communications (Fleet SEVOCOM) net.

access to the worldwide military command and control system (WWMCCS) and its related WWMCCS intercommunication net (WIN). WWMCCS was an invaluable tool that allowed the MEB staff to consult with Headquarters, U.S. Marine Corps, (HQMC) FMFLant, and other commands on various aspects of operations and plans. Perhaps even more significant was the ability to "chat" on subjects up to a "Top Secret" classification with other WWMCCS terminal subscribers. This offered a ready method of passing privileged or sensitive information among commanders and senior staff officers. With the assistance of the U.S. Atlantic Command J-3, a deployable automated response team (DART) which operated a WWMCCS terminal was dispatched to the 4th MEB on board the *Nassau.*[19]

With General Jenkins already concerned with his flagship's command and control limitations, the 4th MEB's communication units were largely spared from cuts resulting from shortages of shipboard space, although the administrative loading of some equipment proved awkward and had to be adjusted later. At Camp Lejeune, the 8th Communication Battalion adopted a "first out, best dressed" policy for Company A, and thus personnel and equipment migrated quickly to Captain Rusch's command.[20]

II MEF's major subordinate commands marshalled communication personnel and equipment to fill out shortfalls in 4th MEB-bound units. The 2d Marine Division attached a position locating and reporting system (PLRS) section from its communication company to the 2d Marines. An individual or vehicle equipped with a PLRS basic user unit (BUU) would automatically have its position updated and displayed on the PLRS master station screen, thereby giving the regimental or division commander continuous tracking of his subordinate elements across a potential battlefield. Gaining two of the division's four PLRS master stations and many of its BUUs, RLT 2 departed the United States with a sizeable portion of the division's PLRS network.[21] As was already planned for Teamwork/Boldguard `90, the 2d FSSG transferred a detachment under Captain Rowe from its communication company to BSSG-4, while the 2d MAW did the same with Major Soroka's Detachment A, MWCS-28. Lieutenant Colonel Spencer joined the MAG-40 staff as its communications officer, thereby freeing Major Soroka to concentrate on preparing his detachment for embarkation and future operations.

The 4th MEB deployed from Morehead City, North Carolina, in three transit groups beginning on 17 August.[22] From the outset, communication among the three groups was rife with problems. The naval telecommunications system was quickly overwhelmed by the sheer volume of record message traffic, with routine messages seemingly disappearing into thin air for days or weeks at a time. Critical information-such as the task force's ships' sailing reports-was not available to the MEB command element as a result because many routine messages were rerouted into the guard mail. As a consequence, the message precedence classification system quickly became inflated as frustrated staff officers "bumped up" normally routine traffic to priority and immediate precedence. With the 4th MEB scattered among three widely separated transit groups during its

movement to the Gulf region, its day-to-day logistics and administrative message traffic could not be transmitted in a timely fashion. The backlog eventually eased somewhat after stricter measures on message releasing authority were instituted throughout the fleet, but valuable time was lost by the 4th MEB in the meantime as it prepared for operations in the Gulf region.[23]

I MEF Early Communications Planning

At Camp Pendleton, Lieutenant Colonel John B. Hall of the I MEF G-6 staff started detailed communications planning for the MEF in conjunction with Lieutenant Colonel Shea and Captain Learn from the 9th Communication Battalion. Learn and his Exercise Internal Look `90 detachment had just returned from Eglin AFB on 1 August, but all thoughts of a possible long weekend quickly evaporated as contingency planning with the G-6 started shortly after receiving word of the Iraqi invasion.[24] Although Hall's specialty was in information systems rather than communications, his role in planning was a central one from the very beginning by virtue of his overall knowledge and his long experience with both the MEF staff and the key personnel throughout the force.[25]

Focusing initially on ensuring that the 7th MEB would have what it needed in theater in the way of communications to perform its mission, Hall, Shea, and Learn determined that a reinforced communication company would be the first out the door, with the remaining elements of the battalion prepared and ready to embark as needed.[26] Colonel Hill-who had just arrived from his cross-country trek from Florida and assumed the G-6 duties from Hall-agreed, but decided that substantial assistance external to the FMF was also required. Having been in the projected Marine AOR several times over the course of his three years at CentCom, Hill knew that a robust civilian telecommunications system existed in Saudi Arabia and Bahrain. Using secure telephones (STU-Ills) available at most Marine installations, advance elements of the 7th MEB would be able to communicate adequately back to the states until the tactical communications system was established. Since the STU-III was base or garrison property and, as such, was technically not a deployable FMF asset, this presented a problem. Colonel Hill, recognizing that the STU-III was a critical means of communication in the current environment, turned a blind eye toward regulations and passed word throughout the MEF to take as many of them to theater as deemed necessary by commanders.[27]

Early Joint Communications Support

For tactical communications, however, Hill was forced to go outside of the Marine Corps to address shortfalls. Working with both the Fleet Marine Force, Pacific (FMFPac) G-6, Colonel Gene D. Schwartzlow, and Colonel John R. Moore, the head of the Telecommunications Branch at HQMC, Colonel Hill requested teams from the JCSE at MacDill AFB in Tampa to tie in the 7th MEB

with CentCom using satellite communication equipment. He also called his recent superior at CentCom, Brigadier General Roscoe M. Cougill, USAF, the J-6, to explain his request.

Colonel Hill wanted three specific systems from the JCSE. The first system was a TTC-39A telephone switch. Even though the Marine Corps had decided not to procure the TTC-39A, the proven capabilities resident in this switch were critical to the mission at hand. As noted earlier, the smaller TTC-42 had only recently been procured by the Corps but had not yet been fielded in the FMF, and he could not afford to deal with the nagging problems between the early-production version of the TTC-42 and the CentCom TTC-39 halfway around the world in Saudi Arabia. Although the use of RMCs during Internal Look `90 had sufficed to support the small I MEF detachment in Florida, they could not be expected to provide the breadth and depth of service required by the 7th MEB in the upcoming deployment to the Gulf.

The second item requested by Hill was a Ground Mobile Forces (GMF) satellite communications terminal off the CentCom GMF system. The "hub" of the GMF system-the TSC-85-could communicate with up to four outlying TSC-93 terminals (or "spokes") through a stationary orbit (or geosynchronous) satellite. Each TSC-93 had a capacity of 12 channels of analog information. Although each MEF had a TSC-85 and four TSC-93s, Hill would need all of the 9th Communication Battalion's TSC-93s just to support internal 7th MEB needs.

Contributing to Hill's dilemma was the fact that all the services' GMF sets were undergoing a significant modification from "A" to "B" versions. The modification converted the analog GMF SATCOM equipment to digital capability. It had recently been completed on I MEF's TSC-85s and TSC-93s, but II MEF's and III MEF's systems were still awaiting their modifications.[28] Since the TSC-85Bs and TSC-93Bs could no longer communicate with their unmodified "A" kin, Colonel Hill had no choice but to request external support pending the modification of the others. With the imminent departure of the 4th MEB, Hill also sought from Cougill and the Joint Staff a JCSE TSC-93B for its use. Concurrently, Major Edward B. Lewis at HQMC worked to arrange for the accelerated modification by the Army of one of II MEF's TSC-93s to the "B" configuration.[29]

The third system requested by Hill was the MSC-71, a vehicle-mounted satellite communications shelter that provided access to a variety of key circuits. This system was one that was specially designed and built to meet JCSE contingency requirements. Consisting of four WSC-3 ultra-high-frequency (UHF) satellite transceivers in a shelter, the system would provide entry into DoD's automated secure voice communications network (AUTOSEVOCOM) and other vital Defense Communications Agency (DCA) circuits. General Cougill readily supported all of Colonel Hill's requests, and in conjunction with the J-6 Directorate of the Joint Staff, the conversion of II MEF's GMF SATCOM assets was moved forward in anticipation of additional requirements.[31]

The Movement of the 7th MEB to Southwest Asia

While Colonel Hill and his section concentrated on the larger issues, at Twentynine Palms Major Boeke and the rest of the 7th MEB G-6 staff focused on the more immediate concern of getting the brigade's communications elements to the theater and planning for their initial employment. Boeke and his section prepared rudimentary radio guard charts, developed circuit prioritization and channelization, and identified initial operating locations to support the 7th MEB in Saudi Arabia.

As planning progressed, General Hopkins decided that the 7th MEB command element initially would be located at the Commercial Port of Jubayl, as would BSSG-7. Regimental Landing Team 7 (RLT 7), built around the headquarters of the 7th Marines, would meet up with its MPS equipment in the port area and then quickly deploy to the northern approaches of the Jubayl area. MAG-70 would locate its headquarters and the bulk of its fixed-wing aircraft squadrons and detachments at a newly opened but still incomplete air base called Shaikh Isa in the southern part of the island state of Bahrain. Because of the limited aircraft parking space at this facility, the group's KC-130s would operate out of Bahrain International Airport on the northern part of the island. MAG-70's rotary-wing squadrons and its OV-l0s would "bed-down" at an old airstrip at the King Abdul Aziz Naval Base at the southwest edge of the city of Jubayl.

As the outline of the pending deployment became clearer, the various communications units within the brigade focused on fleshing out their projected MPS tables of organization (T/Os) and equipment (T/Es). At the 9th Communication Battalion, Lieutenant Colonel Shea and his staff began to shift personnel and equipment within the battalion both to bring Company B up to strength and to prepare to augment it with a heavy slice of Support Company's GMF SATCOM assets. This effort was complicated by an on-again, off-again requirement to be prepared to deploy an appropriately reinforced communication company in support of a possible mount-out by the 5th MEB on board amphibious shipping. Guidance from the 7th MEB prohibiting the assignment of women to Saudi Arabia-bound units in deference to Saudi Arabian cultural norms also hampered the planning effort.

Lieutenant Colonel Shea, already conscious that the bulk of his battalion was likely to follow close on the heels of Major Febuary's reinforced company, was forced from the beginning to forge a compromise between these two competing restrictions. Since women were already prohibited by law from deploying on board amphibious ships, the attempt to limit the early deployment of women to the theater via air quickly began to crumble. The presence of women in key billets and low on-hand personnel strength combined to compel some commanders to deploy virtually every able-bodied Marine in combat support and combat service support units. Even after the threat of an early 5th MEB mount-out faded, this men-only restriction proved highly unworkable. The 9th Communication Battalion had little choice but to deploy several of its female Marines early on with the company supporting the 7th MEB.[31]

Other units within the MEF had to make significant adjustments of personnel in order to accomplish their mission. At the 3d MAW, Colonel Joseph W. Robben, Jr., the designated wing G-6 since relinquishing command of Marine Air Control Group 38 a month earlier, deployed to Saudi Arabia with Major General Moore to serve as his liaison with CentAF. Lieutenant Colonel Phillip J. O'Brien, on the verge of executing reassignment orders to the 5th MEB, promptly stepped up into the G-6 billet. Major Leslie F. Duer, the newly arrived operations officer, became the assistant G-6, and Captain Bryan E. Klinger moved from electronic maintenance to head G-6 operations.

At MWCS-38, Lieutenant Colonel Timothy J. Himes was forced to reconfigure his squadron significantly in order to deploy the requisite number of personnel for a two-airfield MEB aviation combat element. Himes shifted Marines from Detachment B and the squadron headquarters to Detachment A in order to bring the latter up to its authorized strength of nine officers and 191 enlisted men. The now-depleted Detachment B was transformed into Unit A, a communications detachment of 2 officers and 44 enlisted Marines who had previously been cadre. Captain William J. Weiss, formerly the Detachment B commander, took command of this smaller detachment.[32]

Lieutenant Colonel Himes, in command for only a month but having served as the operations officer of MWCS-28 in a previous tour, was faced with a dilemma while he readied his unit for departure. Himes observed that the demands of pre-deployment planning and preparation had quickly overwhelmed the capabilities of the detachment headquarters to serve as both the MAG communications-electronics section and resident communications support element. Spurred on by the fact that Detachment A and Unit A combined amounted to well over half the squadron's on-hand strength, he decided within a week to take command of the deploying detachment himself and to assign Captain Daniel A. Sarmiento to MAG-70 as its full-time CEO.[33] Like the MEF's communication battalion commander, Himes kept an eye on the future deployment of the remainder of the unit, but his immediate effort was placed on the challenge of adequately supporting and tying together MAG-70's widely separated airfields in theater. Lieutenant Colonel Himes appointed his recently arrived operations officer, Major Stephen H. Copley, as the officer-in-charge of the MWCS-38 rear element, with instructions to prepare for its deployment to the theater in the near future.[34]

At the 1st FSSG, the commander of its communication company, Major Christopher M. Weldon, prepared a BSSG detachment from his company for deployment under his executive officer, Captain Ricardo S. Hackney. The company labored under constraints similar to those facing the 7th MEB's other large communication units, but it had the additional problem of having one 30-man communication platoon out with MSSG-13, and another (MSSG-11) due to depart in a few months with the 11th MEU(SOC). Weldon was, nonetheless, able to put together a detachment of nearly 100 Marines under Hackney's command while holding some deployable male Marines in reserve.

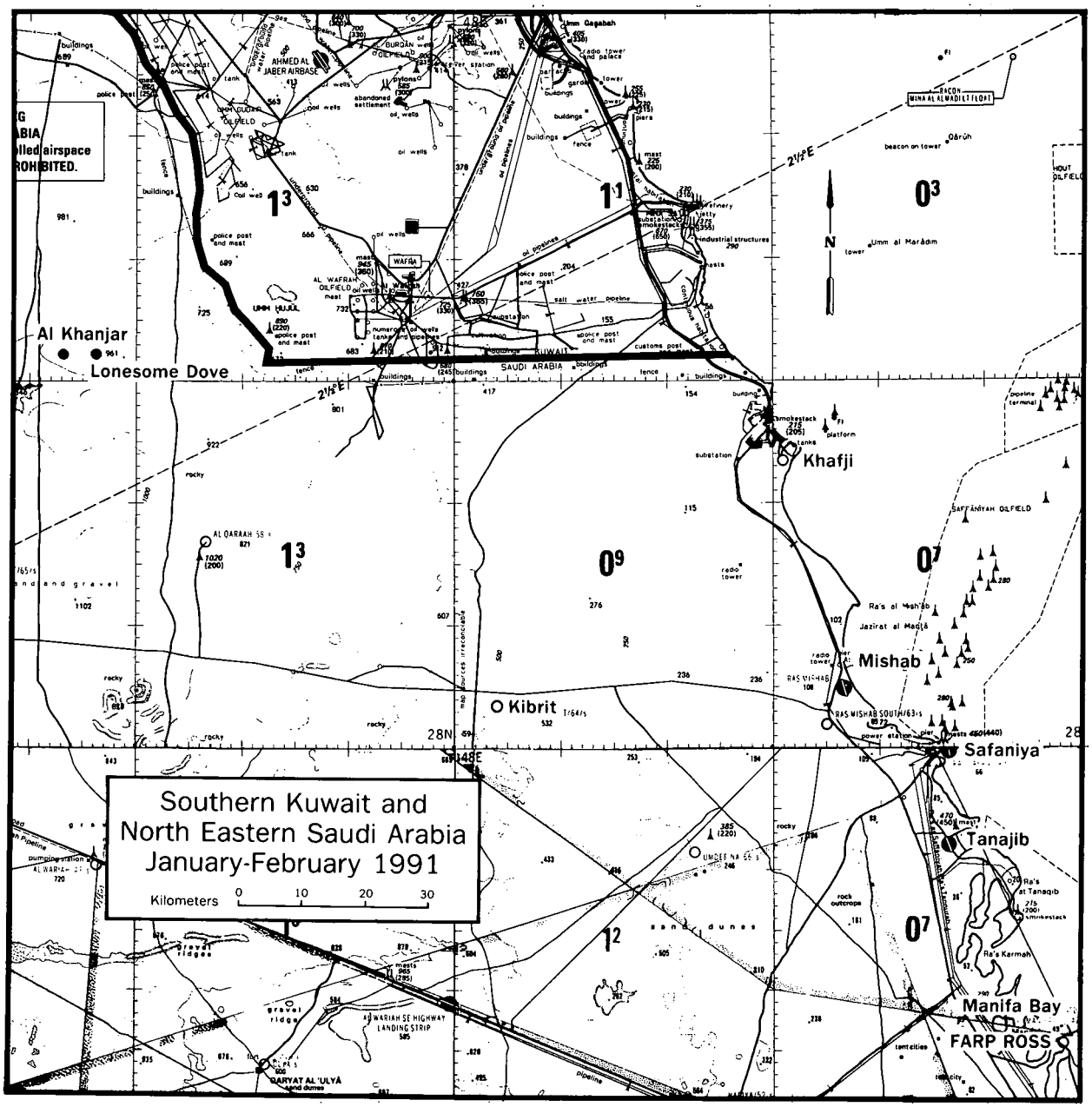
The alteration of the 7th MEB's airlift flow to confront the threat conditions affected its communication units unevenly. Major Febuary's Company B,

9th Communication Battalion, heavily reinforced by elements from Major Frank E. Mikolajczak's Support Company, retained its early spot in the airflow and was able to bring the majority of its planned-for equipment and personnel. They started their movement to theater on 11 August as part of the MEB's survey, liaison, and reconnaissance party (SLRP). Both a TSC-96 satellite communication center van and a TSC-95 high frequency (HF) defense communication system (DCS) entry van were included in this phase, as were significant single channel HF radio assets. Both vans were in place and operating at the Commercial Port of Jubayl by the 15th. Within a few more days the JCSE TSC-93B GMF SATCOM van requested by Colonel Hill arrived and was put into operation at Jubayl, providing " ... theater wide tactical telephone connectivity and AUTOVON [automated voice network] access through CentCom's TSC-85." [35]

The 7th Marines, heavily reinforced by tanks, engineers, light armored vehicles (LAVs), amphibious assault vehicles (AAVs), and artillery to become Regimental Combat Team 7 (RCT 7), moved up in the airlift queue as a result of General Hopkins' decision to accelerate the deployment of his ground combat element. Beginning with the 1st Battalion, 5th Marines, on the 15th, the movement of RCT 7 dominated the available airlift for the next four days, with the notable exception of Marine Light/Attack Helicopter Squadron 369's (HML/A-369) Bell Textron AH-1W "Super Cobras" and UH-1N "Hueys." The 7th Marines' communication platoon deployed several Marines with the SLRP on 12 August, and by the 22d the remainder of the platoon had arrived at Jubayl. [36] On the 19th, elements of BSSG-7 received airlift priority along with the 2d Battalion, 7th Marines, and the 3d Battalion, 9th Marines, followed on 20 and 21 August by more helicopter squadrons and elements of MACG-38. The 23d through the 26th saw the deployment of the remainder of BSSG-7 and MAG-70's fixed-wing squadrons. [37]

As MAG-70 adjusted to General Hopkins' deployment plans, the timing and allocation of airlift for its MACG-38 detachment shifted somewhat. The perceived threat posed by the Iraqi Air Force dictated the need for sizeable ground-based air defense assets for the group, and thus two understrength firing batteries (rather than one full battery) consisting of a total of four HAWK firing units were inserted into the flow.[38] This and other substitutions resulted in the reduction in lift and postponement of the movement of other MACG units to the theater. One such unit was the MWCS-38 detachment, which was delayed for several days and initially received only nine of its scheduled eighteen C-141 equivalent loads of fly-in-echelon (FIE) equipment, although the last minute addition of a cargo-configured Boeing 747 added three more C-141 equivalent loads.[39]

Another significant substitution within MACG-38 involved the deployment of Marine Air Control Squadron 1 (MACS-1). The squadron, which fielded one of the wing's two Tactical Air Operations Centers (TAOCs), was in the process of testing two developmental prototypes of the Corps' Tactical Air Operations Module (TAOM). The wing and group viewed these modules, examples of the Marine Corps' long-term investment in modem digital-based command and control facilities, as being better suited to the high-threat nature of the


Southern Kuwait and
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theater. The major problem with the TAOMs' deployment to Saudi Arabia, however, was the lack of a maintenance support base within the Marine Corps for this unique and highly complex system. Relying at this stage primarily on contractor support, it was recognized from the outset that it would be difficult to keep the TAOMs in service for long on the other side of the earth from Camp Pendleton. Nevertheless, the group felt the risks were worth the greater capabilities offered by the modules, and so they were deployed to Saudi Arabia.

The Establishment of the 7th MEB Communication System

As various units flowed into theater, the communications system gradually expanded from the civilian telephone and tactical HF radio network of the SLRP to an extensive tactical command and control system at month's end. At the Commercial Port of Jubayl, the Marines of the 9th Communication Battalion installed a small analog telephone system in the MEB command post area while awaiting the arrival of the JCSE TTC-39 telephone switch. They quickly established a UHF SATCOM link with CentCom while the higher-capacity GMF SATCOM assets were brought into theater and positioned. Major Febuary's reinforced Company B was quickly joined by most of Support Company and Company A, and with Lieutenant Colonel Shea's arrival on 18 August the bulk of I MEF's communication battalion capabilities were now forward deployed with the 7th MEB.[40]

As the tentacles of the 7th MEB's network reached out beyond the port of Jubayl, planned communications links sometimes proved unworkable. The great distance (approximately 150 kilometers) between the MEB command post at the port and the MAG-70 Tactical Air Command Center (TACC) and headquarters in southern Bahrain pushed to the limit the range of the communication battalion's GRC-201 multi-channel radio sets. First fielded with the FMF as the TRC-97 in the 1970s, the GRC-201 was a super high frequency (SHF) radio set that transmitted a 12- or 24-channel (depending upon configuration) analog signal a distance of just over a hundred miles by "bouncing" the signal off the earth's ionosphere. Operating at near maximum range, reliability problems with this link between Jubayl and Shaikh Isa forced the dispatch of a TSC-93B GMF SATCOM to Shaikh Isa within a few days of its arrival in theater. With the BSSG collocated at the port, the installation of wire cable sufficed to tie it in with the MEB headquarters.

When the RLT 7 command post moved out of the port on 22 August, the regiment established a shorter range very high frequency (VHF) multi-channel radio link back to its rear area at Jubayl using a MRC-135 set. The MRC-135, an eight-channel radio with a range limit of approximately 35 miles, had been in the Marine Corps inventory for more than 15 years and was scheduled for replacement. Technologically ancient, it was limited to analog signals, was non-secure, and tended to overheat and fail in hot climates.

The initial basing of the various MAG-70 aircraft squadrons and detachments presented a significant challenge for the group's communicators. Although

the bulk of the personnel of Detachment A, MWCS-38 arrived on the 21st, it did not start receiving its airlifted equipment until the 24th, and the last of it did not reach Shaikh Isa until the 28th. As was planned, the TACC and MAG-70 fixed-wing detachment at Shaikh Isa were linked via GRC-201 with the TAOC and the MAG-70 rotary-wing detachment at the King Abdul Aziz Naval Base located some 10 kilometers south of the 7th MEB command post in Jubayl. Although this link was also operating at near maximum range (approximately 140 kilometers), it proved generally reliable after its first few days of operation. By 31 August MAG-70's initial communication system was in place and functioning.[41]

As BSSG-7 began to concentrate its units at the Commercial Port of Jubayl, it relied initially upon single channel radio and commercial telephone service for its communication support. This slowly gave way to the increased use of the tactical automated switching system (TASS) with the installation of SB-3614 switchboards at the BSSG headquarters and those of the various detachments. The SB-3614, due to be replaced within a year by the SB-3865, was an analog automatic switchboard with a capacity for 30 subscribers, but three could be "stacked" together to form a larger switch with nearly 90 subscribers.

Back at Camp Pendleton, Lieutenant Colonel Linwood W. Sparrow, the 1st FSSG G-6, and his deputy, Lieutenant Colonel Lawrence E. Troffer, focused their efforts on establishing a communication path over which the group's critical automated support systems could connect back into the Marine Corps Digital Information Network (MCDIN). Without this connectivity, BSSG-7 would not be able to sustain the Marine deployment to Southwest Asia with responsive automated data processing support for the force's supply, maintenance management, and personnel systems.[42]

While they labored at this effort, the question of the scope of automated data processing support for the deployed forces came to the forefront of FSSG communications planning. This could be settled in two ways: a minimal capacity (an interim force automated services center, or IFASC) could be established on the ground in Saudi Arabia, or a more extensive one would have to developed and deployed. The lesser facility would require a larger data capacity communication "stove pipe" back to an established MCDIN entry point because of the high volume of "raw" data that would have to be regularly exchanged between the stateside centers and BSSG-7, while a more sophisticated facility in theater would require less communication capacity.

With satellite capacity at a premium and no relief in site, BSSG-7 was initially forced to deal with a lesser communication capacity. Because it was the only means available, an IFASC was deployed to Saudi Arabia, but with limited communication means it could not long keep up with the demand. This situation necessitated the development of a full-fledged automated services center in Saudi Arabia so that less "raw" data would have to be exchanged over the limited communications path. It was toward this goal that Lieutenant Colonel Troffer turned at the end of August.[43]

Late August: Expanding the 7th MEB Communications System

The last days of August witnessed a steady expansion of the 7th MEB's internal communications network to keep up with the burgeoning number of battalions and squadrons arriving in theater. This sometimes occurred in unexpected places and on very short notice. Unbeknownst to the communicators of MAG-70, the 7th MEB in mid-August received permission to use a much larger and more modern airfield-known as the Jubayl Naval Air Facility (NAF)-for its rotary-wing bed-down site. Located nearly 20 miles to the west of the Port of Jubayl, it was a much better site than King Abdul Aziz from which to operate aircraft, but this last-minute change of venue for the group's helicopters played havoc with MAG-70's communications plans.

With a Harrier squadron in the midst of relocating forward from Shaikh Isa to King Abdul Aziz and the TAOC already in operation there, Captain Weiss was forced to split his small communications detachment to cover both King Abdul Aziz NB and Jubayl NAF. To facilitate communications to the rotary-wing detachment at Jubayl, Weiss' Marines quickly established a GRC-201 link between the two airfields. With the expanding rotary-wing presence at Jubayl NAF, Lieutenant Colonel Himes had little choice but to shift MWCS-38 personnel and equipment from the TACC at Shaikh Isa to Jubayl NAF. The disjointed flow of MWCS-38's airlifted communications equipment to Bahrain hindered this effort, and this was compounded further by the delayed and incomplete distribution of its MPS equipment allocation.[44]

To add redundancy and reliability to MAG-70's slender communications thread, the 9th Communication Battalion began to install GRC-201 and MRC-135 links from the port to both King Abdul Aziz NB and Jubayl NAF by the end of August. With the arrival of the JCSE TTC-39 at Jubayl at that time, the battalion also started to extend digital telephone service both within the 7th MEB command post and down to some of the subordinate commands. This was first done with the Internal Look-proven RMCs, which enabled a small digital trunk group off the TTC-39 to be "remoted" away from the switch (via wire or multi-channel radio) and then broken out to terminate eight individual digital telephones or computer modems. The trunk groups were routed through GMF SATCOM links first to MAG-70 and then later to RLT 7 when a TSC-93B was installed at its command post in early September. These two GMF SATCOM spokes provided the only path within the MEB for secure digital telephone, general service (GenSer) message traffic, and special intelligence message traffic during this phase of the deployment.[45]

The Deployment of Elements of the 1st MEB

With the consolidation of the 7th MEB around Jubayl and in Bahrain, the deployment of Marine forces to the Gulf region shifted away from CONUS-based units. The next FMF unit in the queue was the Hawaii-based 1st MEB, which was

paired with MPSRon-3 out of Guam and Saipan. The arrival of most of the 1st MEB (less its command element) at the end of August and beginning of September significantly relieved the growing personnel and equipment shortages facing the communications units within the 7th MEB. Marines from Major George P. Elsasser's Company B, 7th Communication Battalion, without the 1st MEB command element to support, were used primarily to reinforce the understrength 1st Marine Division units that were starting to flow into Jubayl.

The division, preparing to assume the responsibility as I MEF's ground combat element, was very short of its full complement of communications personnel. The division's communication company alone was augmented by approximately 100 of Elsasser's Marines, while others were sent to its regiments and battalions.[46] With no company left to command, Major Elsasser joined the division's G-6 section. The 3d Marines communication platoon under Captain Michael J. Smith also arrived during this period, as did BSSG-1 's communication detachment under Captain Martin P. Remis.[47]

MWSS-174's assumption of support responsibilities at King Abdul Aziz Naval Base allowed MWSS-374 to focus its efforts on the support of Jubayl NAF. Unit B, MWCS-28, under First Lieutenant Charles V. Tulaney, arrived in theater under MWSS-174 and also settled at King Abdul Aziz Naval Base, thereby allowing the MWSS-374 communication section to concentrate its scarce assets at Jubayl NAF. Both support squadrons soon found their personnel and equipment resources taxed to the limit as internal squadron needs clashed with the demands of a growing assortment of airfield tenant units for communication support.[48]

September 1990: From 7th MEB to I MEF
The `Compositing' of the Staffs and
Initial I MEF Organization

The beginning of September witnessed an unabated flow of Marine units into eastern Saudi Arabia and Bahrain. As ground, aviation, and combat service support units from around the Corps met up with prepositioned or airlifted equipment and were designated combat ready, the focus of effort shifted toward rapidly transforming the 7th MEB into I MEF. Although speculation existed among some MEB staff officers that the 7th MEB command element would be kept together and transformed into I MEF's ground combat element headquarters, this ended with the placement of the 1st Marine Division headquarters into the airlift queue at the end of August.[49]

The transition from a MEB to a MEF staff occurred gradually as staff officers from I MEF and 1st MEB reinforced the 7th MEB staff sections. With the commanding generals of I MEF, the 3d MAW, and the 1st FSSG and many of their key staff officers already in theater by late August, in most cases it was simply a matter of the generals walking into the established headquarters of the 7th MEB's major subordinate commands in the beginning of September and assuming command of the intermixed 7th and 1st MEB units. After spending more than

a week in Riyadh sorting out a variety of issues with General Schwarzkopf's staff, General Boomer moved the I MEF flag and his command post to Jubayl on 3 September. Generals Moore and Brabham did the same for the 3d MAW and the 1st FSSG respectively. RLT-7 remained the I MEF ground combat element for a few more days pending the arrival of the main echelons of the 1st Marine Division headquarters.

With much of 9th Communication Battalion at Jubayl by early September and the initial backbone command and control links in place and becoming more reliable by the day, communications operations saw no abrupt change during the "compositing" of the I MEF command element. As I MEF principal staff officers replaced their brigade staff counterparts, the 7th and 1st MEB staff personnel generally assumed various assistant positions in their respective sections. Major Boeke and his Marines integrated into the arriving I MEF G-6 section, and the transition from brigade to force G-6 proceeded smoothly.

From MAG-70 to 3d MAW

The conversion from composite aircraft group to aircraft wing was generally seamless as General Moore, having been based out of Shaikh Isa Air Base for several weeks, was well versed on the aviation situation in theater. Colonel Rietsch and much of the MAG-70 staff reverted to their normal roles as commanding officer and group staff of MAG-11, and Rietsch promptly took command of the fixed-wing aircraft at Shaikh Isa and the KC-130s at Bahrain International Airport. Colonel Larry T. Garrett and his staff were transformed from MAG-70's rotary-wing detachment staff into MAG-16, and Garrett likewise took command of the rotary wing units based out of Jubayl NAF. MAG-13 (Forward) was established several weeks later at King Abdul Aziz, with Colonel John R. Bioty, Jr., in command of its AV 8B Harrier and OV-10 Bronco squadrons. The MACG-38 detachment became MACG-38 with the arrival of Colonel Joseph Della-Corte on the 19th.

For Lieutenant Colonel Himes and his MWCS-38 Marines, the effort to support the newly established wing was becoming more complicated by the day as the rapid growth of wing activity in the Jubayl area quickly overwhelmed the available communications means. In response, on 3 September Himes formally divided Captain Weiss' detachment at King Abdul Aziz into one unit (Unit B) at that site under his command and another at Jubayl NAF (Unit A) under Captain John T. Quinn II. Unit A Marines were in turn dispatched within days to a newly established forward arming and refueling point (FARP Foss) some 45 miles to the north at Manifa Bay.[50] Due to severe overcrowding of the flight line at Jubayl NAF, several of MAG-16's CH-53 squadrons were moved to a site 10 miles south of King Abdul Aziz NB known as Rhas Al Ghar.[51] MWCS-38 installed a MRC-135 link between King Abdul Aziz and Rhas Al Ghar in order to better support this site. This new subdivision of units further strained the 3d MAW's resources; by mid-month, Lieutenant Colonel Himes had only 14 officers and 251 enlisted

Marines out of the total of 33 officers and 506 enlisted that his table of organization called for to accomplish his wing support mission.[52]

From BSSG-7 to 1st FSSG

The compositing of BSSG-7 and BSSG-1 into the 1st FSSG proceeded smoothly from a communications point of view. Working for the most part within the well-appointed Commercial Port of Jubayl, the 1st FSSG's internal communications were adequate to the needs of the moment, and its close proximity to the MEF headquarters assured good telephone access to the outside world. In mid-September, General Brabham reorganized his command to suit the unique requirements of combat service support in the developing theater. Brabham broke the 1st FSSG down into three functional subordinate commands: Direct Support Group 1 (DSG-1), General Support Group 1 (GSG-1), and Headquarters and Service Group 1.

DSG-1, commanded by former BSSG-7 commanding officer Colonel Alexander W. Powell, was responsible for the provision of direct combat service support to I MEF's scattered elements via its four subordinate combat service support detachments (CSSDs).[53] GSG-1, under BSSG-l's commanding officer, Colonel Thomas E. Hampton, ran the main combat service support area at Jubayl.[54] The communications company fell under the command of the Headquarters and Service Group, which was formed from an expanded FSSG headquarters battalion. Major Weldon arrived at Jubayl and assumed the duty as General Brabham's G-6, while Captain Hackney retained command of the 1st FSSG communications company detachment. BSSG-1 's communications personnel were absorbed by the 1st FSSG's communication detachment, and Captain Remis took a position with the detachment.[55]

Beginning in the second week of September, Marines from HQMC, Quantico, the Regional Automated Services Center (RASC) at Camp Pendleton, and the 1st and 2d FSSGs gathered at Camp Lejeune to help develop a deployable force automated support center (DFASC). Working from plans for a future system, this team spent the next several weeks assembling a shelter-enclosed mainframe computer with appropriate peripheral equipment. By month's end it was ready for shipment to Saudi Arabia.[56]

The 1st Marine Division Deploys to Saudi Arabia

For the 1st Marine Division's communication company, the movement to theater did not commence until 28 August, when the first of the division headquarters' four echelons, designated the alpha command group, deployed to Saudi Arabia. The accompanying communications element conducted sight surveys, established initial single-channel radio circuits with I MEF, and began the installation of the division's tactical telephone system. The main command post group arrived on 3 September, and with those assets in place the division expanded com-

munications between the forward command post north of Jubayl and the main command post being developed at Camp 15, formerly a foreign worker's housing complex on the outskirts of Jubayl. Between these first two echelons, the bulk of Major James M. Johnson's company arrived in theater before the assumption of the ground combat element responsibility by Brigadier General James M. Myatt on 6 September.[57]

The transition from a RLT to a division structure required several changes to the I MEF communication system. As Camp 15 became the home of the division's main command post and its supporting elements, the 9th Communication Battalion installed GRC-201 and MRC-135 multi-channel radio links between the camp and the MEF headquarters at the port. The division's forward command post, falling in on the RLT 7 site north of Jubayl, was tied into I MEF with a TSC-93B GMF SATCOM spoke. On the 15th, the 3d Marines (RCT 3, as of 7 September), under the command of Colonel John H. Admire, established its command post in the area known as "Cement Ridge," north of Jubayl. With the 1st Battalion, 5th Marines; the 1st Battalion, 3d Marines; and the 3d Battalion, 3d Marines, now under its operational control, RCT 3 relieved RCT 7 of its forward defensive mission, and the latter withdrew to serve as the division's mobile reserve.[58]

Captain Michael J. Smith, the communications officer for RCT 3, brought much of his platoon's equipment from Hawaii in addition to drawing his MPS allocation. The regiment's tactical command post deployed quickly to the field, using homemade plywood shelters mounted on MRC-135 multi-channel radio vehicles as mobile radio central vans. RCT 3 established a MRC-135 link with the division rear area at Camp 15, while single-channel radio nets tied in the regiment's subordinate elements. The 9th Communication Battalion provided a man-portable, single-channel UHF SATCOM set (a PSC-3) and an operator to link the 3d Marines to the division command post, as the latter was located northward beyond the range of reliable very-high-frequency (VHF) radio communications.[59]

The division's artillery regiment, the 11th Marines, under Colonel Patrick G. Howard, established an austere forward command post north of Jubayl in early September. As the remainder of the headquarters battery arrived in country in the following weeks, the regiment quickly switched to full field operations.[60] The 11th Marines' communications officer, Major Mateusz K. Jastrzebski, deployed early as part of the regimental command group with only a handful of his Marines and relied initially on single-channel radio communications to subordinate units. Preceding the division command post into theater, the 11th Marines took to the field on the east side of the major highway north of Jubayl. As more personnel and equipment arrived, the 11th Marines established multi-channel radio links with the division main command post, the regiment's forward logistics base, and the rear camp at Jubayl. The threat posed by the Iraqi Army in Kuwait prompted frequent displacements of the regiment's forward elements. Supporting these moves was a constant challenge for the regiment's communicators.[61]

Refining the I MEF Communications System

Although the arrival of the JCSE TTC-39 in late August enabled the MEF headquarters to integrate fully with the theater-wide digital tactical telephone infrastructure, a series of often baffling technical difficulties prevented the extension through SB-3865 switchboards of full digital telephone service down to subscribers at the wing and division level. After several weeks of struggling with the installation of the SB-3865s, the 9th Communication Battalion Marines determined that a major software incompatibility existed between the TTC-39A and both of the smaller TriTac switches.

The battalion's construction platoon commander, Chief Warrant Officer-2 Danny A. Hurd, had experienced similar problems with the TTC-42 several years before during trails at the Joint Interoperability Test Directorate at Fort Huachuca, Arizona, but it had been assumed by Marines that they were relatively minor problems that could be corrected quickly by the contractors. The experience of August and September 1990 showed that this was not the case: further investigation revealed that the machine coding instructions used by the main contractors were incompatible.[62] This meant that these switches could not effectively communicate with each other, which "disallowed the use of the SB-3865 or TTC-42 as either primary switches for MSCs or as a backup [for the TTC-39A] at the MAGTF headquarters."[63]

In the meantime, the 9th Communication Battalion extended limited digital tactical telephone service to the division and the wing through the use of RMCs, which allowed Marines at these commands to access the MEF switch directly. The bulk of their systems remained analog ones built around the elderly TTC-38 switch. The TTC-38, scheduled to be replaced by the TTC-42, was a 300-line switch first fielded by the Marine Corps in the 1970s. The TTC-38 proved temperamental in the extreme heat, humidity, and blowing sand of the Gulf coastal region. The 3d MAW was forced to replace its TTC-38 on 20 September with a stack of SB-3614s due to the former's repeated failures.[64]

The mixture of commercial telephone systems with their tactical digital and analog cousins was a confusing one at times for Marines. This situation was particularly in evidence at Shaikh Isa Air Base in Bahrain, where the 3d MAW and MAG-11 headquarters often had four distinct means of telephonic communications within reach. Instruments available to the staffs there included Digital Secure Voice Telephones (DSVTs) and Digital Non-secure Voice Telephones (DNVTs), both off the I MEF TTC-39 switch, a variety of analog phones (STU-III, TA-838, and TA-938) off the wing's analog TTC-38 switch, and commercial (or "blue" because of their color) phones-some with international access-off the local base telephone switch.[65] Each required a unique set of dialing instructions, which played havoc with a staff largely unschooled in the use of anything other than local American phone systems. MWCS-38 attempted to develop a color-coded system that would make it easier for the subscriber to understand and use the hybrid system, but this effort met with mixed success at best.

Toward mid-September, a growing number of I MEF units (the 1st Light Armored Infantry [LAI] Battalion, elements of the 1st Reconnaissance Battalion, and a MAG-16 detachment) were located well north of Jubayl and out of reliable radio range with the main body of the force. In response, Colonel Hill directed the 9th Communication Battalion to use its fourth and final TSC-93B to support a GMF SATCOM link between the port and FARP Foss at Manifa Bay. This was backed up with a GRC-201 link between the two sites, but the GRC-201 never achieved the hoped-for reliability that would free the TSC-93B set to return to its desired role as I MEF spare. The 1st LAI Battalion (by then designated as Task Force Shepherd), operating out of the Manifa Bay area, also relied on PSC-3 UHF SATCOM sets and commercial cellular telephones to augment their organic tactical radio communications.[66]

A welcome addition to I MEF's capabilities was Detachment One, 7th Communication Battalion, which arrived in theater in early September from Okinawa. Under the command of Major William A. Reed, Jr., the detachment featured one TSC-93A and one TSC-96 from Reed's Support Company, 7th Communication Battalion. The TSC-96 was promptly placed at Jubayl NAF in order to provide adequate message center service to MAG-16 and other tenant units, while the TSC-93A was located at the port of Jubayl with 1st FSSG and linked with Fort Buckner, Okinawa. This link, noted earlier, provided AUTOVON access and general service (GenSer) message traffic to I MEF through the Automated Services Center (ASC) in Yokota, Japan.[67] The Marines of the 7th Communication Battalion who remained on Okinawa also provided an invaluable service to I MEF by supporting a relay site for a UHF SATCOM (PSC-3) link from Jubayl via Okinawa to the I MEF rear at Camp Pendleton.[68]

During September, I MEF instituted a radical shift in the way that Marine field message centers operated when the 9th Communication Battalion began using the UYK-83 microcomputer with an embedded TEQCOM card (as practiced during Exercise Internal Look 90) to terminate AUTODIN (Automated Digital Information Network) links. This microcomputer-based record message traffic system was extended down to all of I MEF's major subordinate commands, allowing for the receipt and distribution of high-speed GenSer message traffic throughout much of the force.[69] Below the level of the major subordinate commands (MSCs), this service was extended to regimental and air group subscribers through the use of point-to-point or dial-in data file transfer using the data transmission capability of the STU-III telephone.

The last weeks of September were a time of consolidation throughout I MEF. Many of the MEF's communications personnel took their first real break after more than a month of hectic activity surrounding their deployment and initial efforts at system installation. Some units requested that additional personnel be brought forward from the MEF's remain-behind elements on the west coast in order to address critical manning shortfalls. With Marine forces in theater rapidly approaching a 42,000-man limit imposed by General Schwarzkopf, these requests were generally denied by the MEF or its major subordinate commands.[70]

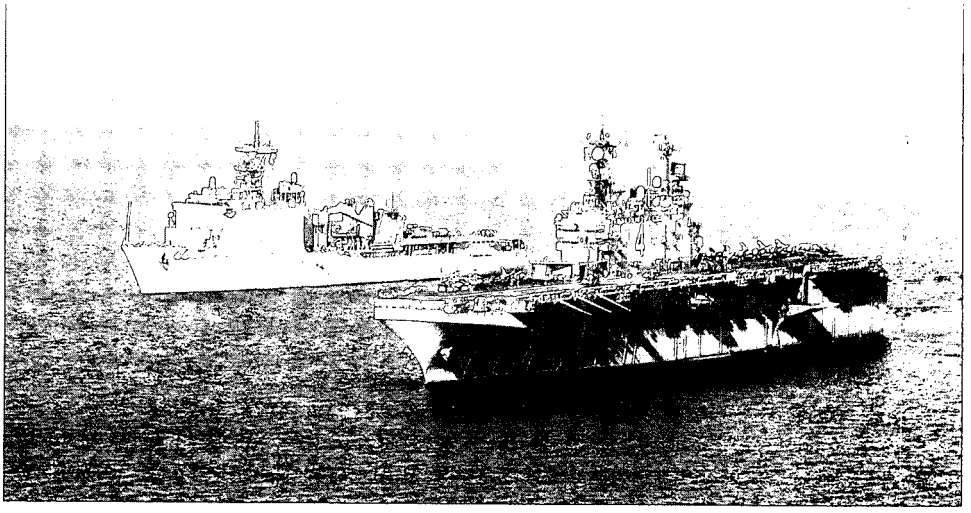
The end of the month did see some relief for the 3d MAW headquarters

through the cooperation of the Air Force's 33d Combat Communications Squadron at Shaikh Isa. On 25 September, the wing received eight common-user telephone trunks off of the 33d's TTC-39 switch, which was brought to Shaikh Isa to support CentAF's F-4G "Wild Weasel" wing based there. By virtue of a CentAF TSC-94B SATCOM spoke also on site, the 3d MAW now had an alternate communications path to the I MEF TTC-39 at Jubayl, which resulted in greatly increased subscriber access and system redundancy and reliability.[71]

Forces Afloat: The 4th MEB and the 13th MEU(SOC)

The Marines of the 4th MEB completed their transit from the U.S. on 17 September when the amphibious task force arrived off the coast of Oman. In the Arabian Sea, the force joined up with Amphibious Squadron Five and its embarked 13th MEU(SOC), which had been on station since early September. With General Jenkins desiring to exercise the landing force at the first opportunity, his G-6 section under Lieutenant Colonel Glenn Williams labored to coordinate a myriad of communications details in preparation.

At the top of Williams' list of concerns stood the MEB's subordinate commands' communications security material system (CMS) account, which included the electronic codes and paper ciphers produced by the National Security Agency that were used to ensure the security of U.S. communications. With Marine units from both the Pacific and Atlantic Fleets deploying to the Gulf region, the generic or inter-theater communications security package (ICP) was the logical CMS software to use. The ICP software allowed units possessing it to



Department of Defense Photo (USN) DS-200425

The dock landing ship USS Gunston Hall *(LSD-44), left background, steams in company with the amphibious assault ship USS* Nassau *(LHA-4), foreground, during Operation Desert Shield. The* Nassau *served as the flagship of the 4th MEB and Amphibious Group Two during the 1990-1991 Gulf War*

encode and decode electronically tactical communications, but this software was in short supply given the large numbers of units deploying to the region. This shortage was compounded further by the fact that some 4th MEB units, most notably MAG-40, did not possess a separate standing CMS account. Normally, MAG-40 simply drew its CMS allocation from MAG-14 or the 2d MAW, so a semi-permanent CMS account had to be developed for it right away.

The allocation of radio frequencies and the development of effective communications-electronics operating instructions (CEOI) presented another challenge to the 4th MEB. NavCent wanted no responsibility for the allocation of frequencies to its Marines, so Williams turned to Colonel Hill at I MEF for assistance. Hill assigned the 4th MEB a block of frequencies, which Williams in turn apportioned throughout the force in a "home-grown" CEOI. [72]

October 1990: The Maturing I MEF Communications System
I MEF Looks to the Future

After a short period of consolidation, October brought renewed activity throughout the I MEF sector in eastern Saudi Arabia. At the I MEF headquarters, Colonel Hill and his Marines worked with other staff sections to identify a more suitable location for the main command post. The present one, still located in a two-story building near the entrance to the port first occupied by the 7th MEB in August, sat precariously close to the main traffic route through the port area. To a generation of Marines who remembered vividly the 1983 suicide truck bombing of the Marine battalion landing team headquarters in Beirut, Lebanon, this seemingly vulnerable position could not be tolerated for long. The MEF staff quickly identified an unused police station in the industrial city of Jubayl to be used as the new main command post. [73]

Also high on the agenda of the staff was the establishment of a mobile or "jump" command post for General Boomer. The general had made it clear to Colonel Hill from the beginning that he believed in commanding from the front, and thus the design of a command post suited to his intent was a priority effort. [74] The mobile command post was initially developed to be operated out of high mobility, multi-mission wheeled vehicles (HMMWVs), but soon shifted to a mix of HMMWVs and command and control variants of the light armored vehicle (LAV-C2). The MEF first employed the mobile command post during a communications exercise on 11 October. [75]

The arrival of the United Kingdom's 7th Armored Brigade (nicknamed the "Desert Rats" from their service in North Africa during World War II) into I MEF's AOR during October necessitated the close coordination with the British by the G-6 staff of a range of communications items from radio frequencies to cryptographic support. The 7th Armored Brigade used a tactical cellular telephone system (called Ptarmigan) that was very similar in operation to the U.S. Army's Mobile Subscriber Equipment (MSE) system. The "Desert Rats" employed a wide variety of communications equipment including SHF SATCOM

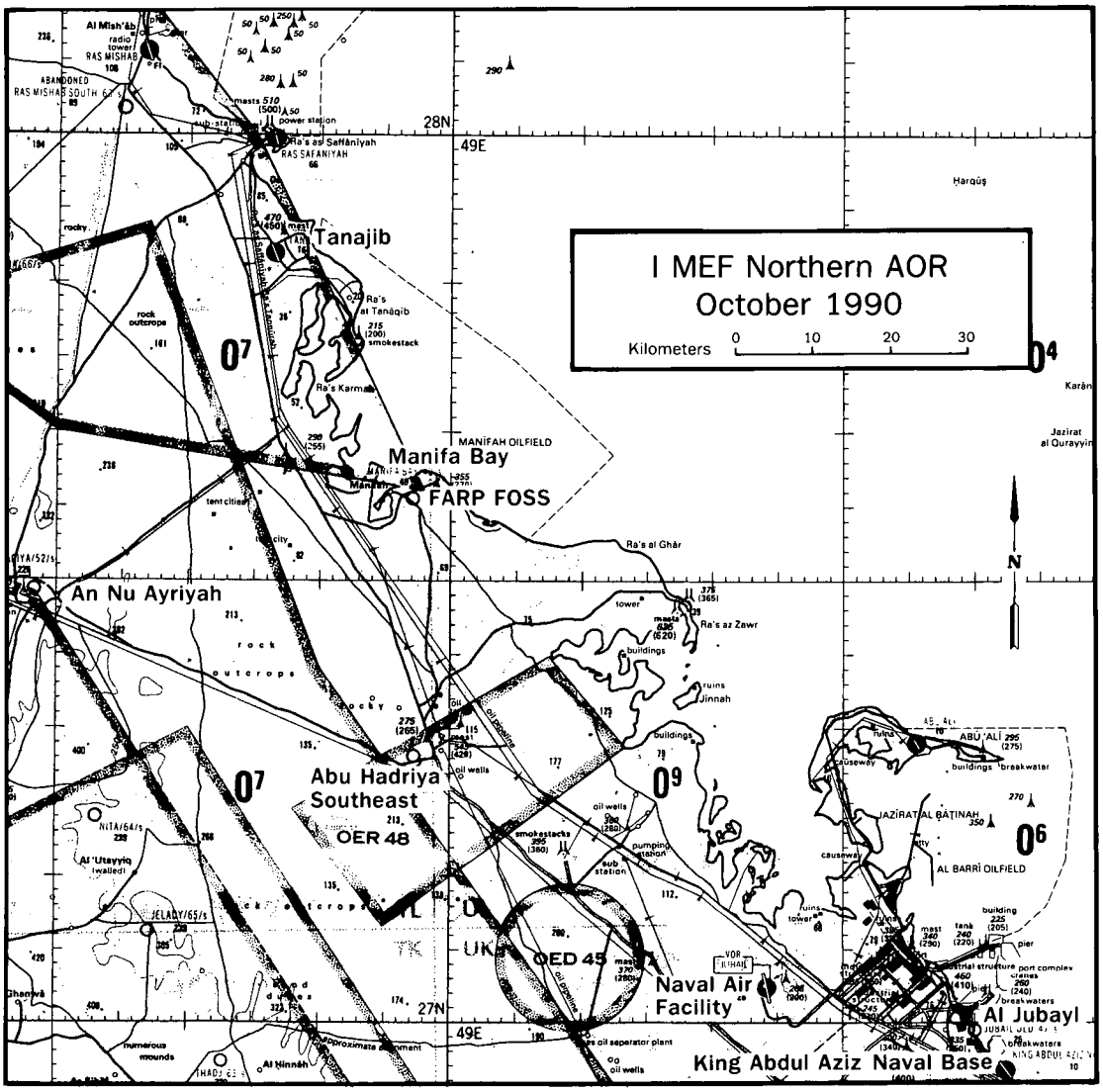
via the British SKYNET satellite, and their effective integration with I MEF posed no significant problems in the area of maintenance because they were self-supporting in logistics.[76]

Joint Communications Issues in the `Maturing' Theater

Joint communications issues received a substantial portion of Colonel Hill's attention during October. Communications liaison was conducted with XVIII Airborne Corps, which occupied the AOR immediately to the west of I MEF's.[77] When notified by the CentCom J-6 that the JCSE TTC-39 and TSC-93B at Jubayl would eventually have to be withdrawn from theater at the direction of the Joint Staff, Colonel Hill requested a replacement for the TTC-39 since he deemed this a critical capability. General Cougill, the Centcom J-6, on his part expressed concern about the overuse of the available satellites in theater. General Cougill desired that the pressure be taken off the satellites wherever possible through the alternative use by the service components of terrestrial multi-channel radio equipment. When Colonel Hill explained the relative deficiencies of the Corps' GRC-201, however, General Cougill pledged to seek TRC-170 assets from the Army to augment I MEF. The TRC-170, scheduled to replace the GRC-201s in the Marine Corps inventory within a few years, had a greater range and were a part of the all-digital TriTac family of equipment.

Other joint issues of concern included both the overall number and the quality of the Joint Communications Electronics Operating Instructions (JCEOI) for Desert Shield, which were quickly determined to be inadequate. As was the case with the 4th MEB, I MEF found the CMS accounts supporting the operation to be deficient, with a theater-wide shortage of joint key lists threatening to hamper operations. Since most units still operated off service-specific key lists, adequate numbers of joint key lists which listed the call signs of all the significant forces in theater was crucial to good command and control. Adding to this problem was the fact that many units had simply left their accounts back in the states, expecting that CMS material would be provided by higher headquarters in theater.[78]

At the 9th Communication Battalion, Lieutenant Colonel Shea and Captain Learn focused on planning for the displacement of the MEF main command post to the unoccupied police station in Jubayl. Although not scheduled to occur until late November, the move would severely strain the battalion's available resources. A virtual mirror image of the resident capabilities at the port would have to be created and tested at the police station before a transfer could occur. At the same time, it appeared that Major John E. McKnight III, and many of his Company A Marines would have to return soon to Camp Pendleton to outfit the 5th MEB for possible deployment. With the pending move of the MEF command post, very little of Company A's equipment could be returned to Camp Pendleton from Saudi Arabia, so much of the communications assets required by the 5th MEB would have to be generated from sources stateside.[79]


I MEF Northern AOR
October 1990
Kilometers 0 10 20 30
Tanajib
Manifa Bay
FARP FOSS
An Nu Ayriyah
Abu Hadriya Southeast
OER 48
OED 45
Naval Air Facility
Al Jubayl
King Abdul Aziz Naval Base
MANIFAH OILFIELD
AL BARRI OILFIELD
JAZIRAT AL BATINAH
Ra's al Ghar
Ra's az Zawr
Ra's al Safaniyah
RAS SAFANIYAH
Ra's Karma
Ra's al Tanaqib
Al Mish'ab
RAS MISHAB
Al 'Utayyiq
Al Hinnah
Harqus
Karan
Jazirat al Qurayyin
N
28N
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49E

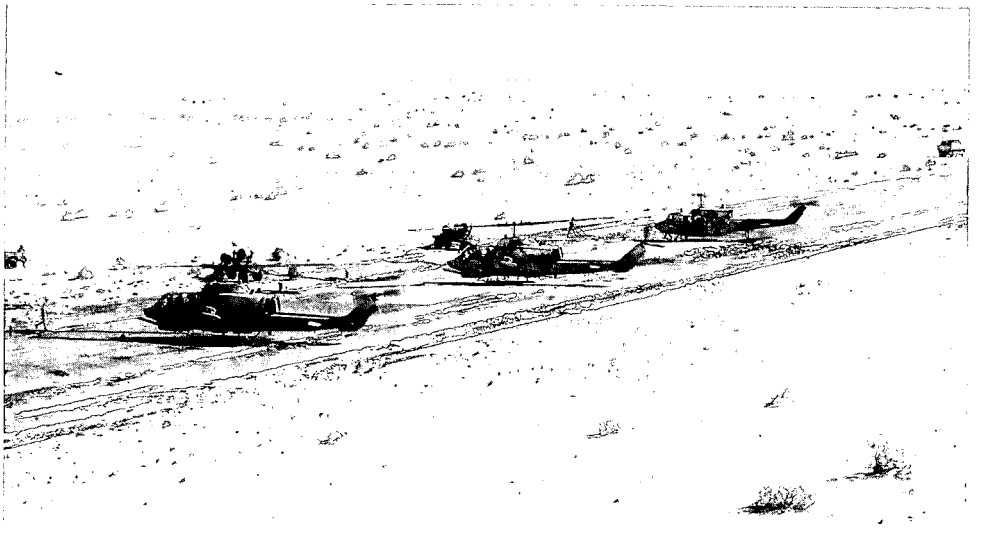
The 1st Marine Division Leans Forward

On 2 October, the 1st Marine Division shifted its main command post further north to an area half a dozen miles south of FARP Foss at Manifa Bay. Major Johnson's communicators first established duplicate single-channel radio nets at the new site for those deemed critical for the alpha command group's temporary control of the division. The company established a MRC-135 VHF multi-channel radio link between the 1st FSSG's Combat Service Support Detachment 141 (CSSD-141) at Manifa Bay and the new command post site. This link provided telephone trunking off the I MEF switch and AUTOVON access until the supporting TSC-93B was repositioned and brought back on line, at which point control was passed to the new division main command post.[80] The company also established multi-channel radio links with the 11th Marines and the 3d Battalion, 9th Marines, which manned the division's forward line of defenses.

The 1st Marine Division placed its TTC-38 telephone switch into operation in early October at the division rear command post at Camp 15, thus extending 300-line analog telephone service to a host of users. Also, the remaining Marines of the division's communication company arrived in Saudi Arabia from Camp Pendleton on 7 October. For the rest of the month, the company focused on staging equipment for further displacements, training to incorporate both command and control variants of both the light armored vehicle (LAV-C2) and the amphibious assault vehicle (AAVC7A1) into the mobile command post, and working with various airborne command and control and retransmission systems.[81]

While its communication company concentrated on these activities, the division's G-6 section under Lieutenant Colonel Rodney N. Smith sought to reconfigure the PLRS network in order to improve its coverage of the so-called "Y" area into which the division's leading task forces and support elements were now migrating. This area, surrounding the intersection of main roads near Abu Hadriya connecting Manifa Bay to the north, Nariya to the northwest, and Jubayl to the southeast, was the new forward security area for the division.

RCT 3 remained in the defense in the area between the "Cement Ridge" and Abu Hadriyah during the month as its communications and other personnel received extensive training on the use of PLRS sets, digital communications terminals (DCTs), and tactical facsimile machines. The division improved its MRC-135 multi-channel radio link from RCT-3 to the division support area (DSA), thus assuring the regiment reliable access into the tactical telephone system and providing a gateway into the division local area network (LAN). The RCT-3 communication platoon established a military affiliate radio system (MARS) station at the beginning of October. This station permitted short radio and message calls back to family members in Hawaii, and thus was highly popular with the Marines of the regiment.[82] The 11th Marines worked to improve communications capabilities from its forward position. PLRS training and integration proceeded



Department of Defense Photo (USAF) DS-400135

The airstrip near Manifa, Saudi Arabia, designated FARP Foss by the 3d MAW, was used to refuel AH-IW and UH-1N helicopters from HMLA-369 during Exercise Imminent Thunder in November 1990.

smoothly, although Colonel Howard raised concerns early in the month about the regiment's ability to perform effectively as the alternate division command post without a PLRS master station and more communications assets. [83]

RCT-7, now designated as Task Force Ripper, remained in its reserve position north of Jubayl, but it exercised offensive operations frequently throughout October. The task force used the PLRS network extensively for the first time early in the month, and after-action reviews of its field performance were positive. However, units encountered problems regarding the range of PLRS sets as well as with the standard VHF radios of the task force, and the division instituted steps to help ensure better coverage in Ripper's northern area of operations. Task Force Ripper reported significant problems communicating on the Tactical Air Request/Helicopter Request (TAR/HR) net with the DASC. The overall quality of the HF radio frequencies assigned to I MEF became an issue as even experienced radio operators throughout the force encountered great difficulty in their attempts to use them. An increased reliance on airborne radio retransmission was viewed as the best internal solution to the HF radio problem. [84]

The 3d MAW and Air Control Communications

With the establishment of the MAW's internal multi-channel radio backbone in September, the focus of the G-6 and MWCS-38 shifted to facilitating the connectivity of the wing's Tactical Air Command Center (TACC) and Tactical Air Operations Center (TAOC) to their respective senior partners at CentAF. CentAF had assumed the role of Joint Forces Air Component Commander (JFACC) at the

CinC's direction, and as the senior air agency, it was responsible for extending communications links down to its subordinates. Accordingly, CentAF provided two TRC-170 multi-channel radio links originating from the Control and Reporting Center (CRC) at Dharhan, Saudi Arabia, to the 3d MAW: one to the TACC at Shaikh Isa and the other to the TAOC at King Abdul Aziz Naval Base. [85]

The 3d MAW improved air control communications between its TACC and the naval battle group anti-air warfare commander (AAWC) in the northern Persian Gulf with the installation of a special HF radio voice circuit. Employing the Advanced Narrowband Digital Voice Terminal (ANDVT), this circuit was used " . . . to provide real time threat warnings between the TACC and the ships presently located in the gulf." Marine Air Control Squadron 2 relieved MACS-1 of the responsibility for the 3d MAW TAOC at King Abdul Aziz in mid-October. MACS-1 returned to Camp Pendleton to resume its testing and certification of the engineering development module (EDM) of the Tactical Air Operations Module (TAOM), but one EDM was left in theater with a small crew to serve as a back-up if needed. During the month, MWCS-38 installed additional VHF multi-channel links in support of the relocation of the Direct Air Support Center (DASC) and several HAWK batteries from the 2d LAAM Battalion.[86]

A key element of communications with the JFACC was a terminal equipment set known as the Computer-Assisted Force Management System (CAFMS). This equipment was CentAF's method of generating and distributing the air tasking order (ATO) to its subordinate air elements throughout the theater, and thus the installation of a CAFMS terminal at the 3d MAW TACC became a high priority effort. The wing G-6 section, under Major Leslie F. Duer from mid-October after Lieutenant Colonel Phillip O'Brien departed for the 5th MEB, spent a great deal of time and effort coordinating the installation of this equipment, first in the TACC in August followed by the TAOC and eventually MAG-11. [87]

Other issues confronting the G-6 at this time included the continuing shortage of communications personnel throughout 3d MAW and the difficulties encountered by the various Marine Wing Support Squadrons as they attempted to provide adequate communications support to tenants at their crowded airfields. Shortages of tactical telephone equipment severely limited the number of phones available to many squadrons and detachments, and the very high demand for PRC-77 VHF radios on the part of military police units could not be met by in-theater assets.[88]

General Moore in mid-October formed an aviation task force-dubbed Task Force Cunningham-under his assistant wing commander, Brigadier General Granville R. Amos, in order to support more effectively the 1st Marine Division's defensive plan. General Myatt intended that the task force make the best use of available early warning and surveillance capabilities to engage and destroy Iraqi armor well forward of division positions using both CAS and close-in fire support (CIFS) and screen the division's flanks using MAG-16's attack helicopters.[89] With the MEF-wide shortage of long-haul communications equipment, neither the wing nor the division could afford to establish new communi-

cation paths to support this concept adequately, although the MEF did engineer a few direct phone links or "hot lines" over existing paths between the division and MAG-16 headquarters.

The 1st FSSG Expands Outward from Jubayl

The MEF's combat service support effort remained centered on the Commercial Port of Jubayl at the beginning of October, but its combat service support detachments performed valuable direct support missions at distant sites such as Shaikh Isa and Manifa. These detachments used the MEF's long haul communications links to maintain contact with the Direct Support Group headquarters. Where possible, they were provided trunks from the telephone switchboards of the nearby wing or division units which they supported.

The deployable force automated services center (DFASC) shelter hastily constructed during September at Camp Lejeune arrived in theater on 5 October, and within a matter of days it was operating as intended. Serviced by a crew of 14 Marines, the system enabled much of the previously exported processing of automated information systems for manpower, supply, and maintenance management to be done at Jubayl. Although the "interim" title was temporarily retained for the facility, there remained little of the system that could fairly be described of as being worthy of that descriptive.

Lieutenant Colonel Troffer, who arrived in Saudi Arabia with the DFASC team, quickly assumed the duties as 1st FSSG G-6. With new demands for support a constant fact of life, he oversaw the consolidation and redistribution of communications personnel and equipment within the group. During the month, the communication detachment was formally redesignated a company, and Major Weldon relinquished command to Captain Hackney when Weldon was selected to be General Boomer's aide-de-camp.[90] Lieutenant Colonel Troffer moved to tighten control of the group's equipment, which had in the previous month been consolidated in the communication company. The G-6 section screened new requests for support and coordinated the reallocation of assets within the command.[91]

Forces Afloat: The Start of the Sea Soldier Exercises

Early October witnessed the start of a series of amphibious exercises, dubbed "Sea Soldier," conducted by the 4th MEB and Amphibious Group 2. The first, Sea Soldier I, ran from 29 September to 6 October and concentrated on the basics of getting the landing force ashore. During the exercise, ship-to-shore communications were kept generally within line-of-sight VHF range and on the whole were very effective. The full range of command and control assets-such as PLRS-were not employed on Sea Soldier I, given the administrative load-out of some equipment, but this was steadily rectified with succeeding exercises.[92]

Period Summary

From the late summer through the early fall of 1990, the Marine Corps deployed nearly 42,000 personnel to the Persian Gulf region in support of Operation Desert Shield. For communicators both ashore and afloat, it was an intense and hectic period that forced them to take a new look at some old problems. Out of this arose the kind of innovative ideas and imaginative solutions that Marines are wont to develop under the pressure of a "real world" operation. Although the slow movement on the diplomatic front suggested the possibility of a very lengthy stay in Saudi Arabia, just around the corner lay a series of high-level decisions destined to accelerate rapidly the pace of events in theater.

From Defense to Offense
Late Desert Shield: Reinforcement and Redeployment
November - December 1990
November 1990: `Imminent Thunder' and `Devil Dog I'

With November's arrival, the intense heat and choking humidity of the Gulf summer finally began to dissipate into a more temperate clime, much to the relief of personnel throughout the region. For communications units throughout the MarCent/I MEF area, the end of the oppressive summer season offered a needed respite not only for people but also for electronic equipment and electric power generators. In retrospect, November represented the final period of relative calm for many Marines before the dramatic "storm" of later events.

On the I MEF staff, preparations continued for the main command post displacement to the "Police Station" site near Camp 5 in addition to planning for exercise Imminent Thunder scheduled for mid-month. The requested replacement for the soon-to-depart JCSE TTC-39 arrived at Jubayl under the operation of a team from the South Carolina Air National Guard, as did six TRC-170 teams from the U.S. Army's 11th Air Defense Signals Battalion to augment long haul communications in the I MEF area of responsibility.

The MEF achieved interoperability between the British 7th Armored Brigade's Ptarmigan communications system and the MEF's tactical telephone system early in the month. The arrival of sizeable quantities of Global Positioning System (GPS) receivers helped redress problems of unit navigation in the featureless desert, and the addition of new man-portable UHF SATCOM sets to the inventory added greatly to the MEF's tactical communications capabilities. [93] President Bush's early November announcement of his intention virtually to double the number of American servicemen in theater had great significance for Marines, as it indicated a seriousness of purpose and set the stage for a showdown with Saddam Hussein's army early in the new year. In response to the President's decision, the I MEF G-6 section prepared its requests for additional Marine communications units required for offensive operations.

The I MEF Command Post Displacement

For the Marines of the 9th Communication Battalion, the planned move of the I MEF main command post in late November remained their central activity, despite the distraction of pending reinforcements and the consequent likelihood of further displacements. Approximately 12 miles separated the old and new command post sites, negating the battalion's ability to rely on tactical telephone cable to carry the communications load during the move. While commercial telephones could be employed to some extent, the bulk of the system would have to be duplicated with everything from tactical telephones to single and multichannel radio equipment. It would be an immensely complicated task involving virtually every Marine and piece of equipment controlled by the battalion.

The 9th Communication Battalion first located the South Carolina Air National Guard TTC-39 telephone switch at the Police Station in preparation for the move. The battalion also positioned a spare TSC-85B GMF SATCOM "hub" at the new site. This TSC-85B had been recently released from the pre-positioned war reserve (PWR) at Marine Corps Logistics Base Albany, Georgia and sent to Saudi Arabia. Lieutenant Colonel Shea's Marines also shifted the GRC-201 multi-channel radio link between Camp 15 and the port of Jubayl in order to tie in the port and the Police Station. They next laid fiber optic cable between the Police Station and the 1st SRIG headquarters area located at Camp 15. The GRC-201 shots linking the old command post at the port to Jubayl Naval Air Facility, King Abdul Aziz Naval Base, and the FARP at Manifa were shifted to the new site as well. The battalion also duplicated the MEF's single channel radio nets and "remoted" them into the new staff section work spaces at the Police Station. The same procedure was undertaken with regard to tactical and commercial telephones.

By the end of November, all was ready for the transfer of communications from the old to the new sites. Recognizing the enormous complexity of the effort that lay ahead, Lieutenant Colonel Shea voiced concern over the sustainment of the system control effort if the cut-over took much longer than expected. After consulting with his staff, Shea decided that Major Febuary would serve as Captain Learn's understudy for the SysCon effort-and his relief-if required.[94] Starting at 2300 on the 27th, the battalion transferred each individual I MEF link and circuit from the port to the Police Station. By daybreak on the 28th the move was completed without a serious service outage. Lieutenant Colonel Shea later identified this effort as " . . . probably the most difficult task undertaken by the battalion and certainly [its] greatest accomplishment of Desert Shield and perhaps Desert Storm."[95]

The 9th Communication Battalion had other obligations in November besides the main command post displacement. A TTC-42 telephone switch, two smaller S$-3685s, and several Marines from the battalion were sent to Germany in order to field test upgraded software designed to eliminate the problems

The I MEF Main Command Post was located at a disused police station on the outskirts of Jubayl, Saudi Arabia. Visible at the top left corner of the photo is the large antenna for the Ground Mobile Forces (GMF) Sattelite Communication equipment, while two others are at the far right.

between the Marine equipment and the TTC-39. The newly-modified software proved to be fully compatible, clearing the way for the future widespread use of this equipment in theater.96 Other tactical training and preparations continued as well. In mid-month, the I MEF mobile command post again took to the field, first from the 12th to the 14th to test internal procedures, followed by a movement northward from the 16th through the 20th in conjunction with the 4th MEB's Sea Soldier III exercise.97

The 3d MAW Looks Ahead

For the Marines of MWCS-38, the beginning of November brought welcome news on two fronts: the President's enacting of "stop-loss" provisions, which slowed the loss of vital squadron personnel, and the arrival at Shaikh Isa of a replacement TTC-38 telephone switch, which by the 10th was rendering full service to the wing headquarters.* The squadron helped to improve further radio

* "Stop-loss" froze the normal attrition (discharges, retirements, transfers, etc.) of those service members in theater at the beginning of November. During September and October, units had been losing Marines due to these factors without gaining equivalent replacement personnel. The "stop-loss" provision was announced as part of President Bush's decision to send an additional 200,000 troops to Southwest Asia.

Department of Defense Photo (USMC) SPN-90-0536

A Marine from 1st Battalion, 3d Marines, uses an AN/PRC-77 field radio to send in a report while on guard duty during Operation Desert Shield. The PRC-77, the primary radio used in infantry battalions during the Gulf War, was little changed from its Vietnam War-era predecessor the PRC-25.

communications between the wing and the Persian Gulf naval battle group when it established the Anti-Air Warfare Collection and Reporting (AAWC&R) Net at the TACC.*

In mid-month General Moore decided to relocate the TACC and wing headquarters to Jubayl Naval Air Facility in order to be in a better position to support the likely offensive. This led to a host of meetings and site surveys on the part of wing G-6, MACG-38, and MWCS-38 personnel concerning the process of transferring air control facilities and related communications to Jubayl NAF. This process also necessitated the interim reinforcement of the TAOC at King Abdul Aziz Naval Base in order for it to serve as the temporary TACC during the displacement.

An added complication was the wing's intention to move both MAG-16 and the soon-to-arrive MAG-26 to airfields further up the coast toward Kuwait. Wing planners focused on suitable airfields at Mishab and Tanagib, but the Saudis proved extremely reluctant to permit their use. Even as airfield negotiations remained at a deadlock, Lieutenant Colonel Himes and members of his staff surveyed communications needs at the sites on the assumption that they would be occupied. In the meantime, the arrival of a TRC-170 team from the U.S. Army's 11th Air Defense Signal Battalion-part of the I MEF allocation from CentCom-on 15 November measurably improved internal wing communications capabilities. This team established another direct multi-channel radio link between Shaikh Isa and King Abdul Aziz, thereby reinforcing the occasionally tentative link between the 3d MAW's TACC and TAOC. [98]

Exercise Devil Dog I, an internal I MEF exercise run concurrently with CentCom's Imminent Thunder at mid-month, tested plans for closer integration between the 1st Marine Division's defensive scheme and supporting 3d MAW units. Central to this exercise was the participants' evaluation of the Task Force Cunningham concept of operations. [99] Post-exercise critiques identified the absence of reliable direct communications between the division and the task force as a significant shortcoming of the concept.'°°

The 1st Marine Division Plans for the Offense

The focus of effort for 1st Marine Division communications personnel during November shifted from supporting the defense to planning and preparation for offensive operations. The G-6 section oversaw the improvement in liaison communications with the neighboring XVIII Airborne Corps' 24th Infantry Division (Mechanized) through the installation of an Army AN/TRC-145 VHF multi-channel radio link among the division command posts. The division integrated with the 7th Armored Brigade's command and control communications

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* AAWC&R is a voice net used to link the ships of a battle group to the group's composite warfare commander (CWC) for antiair warfare (AAW).

after the brigade was assigned to its tactical control from I MEF early in the month. The division also refined and tested its jump command post using command and control variants of the Light Armored Vehicle (LAV-C2).[101]

As the division communication company supported these G-6 efforts, it also kept up with the day-to-day changes in the disposition of the division's subordinate regiments, task forces, and associated combat service support detachments. CSSD-111 tied into the division forward command post with MRC-135 radios provided by the 1st FSSG, but this link never achieved the desired level of reliability. The division expanded its PLRS network on the 18th and 19th with the establishment of adjacent PLRS communities-each with its own master station-in support of a division command post exercise (CPX). The CPX revealed significant problems operating PLRS in such a mode, and efforts continued through the end of the month to rectify the situation, including the mounting of several basic user units (BUUs) in nearby commercial communications towers to facilitate retransmission. In a break from more routine communications matters, Major Johnson's Marines also provided support for the Thanksgiving Day visit by President Bush to the division.[102]

For the division's regiments and task forces, changes to the communications network were modest during the month due to their continued maintenance of static defensive positions. Task Force Shepherd continued to operate its LAI companies out of the Manifa Bay area as the division's forward screening element. RCT-3 with its four infantry battalions remained in defensive positions in the "Cement Ridge" area. Captain Smith's communicators worked with data transmission using the Hadron PRC-6064 Packet Radio Controller over both single channel VHF and UHF SATCOM (PSC-3) radios.[103] Task Force Ripper and the 11th Marines continued their training and exercises in the "Triangle" area. Radio communications remained a major source of difficulty for the forward units, particularly the high frequency (HF) tactical air request (TAR) radio nets with the DASC.

The 1st FSSG Repositions Forward

The month of November was a relatively quiet period for 1st FSSG communications, with activity focused on the mid-month displacement of Direct Support Group 1 from Jubayl to the vicinity of Manifa Bay. General Brabham shifted CSSD-131 and CSSD-132 to General Support Group 1 during November; thus DSG-1 retained command of only CSSD-111 and CSSD-141 by month's end.[104] Reflecting the earlier increase in capability afforded by the mainframe computer installation at the IFASC, the "interim" title was finally dropped and the facility was designated the Force Automated Support Center (FASO). With the impending arrival of II MEF reinforcements, Lieutenant Colonel Troffer re-examined the automated support system architecture for future supportability. After consulting with Lieutenant Colonel Sparrow, who arrived late in the month to assume the G-6 duties, Troffer decided to collocate an IFASC to the north with

General Support Group 2, which was planned for establishment in December at Mishab.[105] The arrival of U.S. Air Force "heavy" TRC-170s from South Korea, with their capacity for operations at extended range, enabled I MEF to plan to establish a direct multi-channel radio link between Mishab and the 1st FSSG headquarters at the Commercial Port of Jubayl.[106]

Forces Afloat

The 4th MEB continued its "Sea Soldier" series of exercises throughout November, with Sea Soldier II early in the month and Sea Soldier III running concurrent with CentCom's 15-20 November Exercise Imminent Thunder. With the reconfiguration of ships' loads, increasing amounts of communication equipment were phased ashore during these full-scale rehearsals. Once ashore, the 8th Communication Battalion's TSC-96 team initiated Defense Communications System (DCS) satellite entries, and the TSC-93B SATCOM team established links into the theater GMF communications system.

Heavy seas curtailed through-the-surf operations during Sea Soldier III, but most of the exercise continued as a helicopter-borne assault from over the horizon. The brigade used airborne radio relay extensively during this event, and LCU-mounted MRC-110 VHF radio vehicles were planned for employment during the exercise. In the end they were not utilized because of rough sea conditions. The 4th MEB's PLRS network proved to be effective once it was established ashore.[107]

December 1990: The Reinforcement of I MEF

Although still operating under CentCom's earlier instructions concerning the defense of the Jubayl area, the prospect of massive reinforcements reoriented the thoughts of Marines toward the expulsion of Iraqi forces from Kuwait. Thus, upon December's arrival, the focus within I MEF shifted to " . . . planning and preparation for offensive operations as directed by USCinCCent."[108] For Colonel Hill and his G-6 section, this involved tasks ranging from the identification of future I MEF command post sites to close coordination with the II MEF G-6 regarding communication plans. All were linked by a common thread: how best to support General Boomer's concept of command and control in the offense.

The I MEF G-6 staff, in consultation with other staff sections, began to finalize its plan for the MEF communication network early in the month. At the tip of the network would be the commanding general's mobile command post, which by December had taken the form of several LAV C2s and a dozen or so supporting HMMWVs. For a variety of reasons, Colonel Hill was not entirely comfortable with this arrangement. It was very difficult to bring together even the minimum essential command and control communications for a MEF commander in such a small configuration. Because the available multi-channel radio equipment was relatively cumbersome, the mobile command post would rely

instead on single-channel radio links to both the MEF's major subordinate commands and the CentCom headquarters. UHF SATCOM would be available to General Boomer, but it could not be used on the move since the MEF had no vehicular omnidirectional antennas required to operate in such a mode.

Far more capable-but still relatively austere-would be the MEF main command post, where the general and his principal staff would fight the MEF from forward sites in the field. This would actually involve the use of two command posts; one, the Main, would be established and operational, while its twin would be set up at an alternate location, ready to assume control on short notice. Each command post would be built around a reinforced communication company and would be tied in with a TSC-93B GMF SATCOM set to the other major elements of the force. Alarmed by the growth in the size of these command posts from what was originally envisioned, at one point the I MEF Chief of Staff attempted to limit severely the number of communications and support personnel at the main command post, but he largely abandoned this when Colonel Hill pointed out that the limits would entail a much-reduced command and control capability.[109]

The heart of the command and control communications system would remain the MEF rear command post at the Police Station complex on the outskirts of Jubayl. In addition to the TTC-39 switch and the TSC-85 GMF SATCOM "hub", another TSC-85 would be brought in from II MEF in order to support the expanded GMF network made necessary by the pending arrival of the 2d Marine Division, the 2d FSSG, and elements of the 2d MAW. Because of the anticipated massive increase in the volume of message traffic resulting from these reinforcements, a separate TYC-39 digital message switch would be provided to I MEF by the U.S. Army. To oversee this burgeoning complex, Hill decided that the primary SysCon and TechCon facilities of I MEF would remain at the police station rather than moving it forward with the main command post.[110]

The Deployment of the 8th Communication Battalion

In order to support the major expansion of the MEF network, Colonel Hill initially requested only discrete elements of II MEF's 8th Communication Battalion: one "letter" communication company, its support company, motor transport and maintenance elements, and some administrative personnel to support them. Hill did not see the presence of an additional communication battalion headquarters as being necessary. When he was informed that the entire remainder of the 8th Communication Battalion would nonetheless deploy to the theater, Colonel Hill and the two commanders concluded an arrangement whereby the 9th would take the lead and the 8th would perform a unique "general support- reinforcing" mission."[111]

In order to accomplish this unusual mission, Lieutenant Colonel Bradley's 8th Communication Battalion would itself require significant augmentation. The dispatch of Company A in August as part of the 4th MEB had been

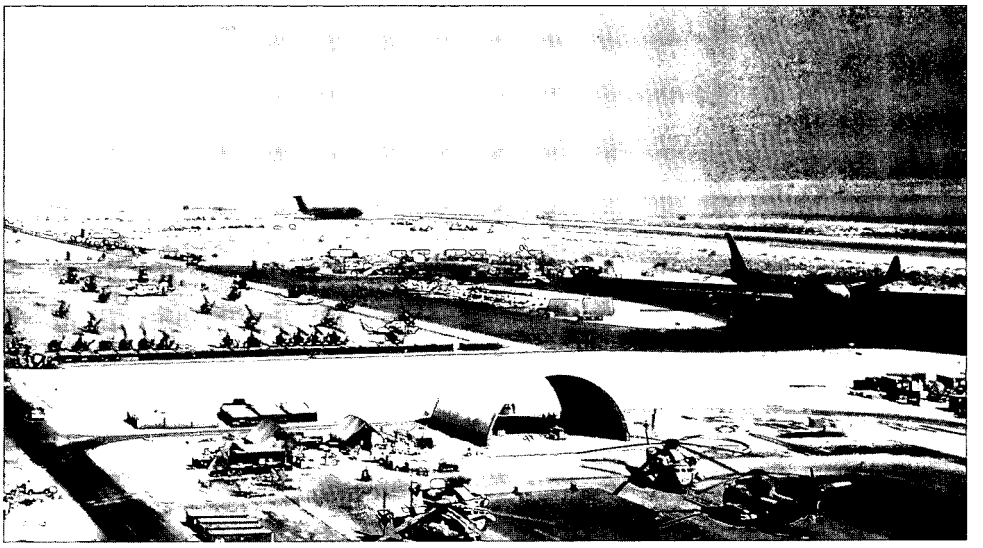
done under a "first out, best dressed" policy that seriously depleted the capabilities of the remaining units. To make up this shortfall, a sizeable portion (425 officers and enlisted personnel) of the Marine Corps Reserve's New York City-based 6th Communication Battalion was activated for duty in Southwest Asia. Manning priority first went to rounding out the depleted Company B and Support Company, and Company C was formed from the remaining Reservists pending their further reassignment within I MEF. The main body of the battalion landed at Jubayl NAF on Christmas Day 1990.[112]

By early January, there would be more than 770 Marines from the 8th and 6th Communication Battalions in theater under the command of Lieutenant Colonel Bradley. The battalion retained its basic organization in Saudi Arabia, less Major Rusch's Company A afloat with 4th MEB. Headquarters Company was commanded by Captain Paul G. Wesley, Company B by Major William M. Ciaston, and Support Company by Major Edward S. McMillan. The executive officer was Captain Carl E. Rodgers, and the principal staff consisted of Major Rudy B. Kowalcyk, the S-3; Major Beverly G. Lee, the S-4; and Captain Lisa R. Schade, the S-1.[113]

The I MEF Main Goes North

For the 9th Communication Battalion, the pace of events in theater began to quicken after Thanksgiving. The remaining deployable personnel from Camp Pendleton under Major Harold L. Compton, the battalion executive officer, departed for Saudi Arabia after Company A deployed with the 5th MEB at the beginning of December. With their arrival in country, the functions of the battalion's headquarters and support companies were separated for the first time since August when forward elements of both were merged. Captain Don E. Bryan again assumed command of the former, while Major Frank E. Mikolajczak retained command of Support Company.[114]

Meanwhile, after the consolidation of the Police Station site and the dismantling of the old port communications, Major Febuary's Company B staged its personnel and equipment and prepared to move once again. On 20 December, General Boomer chose a small workers camp near the Arabian-American Oil Company (ARAMCO) Safaniya oil separation and water distillation plant for his next main command post. This site, some 40 miles southeast of the Kuwaiti border, was located " . . . on a slight rise [that] favored good line of site communication".[115] Febuary's Marines promptly turned to, and by the 7th of January they activated the I MEF Main at Safaniya.[116] Included at this site was a TTC-42 digital telephone switch that, due to the persistent efforts both of battalion Marines, led by Chief Warrant Officer Danny A. Hurd, and knowledgeable personnel from throughout the Corps research and development community, was finally free of the software problems that had plagued ULCS equipment since before the onset of Desert Shield.[117]



This photograph provides a view of the northern end of the aircraft parking ramp at the Jubayl Naval Air Facility outside of Jubayl, Saudi Arabia. The airfield served as the headquarters of the 3d MAW during Operation Desert Storm.

The 3d MAW Headquarters Shifts to Jubayl

December brought long-anticipated change to the 3d MAW's command and control communications network. In preparation for the displacement of the TACC from Shaikh Isa to Jubayl, an enormous amount of advance work was required by MACG-38 elements at three sites: Shaikh Isa, King Abdul Aziz, and Jubayl. At the beginning of the month, the agreed-upon site for the new headquarters at Jubayl Naval Air Facility was little more than an ungraded open field on the southwest side of the runway. While Major Duer and his G-6 staff focused on planning and engineering the changes in the wing communications network, MACG-38 and MWSG-37 personnel worked on the development of the new headquarters area. Lieutenant Colonel Himes chose for MWCS-38's new operating site an area consisting of a series of low rises surrounding a tapped-out quarry about a half a mile to the north of the new wing headquarters and TACC.

At Shaikh Isa, MWCS-38 consolidated as much of its radio, message center, maintenance, and-in particular-field wire stocks as possible in order to free the remainder for shipment northward. This was necessary because, in shifting the TACC to Jubayl, an interim or alternate TACC (ATACC) would have to be established at the TAOC at King Abdul Aziz Naval Base. The TAOC would require additional communications support in order to be able to function effectively in this capacity. With the new wing headquarters site being developed concurrently at Jubayl NAF, this extra demand for support created serious shortages in manpower and material within the squadron. In particular, communication wire and assault cable requirements for multiple sites quickly outran MWCS-38 stocks and presented the single greatest limitation to the move.

A host of organizational changes within MWCS-38 were required to support the wing's shift northward. In preparation for the move from Bahrain, Lieutenant Colonel Himes organized a stay-behind detachment-Unit C, under Captain Richard M. Schmitz-to support Shaikh Isa. Himes sent additional Marines to Captain William J. Weiss' Unit B at King Abdul Aziz, while in a series of phases starting on 2 December the bulk of Detachment A departed Shaikh Isa for Jubayl, falling in on top of and ultimately absorbing Captain Quinn's Unit A in the process.

The next few weeks would witness a rapid succession of milestones for the squadron. On the 10th, an advance party of 6 officers and 53 enlisted Marines from Detachment B, MWCS-28, based at MCAS New River, North Carolina, arrived at Jubayl NAF. The Detachment B commander, Major Kevin A. Hoey, was promptly moved up to the vacant squadron executive officer billet, with Captain Ronald W. Snyder, his assistant, assuming command of the detachment. The 12th saw the long-awaited arrival of the MWCS-38 rear party from MCAS El Toro. On 13 December, Lieutenant Colonel Himes and the main body of Detachment A moved from Shaikh Isa to Jubayl, and Major Alan A. Turk moved from the wing G-6 section to MWCS-38 to serve as the operations officer. With something finally approaching a squadron in terms of authorized manpower after nearly four months in theater, Himes on the 15th separated the squadron headquarters from Detachment A. He brought over Captain Weiss from King Abdul Aziz to command the latter and turned over Unit B to First Lieutenant Stephen T. Hoffman. [118]

After much preparation, on 10 December the TAOC assumed the duties of ATACC. [119] Overall communications from King Abdul Aziz to the rest of the wing were actually much improved when compared to the constant struggle to support the widely scattered MACG-38 elements and forward aircraft groups from Shaikh Isa. [120] The new Jubayl NAF communications site was quickly developed after an all-hands evolution from MWCS-38 personnel and substantial assistance from Naval Mobile Construction Battalion 5 (NMCB-5). Control of the Marine Air Command and Control System (MACCS) was transferred to the new TACC at Jubayl on the 23d. Christmas Day came and went as the communications installation continued, and during the last week of the year both a TSC-93B GMF SATCOM "spoke" and a TTC-42 digital switch from the 9th Communication Battalion arrived on site. By 31 December, digital secure voice telephone service was provided through the switch to the first group of subscribers at the 3d MAW headquarters. [121]

The wing communications system leapt further northward at the end of the month after Saudi officials finally approved the use of the airfield at Mishab by Marine units. The projected movement of the newly-arrived MAG-26 to this airfield from its Jubayl NAF bed-down site, and the displacement of the TAOC from King Abdul Aziz to an area of high ground some seven miles to the west of Mishab, prompted Lieutenant Colonel Himes to dispatch Detachment B, MWCS-28 to Mishab on the 23d. To support these northern sites, MWCS-38 quickly installed GRC-201 multi-channel radio links at month's end that connected the

new TAOC site west of Mishab to both the nearby airfield and Jubayl NAF.[122]

The 1st Marine Division Moves Closer to Kuwait

Change was also the order of the day for communications personnel throughout the 1st Marine Division as a combination of new tactical area of responsibility (TAOR) boundaries and the pending arrival of the 2d Marine Division propelled most of its units northward toward the Kuwaiti border. The division relocated its command posts to the vicinity of Manifa Bay during the first days of the month in four phases: Mobile, Forward, Main, and Bravo. At Manifa, the communication company quickly re-established the multi-channel radio link with the 3d Marines, and a link to the 11th Marines was also brought on line from the new site.

As part of the move to the north, the division PLRS platoon on 2 December transferred control among master stations and displaced forward with the division main command post.[123] This movement by echelon of the master stations was repeated during a tactical exercise without troops (TEWT) from 18 to 22 December.[124] The relocation of the division support area (DSA) was the next major evolution for division communicators, occurring between the 4th and the 15th. For the communications company Marines, this involved actions ranging from the relocation of the TTC-38 telephone switch and TSC-96 northward from Camp 15 to the shifting of multi-channel radio links to the regiments away from the division main command post to the new DSA at Manifa.[125]

The 1st Marine Division G-6 section was heavily involved in the exercise of the PLRS network throughout the month. Working with the communication company, they developed a mobile retransmission team to travel in trace of the forward command post in order to ensure continuous network coverage and practiced user-established PLRS reference sites to sustain the forward movement of the PLRS community. This was accomplished by the division's subordinate elements using Global Positioning System (GPS) receivers, as they provided a sufficiently accurate navigational fix for the required PLRS reference points. The G-6 ISMO staff oversaw the installation of a local area network (LAN) at the DSA at Manifa starting in mid-month, and they eventually extended LAN access to the 11th Marines using a dial-in system. The G-6 section also initiated electronic library and mail system (ELMS) service at the DSA, and supervised the installation of a bank of commercial telephones for morale calls back to the United States.[126]

The 2d Marine Division Deploys to Saudi Arabia

Back at Camp Lejeune, North Carolina, Colonel Sepp D. Ramsperger and his G-6 Marines worked to ready the 2d Marine Division for its movement to Saudi Arabia. Since November, when formal notification of the deployment had reached the division, regular liaison with the G-6 of 1st Marine Division had pro-

vided extremely valuable "lessons learned" information concerning tactical communications in theater. These lessons were quickly absorbed by personnel throughout the division. They addressed items ranging from the stockpiling of wire, batteries, and cleaning supplies, to adequate priority for the airlift and sealift of communications personnel and equipment to theater.

An area of concern to the division G-6 was the conduct of the planned offload of MPSRon-1, because reports of problems with the earlier unloading in Jubayl had indicated that communications units had suffered from missing equipment due to inadequate control. This concern was alleviated somewhat with the decision to have the division communication company deploy early and fall in on the MAGTF command element communications equipment allowance on board MPSRon-1, although last minute changes in airlift priority set this timetable back by a few days.

The augmentation of the division by significant Reserve units-including the 1st Battalion, 23d Marines; the 1st Battalion, 25th Marines; the 8th Tank Battalion; and portions of the 4th Assault Amphibian Battalion and the 4th Tank Battalion-posed many problems for the division G-6 section. Nearly all these units possessed less than a quarter of their authorized communications assets and less than a tenth of their needed cryptographic equipment. Additional equipment was brought in from outside the division with HQMC assistance, but other shortfalls had to be made up through the internal redistribution of division communications assets. The division possessed only about 50 GPS receivers prior to its deployment, as compared to an anticipated requirement of nearly 300. On the positive side, a shortage of nearly 100 personnel in the division communication company was filled with Reserve Marines from the 4th Marine Division's communication company.

On 6 December, Major Nicholas C. Petronzio, the division G-6 operations officer, departed for Saudi Arabia with TSC-96 and TSC-93B SATCOM teams from the 8th Communication Battalion as part of the division's advance element. The teams were established shortly thereafter at Camp 15 in Jubayl, and by mid-month the TSC-96 was in operation. The division communication company started to flow into theater at the same time, and this was complete by month's end with the arrival of the PLRS platoon [127]. The company as planned drew much of its equipment from MPS stocks, and its initial focus was on the installation of a tactical telephone system at Camp 15 to support a temporary division headquarters area. [128]

The division's regiments (minus the afloat 2d Marines) also deployed to Saudi Arabia during the month, with the 6th Marines as the vanguard. At the 8th Marines, Captain Patrick C. Regan, the regimental communications officer, was confronted with a variety of challenges during preparations for the deployment. The 8th Marines, having been assigned the responsibility several years earlier for preparing infantry battalions for MEU(SOC) duty, "owned" four infantry battalions, but two of them (the 2nd and 3d Battalions, 8th Marines) were already "chopped" to their respective MEUs. This left the regiment with the 1st Battalion, 8th Marines, and the 2d Battalion, 4th Marines, but the former was "chopped" to

the 6th Marines for the initial deployment since the 6th Marines was itself short a battalion.

The holes in the regiment's line-up were filled by infantry battalions from the Selected Marine Corps Reserve. At various times from late November until late December, the 8th Marines hosted the 2d and 3d Battalions, 24th Marines; the 1st Battalion, 25th Marines; and the 3d Battalion, 23d Marines, for their initial mobilization and field training. With Reserve units normally operating from small training allowance pools of equipment when in garrison, their proper outfitting was of prime concern. With the 6th Marines (and 1st Battalion, 8th Marines) scheduled to draw their equipment from MPSRon-1, the division directed the 6th Marines to turn over 50 percent of its communications gear to the 8th Marines so they could in turn outfit the Reserve battalions. Only one of these battalions, the 3d Battalion, 23d Marines, remained under the command of the 8th Marines after it arrived in Saudi Arabia.

In early December, the 8th Marines received its issue of Unit Level Circuit Switch (ULCS) equipment. Only weeks away from departure for Southwest Asia, the regiment had little time to train its switchboard operators on the SB-3865. The FMFLant Communications School, however, provided substantial assistance which helped not only in this area but with refresher training for the Reserve Marines throughout the first three weeks of the month. The 8th Marines deployed from Camp Lejeune to Jubayl between the 24th of December and the 4th of January. Except for a sparse communication suite for the command post, the bulk of the regiment's equipment was shipped to theater via sealift, and it was early January before the 8th Marines "married up" with it at Jubayl.[129]

The Tiger Brigade and Mobile Subscriber Equipment

Shortly before Christmas, the 2d Marine Division received word that it would gain operational control of the U.S. Army's 1st Brigade of the 2d Armored Division as partial compensation for the loss by I MEF of the British 1st Armored Division. This unit, commanded by Colonel John B. Sylvester, USA, and known as the "Tiger Brigade," was based at Fort Hood, Texas, and had operated as part of the 1st Cavalry Division for its first several months in theater. From a division G-6 perspective, this marriage posed some significant challenges, since the Army and the Marine Corps had adopted significantly different systems for their divisional communications.

The U.S. Army's tactical telephone communications system below corps-level had operated for some time on a hybrid tactical cellular telephone network known as Mobile Subscriber Equipment (MSE). MSE was an area communications system designed to allow personnel from battalion rear command posts to communicate up through corps-level and beyond using a mix of cellular and point-to-point telephone technology. Operators employed mobile subscriber radio terminals (MSRTs) which were netted with others in the system through (from bottom to top) moveable Radio Access Units (RAUs), Large and Small Extension Nodes (LENs and SENs), or a Node Center Switch (NCS). The Marine

Corps did not procure MSE, but instead planned to extend the TriTac system's telephone capabilities down to maneuver battalion rear boundaries through the use of "long local" telephones. These "long locals" would be extended off of the parent regiment's SB-3865 Unit Level Circuit Switch through point-to-point multi-channel radio links. Below the corps-level, the MSE and TriTac systems were not compatible.

Known as a "Fulda Gap" system by many because it was ideally suited to conditions expected to be encountered in an area defense of Germany or Korea, MSE was difficult to engineer in a more fluid and fast-paced arena such as the open desert because of the need to move constantly portions of the network in order to keep within range of the maneuver battalion rear boundaries. Also, maneuver battalions and brigades possessed no organic equipment to establish an area cellular network; each army corps owned a dedicated MSE signal battalion which was capable of supporting a five-division MSE communications network covering some 37,500 square kilometers. At the corps headquarters this cellular network was tied into the larger army and theater communications system via the NCS and TTC-39 switch.[130]

For Colonel Ramsperger and his staff, this meant that the division headquarters could not communicate via telephone with the Tiger Brigade without the aid of a slice of a corps MSE signal battalion. The 142d Signal Battalion, commanded by Lieutenant Colonel Henry C. Cobb, Jr., USA, was eventually called upon to perform this mission. The 142d provided a RAU as well as five MSRTs, two of which went to the division command group and the remaining three to the commanders of the 6th, 8th, and 10th Marines. The RAU at the 2d Marine Division command post would in turn be connected to the MSE node operated by the 142d Signal Battalion via a channel. from the division's assigned TSC-93B GMF SATCOM. The division would thus gain a "back door" to the theater communications system through the MSE network, but this came at a significant price: almost 30 additional very high frequencies would be required to support the needs of the Tiger Brigade's MSE network.[131]

The Reinforcement of the 1st FSSG

The arrival of 2d FSSG units in Saudi Arabia during December prompted a major reorganization of the Marine combat service support structure. General Support Group 2 (GSG-2) was established on the 1st at Mishab by dividing the GSG-1 headquarters at Jubayl. GSG-2 would serve as the 1st FSSG's forward general support base, while GSG-1 would continue to operate the centralized supply and maintenance functions of I MEF. Both the 2d Supply and the 2d Maintenance Battalions from Camp Lejeune were brought forward to join GSG-1, as was the Marine Corps Reserve's 6th Motor Transport Battalion.[132]

The Direct Support Command (DSC) was formed by General Brabham on 14 December under Brigadier General Charles C. Krulak, the commanding general of the 2d FSSG. The DSC, charged with the provision of direct combat

service support to the 1st and 2d Marine Divisions, assumed command of the 1st FSSG's Direct Support Group 1 (DSG-1) and formed DSG-2 out of newly arriving 2d FSSG units. The BSSG-6 headquarters, brought into theater to oversee the offload of MPSRon-l, formed the nucleus of the DSG-2 headquarters in Saudi Arabia.

With the heavy intermingling of East and West Coast units in this nearly 14,000-man 1st FSSG (-)(+), a similar situation regarding communications support developed. Officers of the respective FSSG general staffs tended to stay with their flag, as did the many of the communications personnel in their subordinate communication companies. The subordinate battalion communication platoons and sections formed a large pool to augment the elements supporting the various DSGs, GSGs, and CSSDs.

Major John F. Hand's Communication Company, 2d FSSG, departed North Carolina on 6 December, and while it consolidated at Jubayl, Major Hand assumed command of the combined 1st and 2d FSSG communication company.[133] This arrangement lasted only into early January, when he and many of his Marines moved north with the DSC. Others were formed into the detachments mentioned above. With its BSSG-4 and MSSG-24 communication platoons with 4th MEB and 24th MEU, Hand's company was somewhat understrength, although the addition of approximately 45 Reserve Marines prior to its deployment helped the company greatly.[134]

Immediately prior to its equipment's departure from Camp Lejeune, the communication company received TTC-42 and SB-3865 ULCS switchboards and their associated telephones. Its late arrival permitted only rudimentary training on this equipment, although a few individuals had received more extensive formal training prior to that point. The bulk.of ULCS system training would come through experience gained in the initial installation and operation.[135]

Forces Afloat

December proved to be a quiet period for 4th MEB and 13th MEU(SOC) in terms of operations. Much of the month was spent planning for a wide range of amphibious operations in support of the looming conflict with Iraq. For General Jenkins and his staff, a significant concern was the large number of requests by II MEF units bound for Saudi Arabia for the return of portions of their people and equipment embarked with the MEB in August. These requests became so frequent that the general instituted a series of staff measures designed to weigh the supportability of each. With an amphibious assault in the planning stages and thus no decrease in his NavCent mission responsibilities, General Jenkins sought to ensure that his command retained its core communications capabilities.

After this review procedure was put in place, certain key items were returned to their parent commands. Several PSC-3 SATCOM teams went ashore, as did one of the two PLRS master stations originally embarked with 4th MEB

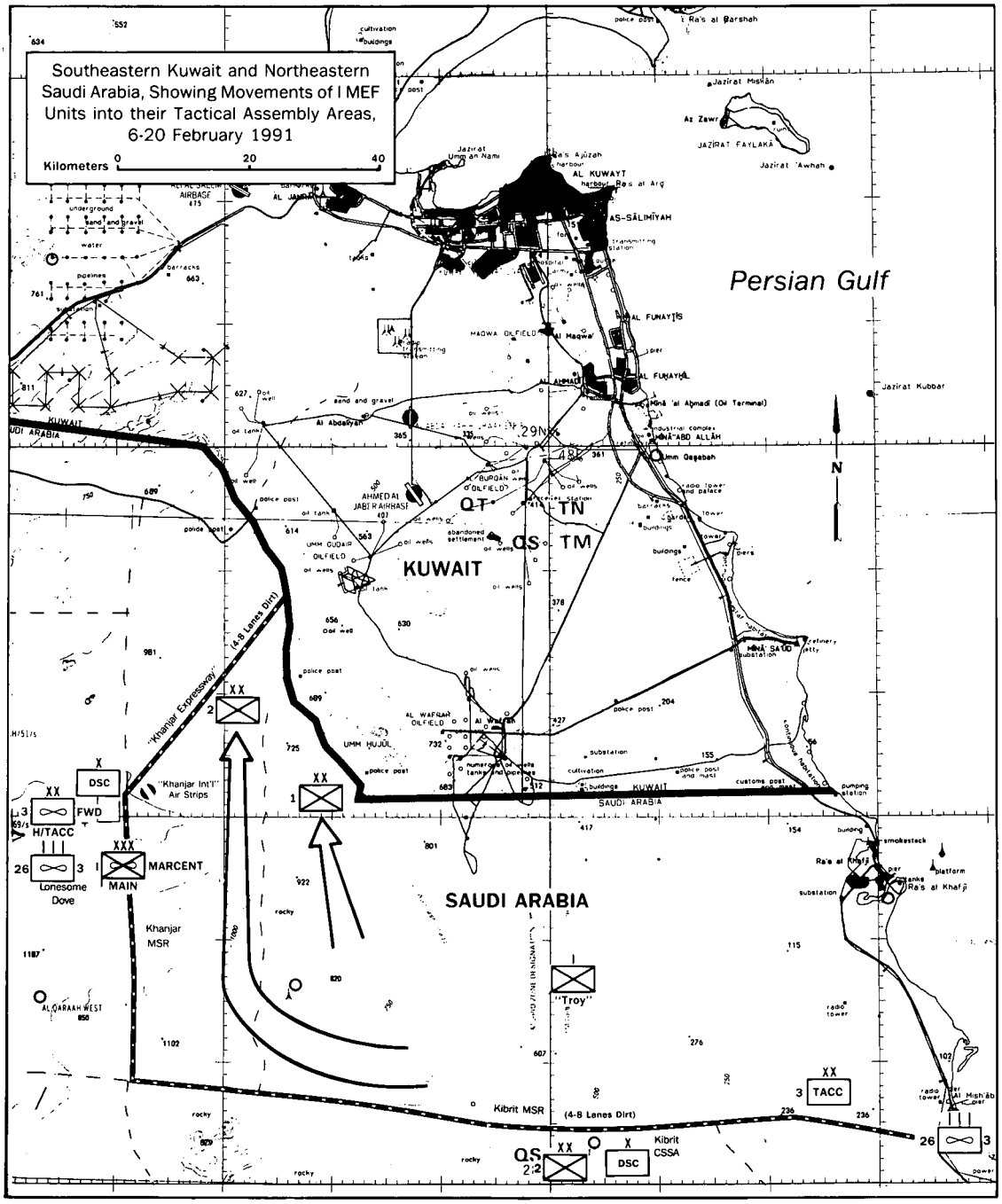
from the 2d Marine Division. The JCSE TSC-93B GMF SATCOM team assigned to the MEB in August departed as well. While the departure of these assets eliminated certain system redundancies, 4th MEB communication elements remained capable of supporting the full range of command and control functions required for an amphibious assault.[136] Although it would not be in theater until after the start of the new year, the amphibious task force gained substantial combat power with the 1 December departure of the 5th MEB from southern California. Commanded by Brigadier General Peter J. Rowe, the 5th MEB was composed of RLT 5, MAG-50, and BSSG-5. General Rowe's G-6 was Lieutenant Colonel William V. Cantu. Due to the high demand of the Marine forces already in theater, the MEB left the United States with a very thin communications capability. Major John E. McKnight III's Company A, 9th Communication Battalion, consisted of only 89 officers and enlisted Marines and was limited mostly to single-channel radio equipment.[137] Major Stephen H. Copley's Detachment B, MWCS-38, was similarly constrained, possessing assets " ... marginally adequate for any scenario in which they would operate ashore."[138] The 5th Marines communication platoon, commanded by Captain Scott G. Bradley, was able to embark with the bulk of its equipment and personnel. RLT 5 was thus the only element of 5th MEB with sufficient communications ability to operate ashore for an extended period of time.

Period Summary

With the massive reinforcement of I MEF well on its way by the end of December, Marines ashore in the Gulf region, were afforded scant opportunity to dwell on their holiday separation from family and friends. With most units involved in a great northward migration, the complexities of training, transporting, and sustaining the force often called for an around-the-clock effort by all hands. For communications personnel, the enormous effort of the past five months seemed to pale when compared with what would be expected of them in the near future. The effective command and control of a highly mobile, corps-sized MAGTF would require the development of a communications system utterly unimaginable to most just a few months before.

Desert Storm and After
January - March 1991
January 1991: From Shield to Storm

The new year found the Marines of the heavily reinforced I MEF migrating northward in a race against time, as the U.N.-endorsed deadline of 15 January for Iraqi forces to quit Kuwait approached rapidly. As newly arriving units continued to pour through Jubayl into nearby encampments, the "old-timers" of I MEF bid farewell to what were by then all-too-familiar defensive positions and rear airfields and logistics bases as they displaced to forward areas closer to the


Southeastern Kuwait and Northeastern Saudi Arabia, Showing Movements of I MEF Units into their Tactical Assembly Areas, 6-20 February 1991
Kilometers 0 20 40
Persian Gulf
KUWAIT
SAUDI ARABIA
QT
TN
QS
TM
"Khanjar Expressway"
(4-8 Lanes Dirt)
"Khanjar Int'l" Air Strips
DSC
FWD
H/TACC
Lonesome Dove
MARCENT
MAIN
Khanjar MSR
"Troy"
Kibrit MSR
(4-8 Lanes Dirt)
Kibrit CSSA
TACC
N

Kuwaiti border. In the middle of this effort, heavy rains throughout northern Saudi Arabia served to saturate Marines' clothing and equipment.

I MEF Girds for Start of Desert Storm

The establishment of the I MEF main command post at Safaniya in late December and early January was just one of many steps in preparation for the approaching offensive against Iraq. The massive repositioning and reinforcement of I MEF's communications system during the month involved a variety of activities, all designed to maximize both its efficiency and redundancy. The arrival of 8th Communication Battalion personnel and equipment in theater had an enormous impact on this effort, starting with the installation of a second complete GMF SATCOM "hub-spoke" network for the MEF. By the end of January, the I MEF GMF SATCOM backbone consisted of 2 TSC-85B "hubs" located at the rear command post at Jubayl with the capacity to link with a total of eight TSC-93B "spokes" supporting the forces in the AOR. These eight "spokes" were apportioned to command posts as follows: the I MEF Main and Alternate (one each); the 1st and 2d Marine Division Mains (one each); the 3d MAW TACC at Jubayl NAF; MAG-11 at Shaikh Isa; the DSC at Kibrit; and the 4th MEB afloat. In addition, there remained in service the sole TSC-93A linking the 1st FSSG to Fort Buckner, Okinawa.[139]

Satellite communication capability was not the only factor affecting I MEF planning in early January. As war loomed closer, General Boomer became increasingly concerned at the very limited maneuver area in which both MarCent and the neighboring Joint Forces Command-East/Eastern Province Area Command (JFC-E/EPAC) had to execute their respective offensive operations. In mid-month, he decided to shift the planned 1st Marine Division breach of Iraqi lines in southern Kuwait further to the west toward its so-called "heel" at the southwestern corner of the border. For the two Marine divisions, this was inconvenient, but it did not create undue hardship because their command posts were of a relatively small size and their GMF SATCOM tether allowed for ready displacements.

For the force commander, however, this shift to the west entailed significant repercussions, since his command post at Safaniya would be too far off to the flank to exercise reliable control over the assault. Thus, a new MEF Main site would have to be developed closer to the breach point for better command and control of the ground assault. With General Boomer's 16 January decision, Major William Ciaston's Company B, 8th Communication Battalion, which provided communications support to the alternate main command post, began its movement to a site just north of Kibrit that was chosen for this purpose. By the end of January the new MEF Main near Kibrit was well on its way to completion, with the expectation that control would be shifted to the site within one week.[140]

The start of the strategic air campaign of Operation Desert Storm on 17 January provided a dramatic backdrop as the I MEF communications network-

much of which was already positioned forward of the combat forces-extended westward deep into the Arabian desert. The internal I MEF multi-channel radio network capacity was greatly enhanced with the addition of two more Army TRC-170 radio teams. The first team was used to link the MEF command posts at Safaniya and the Jubayl Police Station, while the second roughly paralleled the first by linking the 3d MAW TACC with the TAOC to the north near Mishab. GRC-201 multi-channel radio teams from the two communication battalions and MWCS-38 installed a variety of secondary links connecting various command posts in the northern AOR. Communications lines between major subordinate commands crossed frequently as command posts shifted, further blurring the already indistinct division of labor among the various communications units. From Colonel Hill's perspective at the MEF G-6, there was no alternative to this shared effort, as the rapidly developing situation demanded force-wide communications integration.[141]

Confusion over unit responsibilities during this period was kept to a minimum due to strong central direction on the part of the 9th Communication Battalion S-3 section, which served as the heart of the I MEF systems control effort. This was aided by an agreement forged between the two communication battalion commanders back in December to a unique division of labor in regard to the operations of multi-channel radio equipment. Per their agreement, the 8th Communication Battalion's support company assumed responsibility for all of the MEF's GMF SATCOM assets, while the 9th Communication Battalion's support company did the same for the GRC-201 assets. Added to the pool of equipment were MWCS-38 GRC-201s, which were used by the MEF in general support of the northern MarCent system as well as for specific point-to-point links between 3d MAW air control agencies. The 17 January arrival of the bulk of the 8th Communication Battalion's gear at the port of Jubayl provided the much needed margin for system flexibility and redundancy in wartime.[142]

I MEF established an automated message switch network in January using an ARCENT TYC-39 for general service traffic and a 1st Radio Battalion MSC-63A for special intelligence (SI) message service. Colonel Hill pulled Major Hoey from MWCS-38 up to the I MEF G-6 at mid-month to supervise their installation, since Hoey was the most experienced Marine in theater in the operation of the TYC-39, dating from his previous tour as the CentCom AMPSSO.[143] While Hoey quickly put the TYC-39 into operation, the MSC-63A-which was still in the development stage-proved troublesome and never achieved its desired level of service. Both were located at the MEF rear command post at the Police Station in Jubayl. With the extension of Mode I message service to Shaikh Isa over a GMF SATCOM link, the TSC-96 van supporting the site followed the wing headquarters in its move to Jubayl; other TSC-96s were moved to Mishab, Kibrit, and Manifa Bay.

The beginning of Operation Desert Storm presented an unexpected challenge for the MEF communications network in the form of the CentAF daily air tasking order (ATO). The ATOs, averaging nearly 400 pages in length from CentAF and 300 from NavCent, completely inundated Navy and Marine record

communications traffic facilities throughout the theater, starting in the middle of January. Unable to receive only the relevant parts of the ATO, the MEF's communications centers strained under the weight of receiving the whole document and reproducing the necessary portions. As a chorus of complaints arose from around the MEF regarding this situation, Colonel Hill turned to his deputy, Lieutenant Colonel John B. Hall, for a solution to the ATO mess. Hall arranged with the Marine liaison to CentAF, Colonel Joseph W. Robben, for his Marines in Riyadh to "dump" the ATO to I MEF via a computer-to-computer dial-in over the theater tactical telephone system. I MEF in turn electronically distributed portions of the ATO via its WAN system to the 3d MAW and the two divisions as appropriate, and further distribution was made by them as needed. As a result, most of the subordinate addressees were able to be removed from the ATO message, and this in turn relieved the pressure on the MEF communications system.[144]

The 3d MAW Positions for the Fight

For the 3d MAW's communications personnel, the frantic war preparations of late 1990 accelerated further in the first weeks of January 1991. MACG-38 completed the shift of the MACS-2 TAOC from King Abdul Aziz to its new position to the west of Mishab early in the month. In addition to the TACC-to-TAOC link established at the end of December, MWCS-38 laid in two more GRC-201 shots originating from the TAOC: one eastward to Mishab and one 40 miles to the west to Kibrit. As MAG-26 prepared to displace to its new home at Mishab, MAG-16 received word that it also would finally move north, to the Arabian-American Oil Company (ARAMCO) airfield at Tanagib. This prompted the installation of two GRC-201 multi-channel radio links-one from the TACC and one from the TAOC-to the site by the end of the month. To support arriving wing elements there, Lieutenant Colonel Himes dispatched the advance party of Captain Quinn's Unit A northward to Tanagib on 16 January.

In order to provide adequate communications to these new northern sites, the wing was forced to eliminate several multi-channel radio links in the southern end of the AOR to free up the necessary equipment. The first to go was the Shaikh Isa-to-King Abdul Aziz GRC-201 link, the disestablishment of which was made possible after the placement of a JCSE TSC-93 GMF SATCOM spoke at Shaikh Isa. By the end of the month, MWCS-38 was operating a total of 12 AN/GRC-201 multi-channel radio links throughout the I MEF AOR.

Commercial and tactical telephone service saw general improvement during the month due to a combination of new sites and new equipment. MWCS-38 extended digital telephone service from the 9th Communication Battalion's TTC-42 at Jubayl NAF to the TAOC through the TRC-170 link on 27 January. The squadron continued its effort to engineer limited digital trunking service to the sites through its own GRC-201s using special equipment modifications.* The

*A relatively recent equipment modification-the TD-1065/1069-enabled the GRC-201 to transmit and receive several channels of digital information.

Jubayl NAF site proved to be greatly inferior in terms of commercial telephone service to what the wing staff had become accustomed to in Bahrain, with only a few lines available for its use in early January. Consequently, the G-6 section spent a great deal of time attempting to overcome this problem, with a solution at month's end centering on the importation of commercial lines from the city of Jubayl over GRC-201 links. Paradoxically, MAG-16, the previous tenant at Jubayl NAF, had been forced to live with this particular limitation for more than four months, but it found a relatively plentiful supply of 20 commercial telephone lines upon its arrival at the ARAMCO airfield at Tanagib.[145]

The supply of single-channel radio equipment and, in particular, its related cryptographic gear became a concern for the wing G-6 as the demand for mobile secure communications for air support grew beyond the Marine Air Support Squadrons' internal capacity. This was driven by the I MEF decision to create an air support element (ASE) with each division while retaining the Direct Air Support Center (DASC) with the MEF Main. A MACG-38-wide redistribution of HF radio assets alleviated the shortage in this area, but the establishment of additional FARPs in the northern AOR and the need to create a small reserve for future displacements further exacerbated the problem.[146]

The 1st Marine Division: Prelude to the Storm

The 6 January shift of the 1st Marine Division main command post to the area north of the "Triangle" paralleled that of its subordinates as it cleared its former TAOR to make room for the 2d Marine Division and the 1st UK Armored Division. The division communication company labored to support this move and promptly re-established VHF multi-channel radio links among the DSA at Manifa, the main command post, the 11th Marines, and RCT 3. The new link with RCT-3 was not very reliable, however, as its command post at Mishab was nearly 40 miles away. The division PLRS platoon displaced its master station with the main and established a PLRS reference site near Mishab. After the commencement of Operation Desert Storm, the division further extended the network with the emplacement of a PLRS team south of the Kuwaiti border near Al Qaraah on the 26th in support of the 1st Battalion, 25th Marines, and Task Force Shepherd.[147]

By the middle of January, the 1st Marine Division's command post structure had attained the form within which it would soon conduct combat operations. The mobile command post provided the commanding general the ability to move rapidly about the battlefield when required. Based out of several LAV-C2s and a few HMMWVs, the mobile command post was limited to single-channel radio and PSC-3 UHF SATCOM radio communications. The mobile command post would in theory spend the bulk of the time collocated with the forward command post, where General Myatt, assisted by a select group of staff officers, would command the division attack. The forward command post would have more substantial capabilities, the most notable being a TSC-93B GMF SATCOM set. The for-

ward post would be supported by digital telephone service from a remote multiplexer-combiner (RMC) and a small secure compartmented information facility, or mini-SCIF. A unique single-channel radio net-designated Tac 5-linked the forward and main command posts, using AN/UYK-85 microcomputers and modems to pass high precedence information.

At the main command post, assistant division commander Brigadier General Thomas V. Draude would support Myatt through coordination and communication relay. With the main command post would be a PLRS master station as well as the division's second TSC-93B. The main post would be tied-in fully with the larger MEF communications network, and it would host the division's air support element (ASE). Lastly, the division rear command post would be located with the division support area at Manifa Bay. Located there would be the division's TTC-38 telephone switch and the TSC-96 communication center van.[148]

The division's subordinate maneuver regiments and battalions-organized both as mechanized and foot-mobile task forces-spent much of January in defensive positions generally to the south of the Mishab - Kibrit - Al Qaraah track. The exceptions were Task Force Shepherd's LAVs, which backed up Marine reconnaissance teams operating well forward along the inland half of the southern and southwestern border area, and elements of RCT-3 (renamed Task Force Taro), which covered the coastal portion of the border behind the Eastern Province Area Command's (EPAC) Arab forces. The division's artillery regiment-designated Task Force King-gained the 1st Battalion, 11th Marines, from Camp Pendleton and the 3d Battalion, 12th Marines, from Okinawa. Rounding out the division was Task Force Papa Bear, composed of the newly arrived Headquarters, 1st Marines, with its own 1st Battalion; the 3d Battalion, 9th Marines; the 1st Tank Battalion; and various attachments. Headquarters, 4th Marines, moved over to the division from its previous role as the I MEF rear area operations center (RAOC). Within weeks it was designated Task Force Grizzly with the 2d and 3d Battalions, 7th Marines, and 1st Battalion, 25th Marines, as its subordinate elements.[149]

On 22 January, the war arrived in earnest for the division's forward task forces with a series of artillery raids on Iraqi positions in Kuwait. One such raid on the 28th was noteworthy in that it was supported by PLRS and " . . . was the first combat use of the Rockwell GPS surveyed reference sites in support of a PLRS Master Station".[150] The division's command and control network received its first test when Iraqi forces attacked into Saudi Arabia from southern Kuwait along several points during the last few days of January. Inland, Task Force Shepherd battled Iraqi mechanized units at border police posts, while combined anti-armor teams (CAATs) from Task Force Taro supported Arab forces in their successful defeat of a brigade-sized assault on the coastal town of Khafji.

The experience of Task Force Taro reflected the nature of regimental communications during January. With its main command post located just to the west of Mishab since late December, Taro's battalions were concentrated in an area compact enough to permit the laying of field wire to most of them. The task force command post was in turn tied into the division support area (DSA) through

Department of Defense DN-SC-93-02328

The photograph above provides a view of the 3d Marines Command Post west of Mishab, Saudi Arabia, in early January 1991. Two CH-46Es are at rest in the landing zone beyond and the town of Mishab is barely visible to their left in the distance.

Defensive positions at the 3d Marines Command Post west of Mishab are seen in the photograph below, taken in early January 1991. The radio antennas and vehicles of the regimental communication platoon can be seen in the background.

Department of Defense DN-SC-93-02327

a VHF multi-channel radio link, but its extreme distance (nearly 40 miles) meant that the link's reliability was limited. Taro was connected to the division Main by PSC-3 UHF SATCOM radio as well as a variety of single channel VHF and HF radio nets, although the distances involved often limited VHF use and workable high frequencies were hard to come by. This meant that Taro was often unable to communicate on the division's assigned Tactical Air Request (TAR) Net, but the regular presence of an airborne DASC or a forward air controller (FAQ helped to overcome this deficiency.

When the Iraqi Army attacked Khafji at the end of the month, Taro's communications officer, Captain Michael J. Smith, pushed a mobile VHF retransmission team nearer to Khafji so that forward observers from the 1st Battalion, 12th Marines, working with EPAC units could communicate with their battalion in response to EPAC forces' calls for fire. This team also supported the 2d Battalion, 3d Marines, when Taro's commander, Colonel Admire, ordered the battalion northward to back up the Arab forces. The latter successfully repulsed the attack without the commitment of Marine ground reinforcements to the battle. The PLRS network was in operation during the battle, but with no Taro Marines in direct contact with the enemy, it played little role in the fighting around Khafji. [151]

The 2d Marine Division: From Jubayl to Kibrit

The month of January found the units of the newly-arrived 2d Marine Division involved in a series of displacements spanning the 190 kilometers from Jubayl to Kibrit, with interim positions in the well-worn "Triangle" area. Throughout this period, the division conducted unit training, "battle sighting" of weapons, and operational checks of equipment. Its communicators were kept busy supporting the division's northward movement as the forward command post displaced from Camp 15 during the last week of December, first to the "Cement Ridge" and then on 6 January to the "Triangle" area. The main command post followed on the 7th with other division elements close behind, although the last division unit to arrive in theater-Company C, 4th Tank Battalion-did not do so until 19 January. [152]

After marshalling their equipment and personnel in the camps around Jubayl, the 8th Marines moved to the field in the middle of the month with the 2d Battalion, 4th Marines; the 3d Battalion, 23d Marines; and the newly returned 1st Battalion, 8th Marines. It occupied initial defensive positions, first to the southwest of Mishab and then by month's end a few miles south of Kibrit. The regiment established multi-channel radio links with its subordinate battalions and CSSD-28, and it relied heavily on both VHF and HF radio links. With GPS units in short supply, the regiment employed PLRS basic user units (BUUs) down to its line companies.

Finalizing his command post configuration, the regimental commander, Colonel Larry S. Schmidt, decided to displace with alpha and bravo echelons. Each echelon would possess one AAV command variant (AAVC7A1) and one

AAV personnel variant (AAVP7A1) accompanied by soft-skinned vehicles such as radio-equipped HMMWVs. The regimental communication platoon added GPS receivers, PLRS user units, and RC-292 antenna extensions to these vehicles. Moving with the alpha command echelon was a HMMWV-mounted mobile command group that consisted of a half dozen radio vehicles (with a MSRT) and a HMMWV-mounted miniature COC. Colonel Schmidt could displace with all or most of the mobile group, or using the mobile's radio vehicles, Captain Regan could remote the alpha echelon's radios nearly 5,000 feet away from the COC and FSCC.[153]

The 2d Marine Division G-6 section was challenged during the month by a flood of requests for additional communications equipment. Radios for range control, liaison teams, and multiple command post sites had to be rounded up, and less-than-expected MPS stocks and Reserve unit cryptographic shortfalls added to the press. In response, the division reallocated radio vehicles from its regiments and took more than a dozen KY 57s from each active infantry battalion and gave them to Reserve units. This action left most of the company-level radio nets in the division without encryption devices, but the division G-6 section viewed this as a necessary and acceptable risk given the severe cryptographic equipment shortage. As was the case with the other major subordinate commands in I MEF, the division's allocation of high frequencies for its radio nets proved to be extremely difficult to employ. The better of the lot were assigned to the 2d Reconnaissance Battalion, while the rest of the division's units got along the best that they could.[154]

Communications from the main command post were limited to the employment of UHF SATCOM and VHF and HF single channel radio nets until 10 January, when I MEF installed a TSC-93B GMF SATCOM link to the division. Routing and interface problems, however, delayed its full employment until the 14th, when the 8th Communication Battalion finally brought all 12 channels on line. This provided worldwide telephone connectivity, message center and wide area network (WAN) service, as well as a variety of intra-MEF "hot lines" to the Main. A second TSC-93B arrived on 15 January, which allowed for the rapid displacement of the division tactical command posts.

In order to perform his assigned defensive mission while at the same time improving his position for the anticipated offensive, General Keys in early January ordered his division's movement to Kibrit. This occurred between the 14th, when the division main arrived in the area, and the 24th, when its remaining elements completed the move.[155] The division's MSE network slice was installed on the 20th by the 142d Signal Battalion, followed shortly by a GRC-201 multi-channel radio link between its support area and the MEF command post. By 18 January, the division completed its concentration around Kibrit, and the communication company had established single- and multi-channel radio connectivity to the regiments and separate battalions. The division participated in a I MEF fire support coordination communications exercise conducted from 20 to 24 January; better high frequency radio allocation within the division contributed significantly to its success.[156]

The efforts of the communications personnel to install the system rapidly proved critical during the last week of January. The division launched its "first combat mission ... since World War II" on the 27th, when the 2d Light Armored Infantry Battalion (2d LAI Battalion) and the 5th Battalion, 10th Marines, teamed up to conduct a surface artillery raid on Iraqi positions in Kuwait with Battery A of the U.S. Army's 92d Field Artillery in support. Two days later, Iraqi armored units encountered the division's defenses as part of their attack into Saudi Arabia at Khafji and OP-4. This action came at an awkward time for the division, since it was preparing to move its command post and maneuver units further to the north into final assembly areas. Although the division's combat action was limited to elements of the 2d LAI Battalion, it had the effect of postponing some of these moves. [157]

The Direct Support Command is Established at Kibrit

For the communicators of Brigadier General Charles C. Krulak's Direct Support Command, early January was dominated by the buildup of the Kibrit combat service support area. Major John F. Hand's communication company Marines arrived at the site on 4 January, and he directed their initial efforts toward the rapid establishment of basic services for the command. Within weeks, the DSC internal communication system consisted of two parallel telephone systems, with one centered on a TTC-42 digital switch and the other on a TTC-38 analog switch. The TSC-93B GMF SATCOM van on site provided digital trunks to the TTC-42, general and special intelligence message service, and wide-area network connectivity with the rest of I MEF. A TSC-96 van provided backup message center capability for the DSC as well. Communication between the DSC and its subordinate groups was through VHF multi-channel radio links utilizing TTC-38 to SB-3614 analog telephone service. Although the DSC G-6 had planned for switched telephone service down to the CSSD level, in practice this was done infrequently because of distance constraints. More often than not, communication to the CSSDs was through single channel VHF radio nets, and even then the communication company was regularly forced to establish VHF radio retransmission sites to bridge the distance between the scattered detachments.[158]

Major Hand established the communication platoon for DSG-2 under First Lieutenant Scott R. Sizemore. This complemented the mission of the communication platoon for DSG-1, which had provided support to the group since its formation in back in September 1990. Although a certain level of standardization existed, the amount of personnel and equipment dedicated to the groups' subordinate mobile combat service support detachments (MCSSDs) depended heavily on the mission of their supported regiment or task force. [159]

The DSC's Kibrit site branched out from a series of dirt crossroads that intersected the east-west multi-lane main supply route scraped out of the desert by the SeaBees of the 3d Naval Construction Regiment. Near its center was a dirt airstrip that was used heavily by C-130 aircraft to transport high-value cargo and

passengers to the forward area. Because of its exposed position, the DSC spent a great amount of effort digging in its facilities and constructing many miles worth of dirt berms for added protection. The unusually heavy rains in January caused flooding in many of these positions; Major Hand's Marines awoke one morning to find their brand-new TTC-42 switch afloat in its hole. The company promptly moved the switch and checked it for proper operation, and all were relieved when it was determined that the shelter had managed to keep the water out of its delicate electronic circuitry.[160]

Forces Afloat: Reinforcement and Rehearsal

While preparing for a wide range of possible amphibious operations in support of the impeding conflict over Kuwait, the attention of the forces afloat temporarily shifted to the Horn of Africa. The 4th MEB was notified on 2 January that it would have to conduct a non-combatant evacuation operation (NEO) of U.S. citizens and friendly nationals from Mogadishu, Somalia. The government of the country had effectively lost control of the capital as warfare between rival armed groups had spread rapidly into civil war.[161]

Late on the 2d, the USS *Guam* (LPH-9) and the USS *Trenton* (LPD-14) steamed toward Somalia with the MEB's Bravo Command echelon and elements of MAG-40, BSSG-4, and RLT 2. Early on 5 January, two CH-53Es lead the evacuation with an extraordinary eight-hour mission involving multiple night air refuelings from 3d MAW KC-130s. This mission was followed by numerous CH-46E flights during the day and early evening of the 5th once the two amphibious ships closed on Somalia.[162] The 4th MEB's G-6A, Major Robert Morgan, lead a team that established and maintained communications at the U.S. Embassy in support of the NEO. General Jenkins and his staff on board the USS *Nassau* monitored the action over the radio nets and readied for additional operations, although this quickly proved unnecessary.[163]

The arrival of the 5th MEB and Amphibious Group 3 in theater later in January involved frequent and detailed liaison and a certain amount of adjustment on the part of the seagoing staffs, but the Marine command afloat avoided a disruptive major reorganization. With General Jenkins and Rear Admiral John B. LaPlante already designated by NavCent as Commander Landing Force (CLF) and Commander Amphibious Task Force (CATF), respectively, the newly joined U.S. Pacific Fleet units essentially assumed a reinforcing role. Valuing the cohesion of each MEB, General Jenkins kept the two staffs separate and assigned the 5th MEB commander and staff the role of alternate command element on board the USS *Tarawa* (LHA-1). He kept the 13th MEU(SOC) as an independent subordinate MAGTF, while RLT 2 and RLT 5 both answered directly to the 4th MEB. General Jenkins did combine the aviation and combat service support forces, subordinating MAG-50 to MAG-40 and BSSG-5 to BSSG-4.

With the commencement of Operation Desert Storm and its strategic air campaign on 17 January, the amphibious task force's communications network

was temporarily saturated by the sheer volume of CentAF's daily air tasking order. With no Air Force CAFMS terminals installed on board its ships, the Navy was forced to retransmit the ATO over standard record message traffic means. NavCent alleviated this situation somewhat with the institution of the delivery of the ATO from Saudi Arabia using fleet support aircraft, and 4th MEB employed the WWMCCS inter-communication capability to coordinate tasking between the 4th MEB and the 3d MAW.

The amphibious task force conducted Sea Soldier IV, a full dress rehearsal for the planned amphibious assault on Kuwait, from 18-27 January. Impressive in its size and scope, the exercise bolstered the confidence of the staff in the plan for the assault. Lieutenant Colonel Williams was satisfied that the available communications equipment and procedures would support fully the landing force in its mission.[164]

Early and Middle February: The Shift Further West and Final Assembly

With the exception of the complications arising from the winter's unusually heavy rainfall, the I MEF communications system functioned smoothly throughout the initial phases of the air campaign. In early February, it stood poised to support the commanding general's plan of attack, with only the imminent completion and occupation of his new main command post remaining to be accomplished. From this post, General Boomer planned to command the assault into Kuwait, with the 1st Marine Division breaching the fortifications near its southwestern corner and the 2d Marine Division then following quickly in trace of the 1st, passing through it, and further exploiting the attack to isolate southern Kuwait and Kuwait City from the rest of the occupying Iraqi army.

General Boomer fundamentally altered this plan when he decided on 6 February to attack into Kuwait using a two-division breach. The additional breach-to be conducted by the 2d Marine Division-would occur to the northwest of the 1st Division's, almost halfway up the lower southwestern Kuwaiti border between the so-called "elbow" and "heel." The change in plan followed the arrival of additional countermobility equipment and Boomer's reassessment of the quality of the threat facing his Marines. In consultation with his subordinate commanders, Boomer determined that not only General Keys' division but also the Direct Support Command and a helicopter group would have to reposition further to the west in support of this new scheme of maneuver.[165]

I MEF Extends Westward to the Gravel Plain

For Colonel Hill and the rest of the G-6 section, the shift of the I MEF attack further to the west was a cause for concern. He quickly consulted with his communication battalion commanders, the two division G-6s, and his own staff to determine the best way of supporting this change of plans. Although their dis-

cussions initially focused on extending the reach of the Kibrit command post through the use of radio retransmission, Hill soon concluded that the distance to the 2d Marine Division on the left flank was simply too great for effective control from Kibrit. He took this conclusion to the I MEF G-3, Colonel Billy C. Steed, and they in turn promptly explained to General Boomer their concerns about the position of the command post. Boomer listened to his staff officers' analysis and then asked them for their recommendation. Knowing that both the DSC and MAG-26 would be moving around the corner of the southern border, Hill suggested that this area would also be suitable for the main command post. General Boomer, without pause, turned to Colonel Steed and told him to relocate the command post to that area.[166]

The shift of the main command post caused some disruption in the MEF timetable because of the impending shift of control from Safaniya to Kibrit. Fortunately, with the forward elements of I MEF relying primarily on GMF SATCOM links, no major system re-engineering effort was required. However, the GRC-201 network had to be extended to the new area-known initially as "the Gravel Plain" from its generic description on the MEF's tactical maps-to provide adequate communication system redundancy for the forces soon to marshal there. This would take some time, as would the effort to tear down communications at the Kibrit command post site and develop of the new one.

Once given the order to do so, Major William M. Ciaston's Company B, 8th Communication Battalion, quickly reversed its work on the nearly complete Kibrit main command post. Within days this task was finished, and Ciaston's forward echelon had encamped at a point seven miles to the south of the rapidly developing Gravel Plain area where General Krulak's DSC had established its new headquarters. The new I MEF command post was readied in five days after an extraordinary effort on the part of engineers, Seabees, and communicators of all stripes.[167]

I MEF shifted control from Safaniya to the new command post in the western base area-quickly dubbed "Al Khanjar" (roughly "the dagger" in Arabic) by Krulak's Marines-in echelons on the 14th and 15th of February. Major Febuary's Company B promptly disassembled communications at Safaniya, loaded its equipment on board vehicles, and began its trek westward. Within a few days, the company was staged at Al Khanjar and preparing to echelon forward in order to establish the next main command post in Kuwait.

The 1st Marine Division: Preassault Preparations

With the combat actions surrounding the battle of Khafji behind it, on 3 February the 1st Marine Division displaced its main command post to the west of Al Qaraah. Remaining behind on the southern border of Kuwait was Task Force Troy, commanded by General Draude. General Boomer intended Troy to serve two purposes: to mask the movement of Marine forces to their assembly areas around Al Qaraah and Al Khanjar, and to deceive the enemy on the timing and

location of the I MEF assault. The task force was outfitted to simulate a variety of communications links and was connected to the division headquarters by means of a MRC-140 UHF SATCOM vehicle as well as VHF radio retransmission teams.

The division established its forward support area at Al Qaraah (south of the "heel" of the Kuwaiti border) while the main support area remained at Manifa Bay. The communication company re-established MRC-135 multi-channel radio links from the main command post to the DSA (Forward) and Task Force King, and it supported the DSC's displacement between the 8th and the 12th of February. On the 18th, the DSA (Forward) was linked to the DSC, but this was shifted to the 2d Marine Division's support area six days later. On 22 February, the division terminated the multi-channel radio link to Task Force King in preparation for the movement of the main command post; from that point forward all division communications to maneuver forces were via single-channel radio nets and SATCOM.

The division maintained its northern PLRS community in support of an aggressive artillery raid and reconnaissance effort against Iraqi forces. Lieutenant Colonel Smith's G-6 section sought to ensure the effective use of the PLRS network in the upcoming ground assault. Thus, "... a standardized PLRS military identification data base was created throughout the division and incorporated both the I MEF check points and the division's tactical control measures ...." On 22 February, the main command post displaced to near the Kuwaiti border, and the following day the forward command post moved across the border six miles into Kuwait. Both were accompanied by PLRS master stations. To support the division's surge into Kuwait, Smith planned to "leapfrog" the communication company's three operational master stations through the breaches in the obstacle belt in trace of the forward and main command posts.[168]

Starting with Task Force Papa Bear, Task Force Grizzly, and Task Force King, the division's regimental task forces followed the forward command post into their assembly areas in the vicinity of Al Qaraah and started their final preparations for the assault. Task Force Ripper did so by 8 February, and by the 12th, Task Force Shepherd had turned over its screening positions to the 2d LAI Battalion. General Myatt kept Task Force Taro to the east near the coast until mid-month, when it departed for Al Qaraah. He assigned the task force the initial mission of infiltrating by foot the Iraqi defensive belt on the right flank of the breach.

To command his task force in the assault, Colonel Admire organized his headquarters into "alpha" and "bravo" command posts. For the alpha group, which had very few personnel and served as a "jump" command post, Captain Michael J. Smith provided MRC-110 VHF and MRC-138 HF radio vehicles from the 3d Marines communications platoon. Included in the communications suite for the alpha group was a PSC-3 UHF SATCOM set with which Colonel Admire could monitor the division tactical net. The bravo group was much larger and used four "gutted" MRC-135 multi-channel radio vehicles with plywood shelters grafted on the backs that housed the task force's combat operations center (COC) and fire support coordination center (FSCC).

Through the use of radio remote units, the VHF and HF radio vehicles that comprised the "radio hill" site could be separated from the bravo complex by more than a half-mile in order to help defeat Iraqi radio direction-finding efforts. Communication from the task force headquarters to its subordinate battalions would be via low-power single-channel radio nets, since the latter would be entirely foot-mobile during their infiltration. PLRS and GPS would be used extensively, with PLRS basic user units distributed down to the infantry company headquarters level.[169]

The 2d Marine Division: Preassault Preparations

After a short delay resulting from the Battle of Khafji, the units of the 2d Marine Division commenced their move into assembly areas north of Al Khanjar

in mid-February. The division main command post moved by echelon from Kibrit to its new location west of the Kuwaiti "heel" on 16-17 February. Only six miles from the border, a "strong sense of urgency" permeated the atmosphere as Major Linder's company rapidly activated the command post communications. [170] The division PLRS platoon readied its equipment for the assault, but only two of its four master stations were available; the third was cannibalized for repair parts and the fourth remained afloat with the 4th MEB. [171]

In the weeks before the ground assault, the division G-6 section completed a series of measures designed to alleviate serious shortages of equipment throughout the division. In order to provide secure communications capability for the heavily reinforced 2d LAI Battalion (whose attached Reserve companies had arrived in theater with virtually no cryptographic equipment), ten KY 57 radio encryption devices were redistributed from each of the division's battalions. This left enough cryptographic devices in each infantry battalion to "cover" the radio nets from their headquarters on up, but the company-level nets were left unsecured as a result of this action.

Shortfalls in GPS sets and VHF radios throughout the division were eventually made good, but sometimes not until the very last moment. A few days before the ground assault started, the division received 135 high-powered VHF radios for its tracked and wheeled vehicles, while 55 more GPS sets did not arrive until D-Day. Although it proved invaluable in the desert, a major problem with the GPS system was that its constellation of supporting satellites was still incomplete, resulting in a gap in coverage lasting from 1800 to 2000 hours every day. [172]

The division's two infantry regiments-the 6th and 8th Marines-moved into their assembly areas through the middle of the month along with the Tiger Brigade. While the 6th Marines slid west around the "heel" of Kuwait, the 8th Marines with the attached 2d Tank Battalion on 7 February moved north of Kibrit to cover the MEF's movement. Between the 16th and the 19th, the 8th Marines swung its battalions to the west and into their final assembly areas. [173] Colonel Schmidt located his command post on an area of high ground about a dozen miles from the Kuwaiti border. Because of the close proximity to Iraqi forces, Captain Regan did not re-establish multi-channel radio links to the battalions. For the assault, he planned for single-channel radio as the primary means of communication within the regiment, supplemented where possible by the division PLRS network. [174]

The Direct Support Command: Movement to `Al Khanjar'

For I MEF's forward logistics units, the middle weeks of February were dominated by the wholesale displacement of the Direct Support Command from Kibrit to Al Khanjar. This move dictated a complete reconstruction of the DSC communication system. Remaining at Kibrit would be communications means sufficient only to support a FARP, a field hospital (for trauma cases), and a few ancillary units. The vast majority of the command began to displace to the Al

Khanjar area-approximately 70 miles northwest of Kibrit-within days of General Boomer's 6 February decision.

Similar to the experience of the I MEF command post move, the redeployment of the DSC to Al Khanjar severely tested the Marines of Communication Company, 2d FSSG. Major Hand led the company in an around-the-clock effort to support the shift of the DSC command post to Al Khanjar. His executive officer, Captain Lloyd J. Hamashin, set out on the 7th to Al Khanjar with the company's advance party. By 14 February the new command post was operational and tied in with the I MEF multi-channel radio network through a TSC-93B GMF SATCOM "spoke" and 9th Communication Battalion GRC-201 links to the nearby I MEF main command post. [175]

Internal DSC communications remained much the same as they had been at Kibrit. Due to a shortage of 26-pair assault cable, the communication company made extensive use of commercial 25-pair cable for the command's telephone network. VHF multi-channel radio links connected the DSC to its subordinate DSGs, but they were backed up by single-channel radio nets. The 1st and 2d Marine Divisions also extended VHF multi-channel links to their respective DSGs when possible. Tactical telephone systems within the DSGs were generally Spartan. For communication among the Direct Support Groups and their Mobile Combat Service Support Detachments (MCSSDs), the commands relied solely on single-channel radio nets, and the same was true among the CSSDs and their supported regiments and task forces. [176]

The 3d MAW: The Air War Continues

The beginning of February found the units of the 3d MAW moving into what was expected to be their final positions for the impending start of the ground war. However, just as the wing's two helicopter groups started to displace their squadrons to Mishab and Tanagib, General Boomer's decision to move the planned breach of Iraqi defenses westward left both sites well off to the flank of the main attack and thus out of position to render optimum support. In response, General Moore determined that a forward helicopter base would also have to be developed in the western I MEF sector. With MAG-16's move to Tanagib nearly complete, the wing commander decided to move MAG-26 to the west near the new site of the Direct Support Command. This redeployment further lengthened the wing's communications network, and the TAOC site west of Mishab became the anchor for additional GRC-201 multi-channel links extending out in that direction from the coast.

In addition to MAG-26's displacement, the 3d MAW decided to establish a helicopter tactical air control center (HTACC) in the area to bring about better assault support during the coming offensive. The HTACC would serve as the wing's alternate TACC and the command post of General Amos. In order to gain a more complete radar picture of southern Kuwait for the wing, MACG-38's commanding officer, Colonel Joseph Della-Corte, decided to locate an Early Warning

and Control (EW/C) site at Al Qaraah East. Detachment B, MWCS-28, began its shift in early February to MAG-26's new home near Al Khanjar-dubbed "Lonesome Dove" by the wing staff after a popular Old West television miniseries-together with H&HS-28 and MWSS-273. [177]

Tying in this new site proved to be a significant challenge for the wing. MWCS-38 eliminated more GRC-201 links in the south to make available resources for the expansion in the north. The squadron dismantled the Jubayl NAF-to-King Abdul Aziz GRC-201 link and in its place installed a MRC-135 link to connect the wing and MAG-13 (Forward). MWCS-38 then extended additional commercial telephone trunks over the Jubayl-to-Jubayl NAF link. Commercial telephone service thus became the primary means of communication with MAG-13. With newly "freed-up" GRC-201s, MWCS-38 established two more links in the northern AOR; one between Kibrit and the developing early warning and control site to the northwest, and the other between this EW/C and MAG-26 and the HTACC at Lonesome Dove. [178]

The EW/C was located to extend the view of the MACCS well into Kuwait in support of the coming offensive. It was also well suited to serve as node for the further extension of the wing communications network. This was necessary for the planned displacement of elements of the 3d MAW into Kuwait, with the target location being the Ahmed Al Jaber Airbase approximately 40 miles to the north. This site was intended to be the next home of both the HTACC and MAG-16. MWCS-38 therefore positioned another GRC-201 at the TAOC site and aimed it at Al Jaber, while its paired set was staged at Tanagib, ready to be transported to Al Jaber after the site was secured by the 1st Marine Division.

By the middle of February, the squadron had pulled the last of its communicators out of the Rhas al Ghar site south of King Abdul Aziz after MAG-16's heavy-lift helicopters based there moved north to Tanagib. Unit B, MWCS-38, at King Abdul Aziz was disestablished, and responsibility for the site was turned over to Unit B, MWCS-18. By 20 February, Captain Ronald W. Snyder's Detachment B, MWCS-28, had installed the communications suite for the 3d MAW HTACC and MAG-26 at Lonesome Dove. [179] With little time to spare, the 3d MAW was fully positioned to support the I MEF ground offensive.

Forces Afloat: Waiting and Watching

While the Marines of I MEF concentrated on their last-minute redeployment in preparation for the assault into Kuwait, the Marine forces afloat continued to refine the plan for an amphibious assault over the beaches south of Kuwait City. This plan envisioned a rapid link-up with forward elements of I MEF, and thus the provision of adequate communications between the two commands was a vital task. Lieutenant Colonel Williams faced a difficult problem in this regard because of the very limited communications means on board the *Nassau* relative to the demands of the Navy and Marines. With the ship's WSC-3 UHF SATCOM transceivers already committed to an assortment of high-priority circuits (includ-

Department of Defense Photo DM-SN-93-02256

CH-46E Sea Knight helicopters, foreground, and CH-53D Sea Stallion and CH-53E Super Stallion helicopters, background, are parked at Lonesome Dove airstrip in northeastern Kuwait on 25 February 1991. Lonesome Dove, which served as the base for MAG-26 during the latter part of Operation Desert Storm, was constructed in two weeks to support the I MEF attack into southwestern Kuwait.

ing one dedicated to 4th MEB's command net) and HF radio circuits similarly occupied, there was simply no additional capacity for dedicated communications paths among the ashore and afloat Marine commands.

The I MEF and 4th MEB G-6 sections forged an innovative solution to this problem. With more substantial UHF SATCOM and HF radio assets ashore, Colonel Hill and Lieutenant Colonel Williams agreed that I MEF would monitor the 4th MEB's landing force command net, thereby establishing a means of direct communication between the two without adding more circuits to the already overburdened flagship. To augment this capability, Marine communications personnel were able to route secure telephone calls from the *Nassau* to the I MEF command post using the ship's WSC-6 SHF SATCOM transceiver. These calls were first transmitted to Naval Communications Area Master Station Atlantic, where they were then "patched" to Saudi Arabia through commercial international long distance telephone lines to a STU-III at the I MEF command post. Although difficult to engineer and at times unreliable, this method nonetheless provided a valuable private means of communication between Generals Boomer and Jenkins. The decision by CentCom in the days prior to D-day not to employ an amphibious assault obviated some of these efforts, but they remained important capabilities for General Jenkins.

Late February: The Ground Campaign

Throughout the I MEF AOR in late February, communications personnel braced themselves for the commencement of the ground offensive designed to expel Iraqi forces from occupied Kuwait. The target date for the start of the ground war-G-day-was set for 24 February. At the I MEF main command post near Al Khanjar, Colonel Hill and his G-6 staff surveyed their vast communications

network for last-minute problems. Considering the enormous changes to the network resulting from the recent displacement of much of the force, there was much that could go wrong. With the ground offensive scheduled to begin in a matter of days, the ultimate test of the system would come shortly.

I MEF: Command from the Front

Colonel Hill's greatest concern on the eve of the assault was for the safety of his major communications complex at the MEF rear command post at Jubayl; one lucky (or errant) SCUD missile impact could conceivably knock out both the MEF's GMF satellite communications "hub" and its senior system control center. As unlikely as this possibility was, it nonetheless had to be considered, because such a loss would drastically reduce the MEF's command and control capability and could not be made up in a timely manner. Unfortunately, there was little available equipment in the Marine Corps' inventory with which to add further redundancy to the system, so Hill simply had to hope for the best. [181] He had the MEF's third TSC-85B, which was brought into the theater by the 8th Communication Battalion, staged at Manifa as a reserve. Putting it into operation in the event of a strike on the rear command post, however, would take many hours and would only be at best an interim measure. [182]

As G-day approached, CentCom made certain key decisions in the area of communications. The foremost of these was that single-channel radio frequencies-normally changed on a daily basis for greater communications security-would be frozen during the ground assault until further directed. With the multitude of joint and combined forces in theater already a source of great confusion for radio frequency managers, Marines generally welcomed this directive. It was nonetheless a calculated gamble on the part of the CinC that Iraqi electronic warfare capabilities would not pose a serious threat to coalition tactical communications. [183]

In the transition from I MEF's "air" to "ground" campaigns there was no clear point of demarcation, but rather a gradual shift in emphasis from one to the other. The artillery raids of early and middle February gave way first to cross-border reconnaissance missions and then wholesale unit infiltrations after 20 February. By the designated H-Hour on the 24th, much of the 1st Marine Division was already inside Kuwait, as was the leading edge of the 2d Marine Division. At the MEF main command post, Colonel Hill was relieved to see that communications-and in particular, the GMF SATCOM network-was functioning as planned.

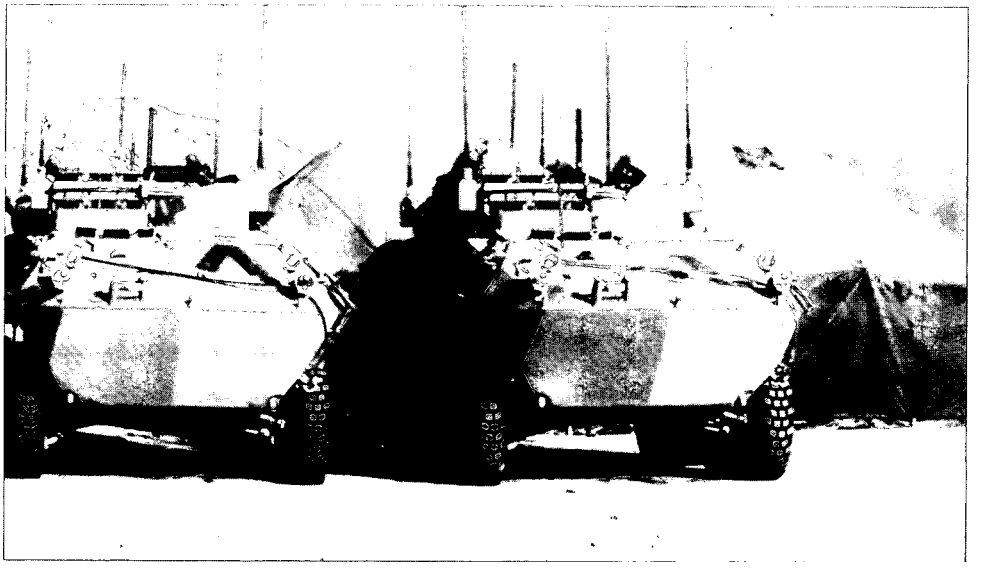
One area of concern remained the "hot" cut-overs of the TSC-93Bs GMF SATCOM vans envisioned during the assault as the MEF Main and the two division command posts "leap-frogged" into Kuwait. With the maximum usage of satellites in theater, there existed a danger of mobile ground stations entering nets at the wrong output power or frequency bandwidth. If either of these two factors exceeded their assigned ratings, this could jeopardize the functioning of the satel-

lite and thereby put the whole network at risk. Systems controllers in the U.S., if they detected a tactical ground station putting their satellite at risk by exceeding their assigned ratings, would unhesitatingly order the offending station off the net.[184]

I MEF Mobile Command Post Operations

With the successful breach of the Iraqi defensive belt by his divisions and their subsequent rapid exploitation, General Boomer departed the main command post with his mobile group on the morning of the 25th to go forward into Kuwait. After co-locating with the 2d Marine Division command post for much of the day, the Mobile set out for the area north of Al Jaber known as the "Ice Tray" by Marines because of its appearance on the map. The Mobile displaced on the morning of 26 February and again on the 27th, this time eastward toward Kuwait City.[185]

Communications from the mobile command group during the three day period were generally good, although a problem with the UHF SATCOM MEF command net left General Boomer on occasion unable to communicate through that medium with some of his subordinate commanders. The net was established as a commander-to-commander link, and, because Boomer and his subordinate commanders would often be on the move, a "conference call" among them was scheduled for every four hours. The problem encountered with this net was a vexing one for General Boomer, because an unusual condition sometimes permitted him to talk on the net but not be heard by all of the subscribers. At other times, Boomer could only listen to conversations among his subordinates. The mobile



Two command and control variants of the light armored vehicle (LAV-C2) appear outside a command post in northeastern Saudi Arabia during Operation Desert Storm. The LAV-C2 was used as a mobile command post by LtGen Boomer and his subordinate division commanders during the war

stations on the net-Boomer's as well as those of the two division commanders-tended to experience this problem more often, but fixed command posts such as the Direct Support Command also encountered similar difficulties.

While this situation occasionally hampered General Boomer's ability to control his forces, his command group's LAV mounted VHF single-channel radio nets were generally able to relay information and orders to the intended subordinate commands. Also, the mobile command post did not lack for experienced communicators who understood the system. Captain David P. Olszowy served as the G-6 representative with the Mobile, and General Boomer's aide-de-camp, Major Christopher M. Weldon, also brought his communications expertise to the group. At the main command post, communications with CentCom and to the MEF's major subordinate commands functioned more smoothly. In addition to the near-flawless operation of the I MEF GMF SATCOM network, the presence of an ArCent liaison team with its own GMF SATCOM terminal added further redundancy to the system by providing an entry to the ArCent system. [186]

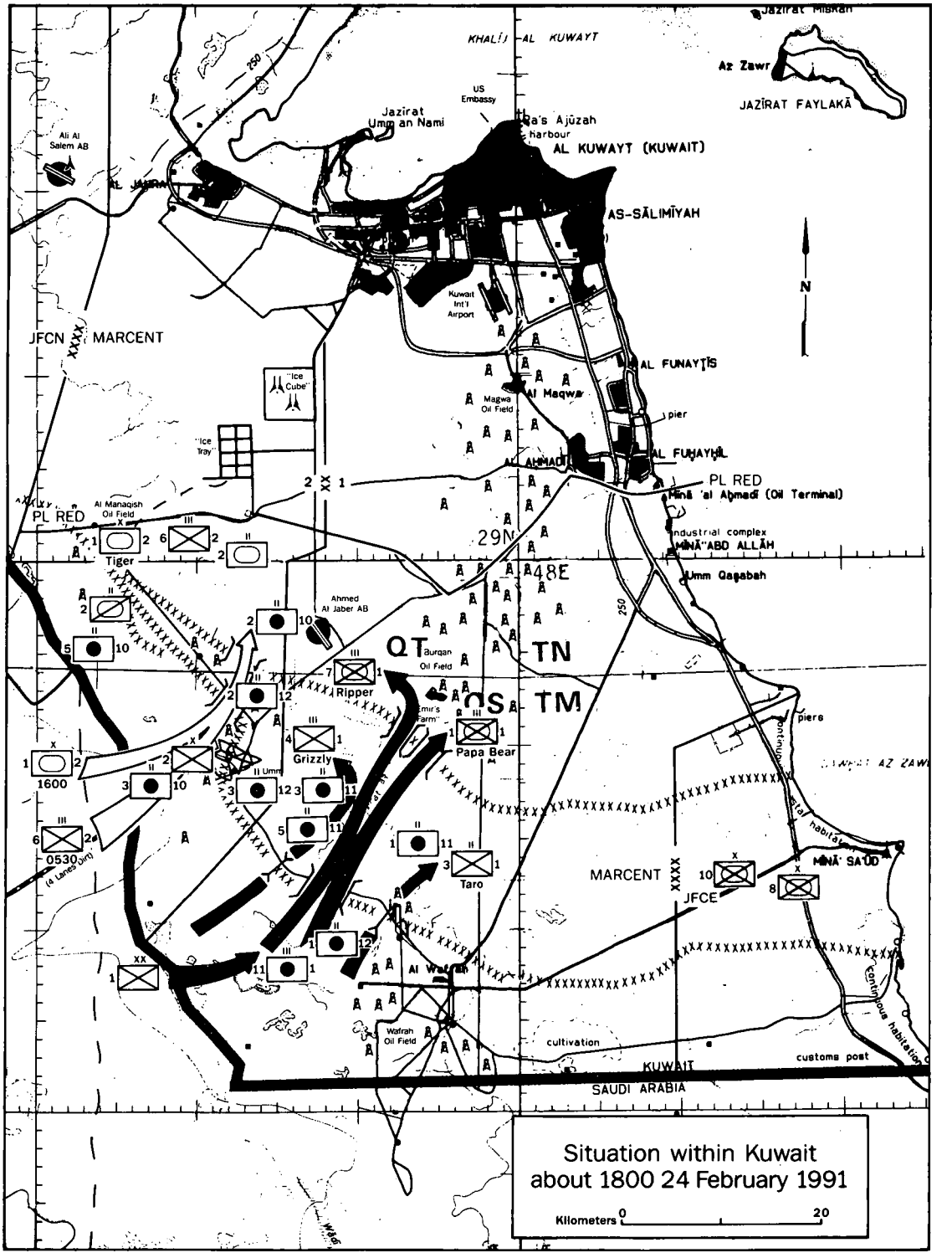
The I MEF Alternate Command Post

On 24 February (G-day), Company B, 9th Communication Battalion, was staged at the Al Khanjar command post in preparation for its planned movement into Kuwait. On G plus 2, a reconnaissance element from the company under its executive officer, Captain Douglas A. Marcy, set out from Al Khanjar to Al Jaber to perform a site survey. On the 27th, the company main body was guided from the breach into Al Jaber by Chief Warrant Officer 2 Daura L. "Dave" Brockett, who had remained on-site after the reconnaissance party returned to Al Khanjar.

Major Febuary's first task was to ensure that his company's operating areas were clear of unexploded ordnance and booby traps. This survey was performed by Febuary and his officers and senior staff NCOs. They also identified a few buildings at the airfield that were largely undamaged as being suitable for staff spaces, but these required a significant amount of cleaning in the wake of the Iraqis' wanton vandalism prior to their retreat. The company accomplished this while establishing basic tactical communications services for the airfield. They brought the TSC-93 and the single-channel radio nets on line, followed quickly by the TTC-42 telephone switch. Febuary's Marines extended limited telephone service to the various headquarters sections as well as to other commanders at the site. One of the battalion commanders was even able to call back to Twentynine Palms, California, just before the cease-fire was sounded to reassure those concerned about the battalion's well being. Word of the cease-fire and General Boomer's decision to fall back on Al Khanjar finally halted the development of Al Jaber as a command post on the evening of the 27th. [187]

The 1st Marine Division: The Assault on the Right

On 23 February (G-1), the Marine advance into Kuwait began in earnest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Ali Al Salem AB
AS-SĀLIMĪYAH
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Al Maqwa
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AL AHMADĪ
AL FUHAYHIL
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Al Manaqish Oil Field
industrial complex
MĪNĀ"ABD ALLĀH
Umm Qaṣabah
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48E
Tiger
Ahmed Al Jaber AB
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Situation within Kuwait
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with the infiltration by the 1st Marine Division of Task Forces Taro and Grizzly into the southeastern and northwestern flanks of the division breach. The division forward command post moved six miles into Kuwait and set up just outside the first obstacle belt. It was accompanied by a PLRS master station, but with the 1st and 2d Marine Division PLRS communities operating in such close proximity, "over 75% of [the 1st Marine Division's] community was lost to 2d Marine Division." This situation was quickly salvaged by Master Sergeant Kevin R. Karr, who flew to the 2d Marine Division's command post and corrected the problem.

On the 24th (G-day), the division's two mechanized regimental task forces-Papa Bear and Ripper-breached both obstacle belts and, along with the LAVs of Task Force Shepherd, prepared to exploit their success with the seizure of Al Jaber Airfield. The PLRS community continued to "leapfrog" into Kuwait, with one master station setting up near the first obstacle belt while the other moved with the Forward command post through the breach to the other side of the two belts. The master station at the Main then traveled through the obstacle belts to the forward command post and took control of the community, although enroute the five-ton truck carrying the station broke down and had to be taken in tow by another. [188]

In the realm of single-channel radio, the division G-6 arranged for " .. . 24 hour airborne relay of the division Tac net during the offensive ground campaign to ensure continuous communications." The PSC-3s provided reliable single-channel satellite communications to I MEF, to the division's subordinate task forces, and to the remotely piloted vehicle (RPV) companies. TSC-93B GMF SATCOM sets with both the forward and main command posts provided access to secure voice telephone service, special intelligence traffic, and vital air support and G-3 "hotlines." Only one set could receive and transmit at any one time, but control was passed back and forth as the forward and main command posts "took the helm" as the division advanced into Kuwait.[189]

On 25 February, the division PLRS network again moved forward, but with hundreds of additional subscribers after the 2d Marine Division's master station failed and many of its units had migrated over to the 1st Marine Division community. This situation continued through the 26th, with the number of subscribers reaching a high of 435 active basic user units. The network was reinforced by a third master station with the movement on the 25th of the main command post into Kuwait. The "leapfrogging" of the network continued through Al Jaber Airbase on the 26th to Kuwait International Airport on the 27th. By the cease-fire on the 28th, all three master stations were positioned around the airport. [190]

The hectic pace of the division's advance was reflected in its task force communications, which depended fully on single channel radio nets. Task Force Taro, whose jump command post moved into Kuwait on the evening of 22 February, experienced no significant communications difficulties in the hours before the attack. The destruction of a nearby artillery target acquisition radar by an errant coalition HARM missile provided a sobering glimpse of what damage a

The 1st Marine Division Mobile Command Post is seen during the ground campaign in late February 1991. The commanding general, MajGen James M. Myatt, wearing a black watch cap, is seated to the left. LtCol Jerome D. Humble, his G-3, holds a radio handset at center

competent enemy might be able to inflict on the task force. Once the attack kicked off, the division's single-channel radio nets functioned effectively, although determining which station had net control was at times confusing.

The main command post joined the Jump shortly before the attack. The Jump stayed in position until G plus one, after the heliborne insertion of Task Force X-Ray (elements of the 1st Battalion, 3d Marines) as a blocking force on the edge of the Al Wafra oil field.* After X-ray's lift, the jump command post surged forward with its truck-mounted 2d Battalion, 3d Marines, toward Al Jaber air base while the 3d Battalion, 3d Marines, followed on foot. From Task Force Taro's perspective, the division PLRS network functioned "beautifully" throughout the advance, with Taro able to track its widely separated second and third battalions as well as the division's other task forces all the way through to Kuwait International Airport. The only significant problem encountered during the assault was lost communication among the command groups due to the large distance between them, but this did not hamper Taro's advance into Kuwait.[191]

* The lift was originally attempted late on D-Day. Because of poor visibility and reported enemy fire in the primary landing zone, the mission was aborted at the last minute.

The 2d Marine Division: The Assault on the Left

To the north of the 1st Marine Division, General Key's 2d Marine Division began a three-day preparatory screening and reconnaissance effort on 21 February, followed by its assault on the 24th at 0530. Initial command and control communications functioned smoothly, although the "capture" of the PLRS community on the 23d by the 1st Marine Division's PLRS master station was a cause of great concern. Thanks to prompt action on the part of its sister division's communicators, the disruption of the 2d Marine Division's pre-assault activities was kept to a minimum. On the 24th, the division breached the enemy's defensive belts with the 6th Marines at the tip of the spear. The regiment approached the breaching problem as it would an amphibious operation, with the exception that sand offered certain advantages over water in regard to communications. Field wire was laid along the path of each breach, adding redundancy to radio communications. The division established a breach control net with multiple retransmission sites in support. Demands for radio communications far exceeded the peacetime allocation of equipment. By the start of the ground war, the division's communication company was operating 21 MRC-110 VHF radio vehicles; its normal allocation was six. During the breaching operation, "VHF [radio] communications with all attacking units worked extremely well". [192]

The Army's MSE network proved very useful to those few commanders who had access to it. After General Keys' forward command post outran VHF radio range, "a call was placed on MSE and communication was established throughout the evening via the RAU [remote access unit] and the general's MSRT [mobile subscriber radio telephone]." Keys' forward command post, based out of two LAV-C2s, was outfitted with an impressive array of communications in addition to the MSRT. The communicators in the Forward jokingly referred to these LAVs-equipped with a PLRS BUU, a GPS set, and a PSC-3 UHF SATCOM radio on top of the standard VHF, UHF, and HF radios-as "MRC-1000s." This was in reference to the additive effect of the individual equipment nomenclatures used by the Corps for its vehicle-mounted radios (i.e. MRC-110, MRC-138 and MRC-140) that the communication Marines had crammed onto the LAV-C2s. [193]

The division's forward PLRS master station located with the 10th Marines displaced on the 25th, but once in position it could not be brought back into operation. As a result, some of the community migrated over to the 1st Marine Division's master station while operators struggled to locate the source of the problem. Service was not restored again for several days after it was determined that a failed electronic cryptographic fill device was the culprit. The other master station departed the main command post shortly after the first experienced problems, but it spent the next three days in convoy attempting to move forward into position without ever setting up. [194]

Shortly after midnight on the 27th, the alpha echelon of the main command post joined up with General Keys' forward command post north of Al Jaber

airfield. The TSC-93B GMF SATCOM set, however, was found to have a bad part when the operators attempted to establish communications. With this critical component out of order, Colonel Ramsperger and Major Linder retraced their steps in a single HMMWV all the way back to the bravo echelon at the Kuwait border to secure a replacement part.[195] It was 2130 by the time they finally returned, but the end result was that multi-channel satellite communications were restored to the alpha echelon.[196]

After moving up to the Kuwaiti border on 23 February, the 8th Marines followed the 6th Marines into Kuwait on the 24th and moved through the breach on the morning of the 25th. Good radio communications were maintained among the command echelons and the division as well as with the battalions, although individual nets would experience problems that had to be worked around. The loss of the division PLRS network did not impact the 8th Marines attack seriously, since it was already through the breach and the last-minute. influx of additional GPS sets had improved the ability of subordinate units to navigate through the often confusing or featureless wasteland.

The regiment's alpha echelon was forced to switch to its accompanying mobile HMMWV-based command post after an electrical fire damaged its AAVC7A1. Although an inconvenience, this did not measurably degrade communications with the division or its subordinate battalions. As the alpha echelon proceeded north, it displaced several times a day and continued to locate its antenna farm at a distance whenever possible. Satellite communications with the division remained effective throughout the four days of the ground war. Maintaining good radio communications, the regiment used its MSRT sparingly, although the MSE system provided a valuable backup means to the division.[197]

The 3d MAW: Forward into Kuwait

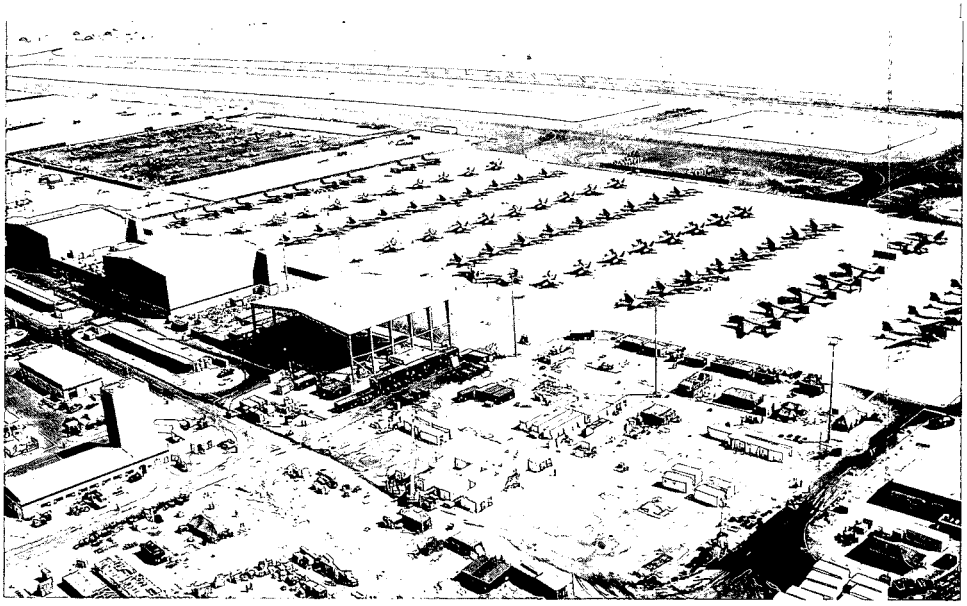
With the activation of the 3d MAW HTACC on 20 February, the wing completed the reconfiguration of" its communication network in advance of the ground assault. Over the next several days, MWCS-38 staged equipment and personnel at both Tanagib and Lonesome Dove in preparation for the extension of the Marine air command and control system into Kuwait. The focus of effort was Al Jaber Airfield in southern Kuwait, which was planned to serve as a forward base for MAG-16 as well as the location of an EW/C site and the home of alternate TACC.

With the beginning of the ground assault on the 24th, the northward displacement of the MACCS began in earnest. Stinger missile teams from the 2d and 3d LAAD Battalions accompanied advancing ground units, followed closely by HAWK missile fire units from the 2d and 3d LAAM Battalions. On 26 February, MAG-16 helicopters transported an advance party from Unit A, MWCS-38 under Master Sergeant Dennis W. Gedeon from Lonesome Dove to the recently secured Al Jaber Airbase, where they promptly established radio communications with the wing headquarters.

On the 27th, MAG-16 flew in additional personnel and equipment from Tanagib, including a GRC-201 multi-channel radio set. A mobile-loaded EW/C also arrived at Al Jaber that day via overland convoy. The GRC-201 operators immediately began to install the link between Al Jaber and the TAOC site west of Mishab. This link was established in a near-record time, and by 28 February the EW/C was operational and connected with three HAWK fire units in the vicinity.[198] However, visibility at Al Jaber was so poor due to heavy smoke from the numerous oil-well fires that the plans for its use as a forward base were quickly abandoned. The multi-channel radio link from the airfield to the TAOC was shut down within a few hours of its initial operation, and the MWCS-38 single-channel radio team displaced to Kuwait International Airport where it provided initial communications support to advance wing units.[199]

The Direct Support Command: Operations in Kuwait

Directly in the wake of the attacking regiments and task forces of I MEF's two divisions traveled the mobile combat service support detachments of the Direct Support Command. Between 24 and 26 February, DSG-2 moved several of its units from east of Al Khanjar to its new combat service support area southwest of Kuwait City.[200] DSG-1 likewise followed in trace of the 1st Marine Division. The rapid advance of the MEF's forward elements tended to outrace the DSC communications system, since much of the network was anchored at Al Khanjar. The MEF commander's UHF SATCOM net proved troublesome as well from the DSC command post. Outside Al Khanjar, VHF single-channel radio was



Department of Defense Photo DF-St-92-09116

Flightline area of Shaikh Isa Air Base in Bahrain is seen in March 1991. MAG-1I operated more than a hundred fixed-wing jet aircraft from here during Operation Desert Storm.

the predominant medium of communication among units. As was the case with I MEF's other subordinates, HF radio often proved unworkable during the ground assault.[201]

The DSC established its forward element at Al Jaber Airbase and located a supporting VHF radio retransmission team at the 2d Marine Division's cut in the berm at the border. The command attempted to establish a MRC-135 multi-channel radio link between Al Jaber and Al Khanjar, but it encountered technical problems that prevented the link from becoming fully operational.[202] It also extended through to Al Jaber a main supply route (aptly named the "Al Khanjar Highway") that, prior to G-Day, had been engineered by the DSC between Al Khanjar and this area of the Kuwaiti border. Only 48 hours after the initial displacement of DSC elements to the airfield, a I MEF GRC-201 multi-channel radio link connected it to Al Khanjar.[203]

Forces Afloat: Feints and Faylaka Island

Despite months of planning and preparation, Operation Desert Saber, the amphibious assault by the combined 4th and 5th MEBs near the port city of Ash Shuaybah in southern Kuwait, was dropped from active consideration by General Schwarzkopf and his senior Navy and Marine commanders in early February. General Boomer's decision to shift the breach of Iraqi lines around the southwestern corner of Kuwait placed an amphibious assault out of effective supporting range of I MEF. The likely collateral damage caused by allied shore bombardment figured prominently in the CinC's decision, as did concern over excessive Marine casualties. The uncertain naval mine threat worried the NavCent commander and interjected a high degree of caution into planned naval movements in the northern Persian Gulf. The 18 February crippling of the USS *Tripoli* (LPH-10) and the USS *Princeton* (CG-59) by naval mines in an area off the Kuwaiti coast earlier thought to be outside the threat area confirmed many of these reservations.

Even without an amphibious assault to execute, the Marines afloat in the Gulf did not lack for missions as the ground campaign got underway. The 4th MEB and 13th MEU(SOC) undertook large-scale deception operations off Ash Shuaybah, the Al Faw penninsula, and Faylaka Island. Later, on 2 March, the 13th MEU(SOC) took the surrender of the Iraqi garrison on Faylaka Island. The 5th MEB landed in northeastern Saudi Arabia at Mishab and Tanagib on 24 February and assumed the mission of I MEF reserve. Elements of RLT-5 and MAG-50 took the fight to bypassed Iraqi units along the southern border area of Kuwait up to the cease-fire. VMA-331, MAG-40's AV 8B Harrier II squadron, flew combat strikes into Kuwait from the USS *Nassau* (LHA-4) commencing on 20 February.[204]

A key part of the 4th MEB's amphibious deception operations was the heavy use of shipboard communications circuits to reinforce the credibility of the feint toward the coast. These were timed to coincide with ship and aircraft move-

ments toward the area, and the total effort yeilded gratifying results.[205] Reports after the cease-fire credited the amphibious forces with fixing over 80,000 Iraqi soldiers in static defensive positions on the coast instead of participating in the battles inland.

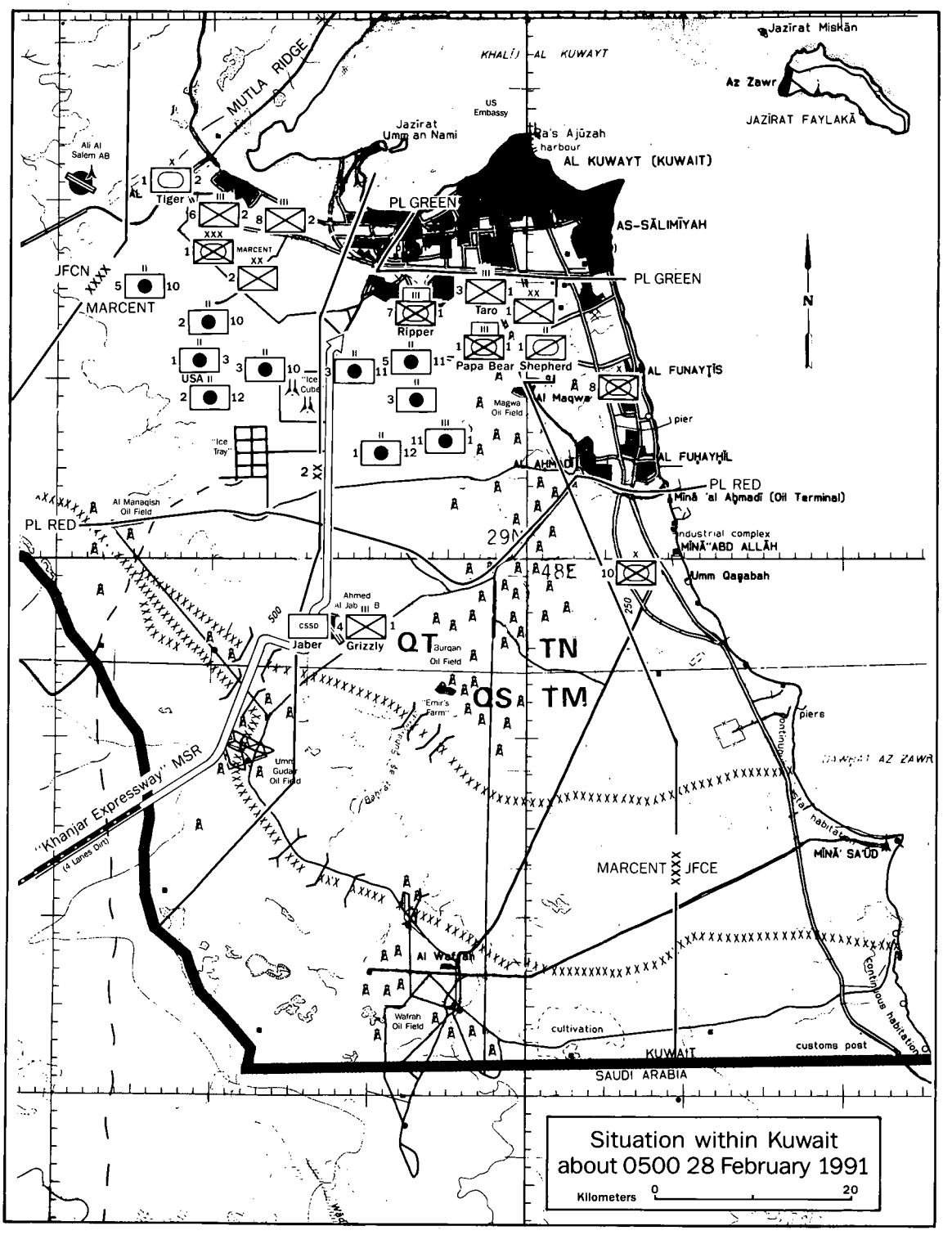
Cease-Fire Operations: March - May 1991

After slightly more than four days of ground combat operations, the U.S. and its coalition partners declared a cease-fire effective 0800 on 28 Febuary 1991. This action briefly froze the structure of the I MEF communication system in place before it began to collapse back onto the port of Jubayl as most I MEF units were quickly withdrawn from Kuwait. The MEF command post abandoned Al Jaber airfield within a few days, although it remained in operation as a forward support base for DSG-2 until the coastal highway in southern Kuwait was rehabilitated. The DSC forward element returned to Al Khanjar, where it continued to support those Marines remaining in Kuwait while it, too, prepared to relocate south. The 2d Marine Division shifted to the defense in zone of its AOR in Kuwait. The reinforced 8th Marines took over this mission by the end of March as the rest of the division migrated back to the Jubayl area.[206] The MEF established a communications node at Kuwait International Airport in support of the 8th Marines that consisted of a TSC-93B "spoke," a digital switchboard, and an array of single-channel radio nets.[207]

In accordance with General Boomer's "first in, first out" guidance to the force, the 1st Marine Division fell back on the Manifa DSA in early March while it prepared to depart for the United States. This also applied to early-arriving units of the 3d MAW, 1st FSSG, and 1st SRIG, but their unique responsibilities and general intermixing of East and West Coast units required careful planning and coordination before they could depart from Saudi Arabia. The 3d MAW's helicopter bases at Tanagib and Lonesome Dove were quickly closed down. MAG-16 and MAG-26 staged most of their aircraft and ground equipment at Jubayl NAF for air shipment out of the country. Detachment B, MWCS-28, assumed responsibilities for the steadily shrinking wing communications system at Jubayl while MWCS-38 packed up and headed for home at the end of March.

The same type of mission swap occurred between the 8th and 9th Communication Battalions. The two units " . . . drew up the steps of each phase of transition designed to pass operational control, relieve 9th Communication Battalion equipment and personnel, and down-scale the communications network while still maintaining communication support for all Marine Corps MSCs during their retrograde and contingency operations".[208] This occurred during the last three weeks of March, although the support of the 8th Marines in Kuwait delayed the retrograde of some elements of 9th Communication Battalion beyond 28 March.

The 8th Communication Battalion led the communications effort through April and into May 1991. On 22 April, after General Boomer's departure from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Ali Al Salem AB
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MARCENT
JFCN
MARCENT
PL GREEN
Taro
Ripper
Papa Bear Shepherd
AL FUNAYTĪS
USA
"Ice Cube"
Al Maqwa
Magwa Oil Field
pier
"Ice Tray"
AL FUHAYHĪL
PL RED
Mīnā 'al Aḥmadī (Oil Terminal)
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industrial complex
MĪNĀ 'ABD ALLĀH
Umm Qaṣabah
Ahmed al Jab
CSSD
Jaber
Grizzly
QT
Burqan Oil Field
TN
QS
TM
"Emir's Farm"
piers
Umm Gudair Oil Field
AZ ZAWR
"Khanjar Expressway" MSR
(4 Lanes Dirt)
MĪNĀ' SA'ŪD
MARCENT JFCE
Al Wafrah
Wafrah Oil Field
cultivation
KUWAIT
customs post
SAUDI ARABIA
Situation within Kuwait
about 0500 28 February 1991
Kilometers 0 20

Saudi Arabia, the Marine units remaining ashore in theater were reorganized under Commander, Marine Forces Southwest Asia (ComMarForSWA). Most of the battalion departed for Camp Lejeune on 10 May, when a task-organized company under Major Edward S. McMillan-designated Company Team Sierra by the battalion-assumed the duties of supporting ComMarForSWA. After the 27th, a remain-behind element " . . . provided GMF connectivity for ComMarForSWA during the MPF [Maritime Prepositioned Force] back load predicted to last until February 1992". During this draw-down, I MEF's once vast terrestrial multi-channel radio network shrank by the end of March to one link between the port and the Police Station at Jubayl. The GMF SATCOM network, however, remained robust until the end of April when the G-6 " . . . had only deactivated one spoke from a MarCent hub and disestablished one point-to-point circuit that was provided by JCSE to tie MarCent into CentCom." [209]

Conclusion

The rapid establishment and unprecedented growth of the I MEF communications network in Saudi Arabia, Bahrain, and Kuwait from August 1990 to February 1991 was an extraordinary event from the perspectives of both its architects and its subscribers. Over the course of just a few months, the Marine Corps undertook a dramatic shift not only in the means but also in the methods by which it accomplished tactical communications. This shift in turn greatly altered much of the Marine Corps' battlefield command, control, and intelligence functions.

Operation Desert Storm was the combat debut of an entire family of modem, highly complex communications equipment. Analog telephone switching systems that had been in use for a generation or more were finally supplanted by their far more capable digital cousins. The personal computer left the limits of the

Kuwait International Airfield appears after the 28 February 1991 cease-fire. Coalition helicopters are visible beyond tail and engines of a destroyed British Airways Boeing 747.

home and garrison headquarters environment to become an integral part of field communications and was used extensively in both tactical radio and "hard wire" local area network systems. Mobile multi-channel satellite radios assumed the central role in MEF and MEB-sized communications systems. While still heavily relied-upon at lower tactical echelons, single-channel voice radio circuits began to be supplanted by wireless data networks such as the Position Locating and Reporting System.

The Marine Corps also experienced a sea change in terms of communications organization during the conflict. The demands of the Corps' maneuver warfare style in the open desert terrain presented enormous challenges to G-6 personnel throughout the theater. As one post-war assessment noted, during Desert Storm " ... Marine divisions and infantry regiments were limited by Vietnam-era communication T/Os and T/Es that did not adequately address the requirement for multiple unit command posts, VHF retransmission equipment, or operations in a highly mobile environment."[210] Yet this problem extended beyond ground combat units, as even the MEF headquarters went to the field and assumed the mantle of a "warfighting" command post for the first time. As a result, during 1992 restructuring efforts, the Marine Corps slated communication battalions to receive additional personnel and equipment. As of early 1995, however, some of these equipment additions were being held in abeyance due to a Department of Defense-wide shortage of funding for new equipment.

Aviation communications units, after years of cuts and consolidations in the wake of the Vietnam conflict, experienced great difficulty providing needed support to the 3d MAW's ever-multiplying airfields in Saudi Arabia and Bahrain. Likewise, the MEF's Direct Support Command struggled to provide appropriate communications to its two mobile combat service support groups and their subordinate detachments. The communications support of numerous liaison teams sent to neighboring U.S. and foreign units from I MEF put even further strain on an already difficult equipment situation.

To keep up with these extraordinary demands, most of the Corps' communications resources were committed to the theater by February 1991. Two of the three active communication battalions (the 8th and 9th, totaling approximately 1,600 Marines) were deployed to the Persian Gulf region during Desert Storm in support of the I MEF and 4th and 5th MEB command elements. The influx of a majority (425 Marines) of the personnel of the Marine Corps Reserve's 6th Communication Battalion added needed depth to these units, as did active duty elements from Hawaii and the Okinawa-based 7th Communication Battalion. Many of the 6th and 7th Communication Battalion personnel sent to the theater were used to help bring division and wing communication units up to strength. All told, nearly 2,000 Marines provided communications support to the I MEF command element ashore in Saudi Arabia during February 1991. By way of comparison, in January 1969 the 5th and 7th Communication Battalions fielded a total of just more than 1,400 personnel in support of the III Marine Amphibious Force (III MAF) in the I Corps Tactical Zone in South Vietnam.[211]

The integration with and support provided by joint and other service com-

munications elements were critical factors in I MEF's success in Operation Desert Storm. At the very heart of the I MEF system stood a CentCom-provided digital telephone switch whose capabilities simply could not have been replicated by Marine equipment. Likewise, Marine Aircraft Group 11, based in Bahrain, was dependent upon access to an Air Force switch for adequate tactical telephone communications during much of the war. Air Force and Army long-haul communications teams provided critical primary links that enhanced the overall redundancy of the I MEF system. A generation of Marine communications officers and staff non-commissioned officers with extensive experience in both Service and Joint commands served as the glue which bound the system together.

As always, it was the individual Marine who provided the solid foundation upon which the entire structure lay. In military occupational specialties ranging from telephone repairman to radio operator, the communications Marines who served in Desert Shield and Desert Storm displayed exemplary dedication, resourcefulness, and patience throughout the often long and trying months in the harsh desert environment of the Arabian Peninsula. During the war, they met and overcame every obstacle on the way to providing rapid and reliable communications support to commanders at all levels throughout the I MEF area of responsibility. As such, they deserve the lion's share of the credit for a job well done.

Notes

The primary sources for this monograph are unit command chronologies (ComdC) on file at the Marine Corps Historical Center (MCHC), Washington Navy Yard, Washington, D.C. The author of this monograph served in a variety of billets with MWCS-38 before, during, and after Operations Desert Shield and Desert Storm. The use of "author's note" reflect those areas in which the author had direct experience. The majority of interviews of participants cited are tape recordings on file at the Oral History Unit, Marine Corps Historical Center. Participants' correspondence with the author are in the form of letters and electronic mail (E-mail) messages.

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2. Col Robert G. Hill, comments on draft ms, 28Aug94 (Author's Files, MCHC, Washington, D.C.), hereafter Hill comments.
3. Col Robert G. Hill intvw, 5Apr94 (Oral HistColl, MCHC, Washington, D.C.), hereafter Hill intvw.
4. Learn intvw.
5. Learn intvw.
6. Maj Gerald R. Boeke intvw, 7Apr94 (Oral HistColl, MCHC, Washington, D.C.), hereafter Boeke intvw.
7. Author's note: MWCS-38 at the time possessed 14 GRC-201s, with each detachment assigned seven. With a pair required to establish each link, this allowed for three links per detachment plus one spare. Because of the GRC-201 's reliability problems, plans normally allowed for only two links, with the spares used to "back up" on-line sets at each site. At any one time, detachments normally had only four or five of seven sets fully operational, so some swapping occurred to cover exercise requirements. With two major exercises scheduled concurrently many thousands of miles apart, this would not be possible, so maintenance "get well" time prior to field exercises was viewed as crucial by the squadron.
8. Maj William S. Febuary intvw, 7Apr94 (Oral HistColl, MCHC, Washington, D.C.), hereafter Febuary intvw.
9. Author's note: The WTI course, conducted by Marine Aviation Weapons and Tactics Squadron 1 (MAWTS-1), was normally run during spring and fall at MCAS Yuma, Arizona. Each course required the dispatch of nearly one third of MWCS-38's personnel to Yuma for a 5-6 week period.
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15. 13th MEU(SOC) ComdC, 1Jul-31Dec90 (MCHC, Washington, D.C.).
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17. 7th MEB ComdC, Jul-Sep90 (MCHC, Washington, D.C.).
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19. Williams intvw.
20. Allen ms.
21. Capt Erik J. Knutila intvw, 23Jun94 (Author's Files, MCHC, Washington, D.C.), hereafter Knutila intvw. Capt Knutila was the 2d MarDiv PLRS Platoon Commander during Operation Desert Storm.
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28. LtCol J. M. Elder, USMC (Ret), "Historical Record of C4 Systems in Desert Shield/Storm" (unpublished ms, Author's Files, MCHC, Washington, D.C., 1994), hereafter Elder ms.
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34. Col Timothy J. Himes correspondence with author, 3May94 (Author's Files, MCHC, Washington, D.C.), hereafter Himes ltr.
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40. CO, 9th Comm Bn ltr to dist list, Subj: I MEF Communications Chronology for Operations Desert Shield and Desert Storm, 15Jun91 (Author's Files, MCHC, Washington, D.C.), hereafter CO 9th Comm ltr.
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47. Maj Michael J. Smith intvw, 12May94 (Oral HistColl, MCHC, Washington, D.C.), hereafter Smith intvw.
48. LtCol Leslie A. Duer correspondence with author, 19May94 (Author's Files, MCHC, Washington, D.C.), hereafter Duer ltr.

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52. CO, MWCS-38 ltr to CG, 3d MAW of 29Sep90, Subj: MWCS-38 Personnel Shortages for Operation Desert Shield (Author's Files, MCHC, Washington, D.C.), hereafter CO MWCS-38 ltr.
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56. Troffer intvw.
57. HqBn, 1st MarDiv ComdC, Jul-Sep90 (MCHC, Washington, D.C.).
58. 3d Mar ComdC, Sep90 (MCHC, Washington, D.C.).
59. Smith intvw.
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68. Hill intvw.
69. CO 9th CommBn ltr.
70. CO MWCS-38 ltr.
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74. Hill intvw.
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79. Hill intvw.
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87. Duer ltr.
88. Duer ltr.
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91. Troffer intvw.
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93. I MEF ComdC, Nov90 (MCHC, Washington, D.C.).
94. Febuary intvw.
95. CO 9th CommBn ltr.
96. CO 9th CommBn ltr.
97. 9th CommBn ComdC, Nov90 (MCHC, Washington, D.C.).
98. MWCS-38 ComdC, Nov90 (MCHC, Washington, D.C.).
99. CG 3d MAW Desert Shield Sitrep 068 in 3d MAW ComdC, Nov90 (MCHC, Washington, D.C.).
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103. 3d Mar ComdC, Nov90 (MCHC, Washington, D.C.).
104. DSG-1 ComdC, Nov90 (MCHC, Washington, D.C.).
105. Troffer intvw.
106. Hill comments.
107. Williams intvw.
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109. Hill and Learn intvws.
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111. Allen ms.
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113. 8th CommBn ComdC, Jan91 (MCHC, Washington, D.C.).
114. 9th CommBn ComdC, Dec90 (MCHC, Washington, D.C.).
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116. CO 9th CommBn ltr.
117. Learn intvw.
118. MWCS-38 ComdC, Dec90 (MCHC, Washington, D.C.).
119. MACG-38 ComdC, Dec90 (MCHC, Washington, D.C.).
120. Himes intvw.
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122. MWCS-38 ComdC, Dec90 (MCHC, Washington, D.C.).
123. HqBn, 1st MarDiv ComdC, Dec90 (MCHC, Washington, D.C.).
124. 1st MarDiv ComdC, Dec90 (MCHC, Washington, D.C.).
125. HqBn, 1st MarDiv ComdC, Dec90 (MCHC, Washington, D.C.).
126. 1st MarDiv ComdC, Dec90 (MCHC, Washington, D.C.).
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149. 1st MarDiv ComdC, 1Jan-28Feb91 (MCHC, Washington, D.C.), pp. 2-1 to 2-2.
150. 1st MarDiv ComdC, lJan-28Feb91 (MCHC, Washington, D.C.), pp. 2-24.
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152. 2d MarDiv ComdC, lJan-13Apr9l (MCHC, Washington, D.C.), pp. 11-3.
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170. 2d MarDiv G-6 notes.
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Appendix A

The State of Fleet Marine Force Communications Summer 1990

Fleet Marine Force Communications Organization

Introduction

To provide communications support for Marine air-ground task forces (MAGTFs), the Marine Corps of 1990 fielded a variety of specialized units within the Fleet Marine Force. The commanding generals of the three standing Marine Expeditionary Forces (MEFs) each possessed several communication organizations either directly under their command or embedded in the commands of their major subordinate elements, normally a Marine Division (MarDiv), a Marine aircraft wing (MAW), and a force service support group (FSSG).* Although these three elements-ground combat, air combat, and combat service support-are recognized by the Marine Corps in principle as separate functional components of a MAGTF under a common command element (CE), in practice their internal communications systems are rarely isolated from one another due to the intermixing of units and subunits throughout the MAGTF's area of responsibility.

The Organization of MEF Communications

At the top of the communications hierarchy of the Corps' largest standing MAGTF in 1990-the Marine Expeditionary Force-stood the headquarters of the commanding general, which since 1988 had been known as the MEF Command Element. This command element administratively grouped the Marines of the MEF general staff into a headquarters company, but for operational

* I MEF, consisting of the 1st Marine Division (1st MarDiv), the 3rd Marine Aircraft Wing (3d MAW), the 1st Force Service Support Group (1st FSSG), and the 1st Surveillance, Reconnaissance, and Intelligence Group (1st SRIG), was located at bases in Southern California. II MEF, with 2d MarDiv, 2d MAW, 2d FSSG, and 2d SRIG, was located in North and South Carolina. III MEF, forward-based in Japan and Okinawa, consisted of most of 3d MarDiv, 1st MAW, 3d FSSG, and 3d SRIG. The balance of the above fell under the 1st Marine Expeditionary Brigade, a separate standing MAGTF based in Hawaii.

support the staff was divided into sections according to functional areas of responsibility. The traditional division of labor on the MEF principal staff had grown in the previous decade from the familiar G-1, -2, -3, and -4 sections, along with a host of so-called special staff functional areas to include by 1990 peacetime standing G-5 through G-7 sections. In the 1980s, the MEF G-6 section was created by combining the communications-electronics officer (CEO) section and that of the information systems officer (ISMO). Prior to then, both had existed as separate special staff sections. The G-6 section was responsible for the overall planning and direction of communications, information systems, and electronic maintenance functions of both the MEF CE and the MEF-wide command and control communications network.

The Surveillance, Reconnaissance, and Intelligence Group

The Marine Expeditionary Force had under its direct control an assortment of specialized supporting units designed to provide intelligence, communication, reconnaissance, liaison, and surveillance to the force. Besides separate battalions, these specialized units included smaller units such as the force reconnaissance company, the air and naval gunfire liaison company (ANGLICO), and the force imagery interpretation unit (FIIU). All were combined in 1988 under a single headquarters element known as the surveillance, reconnaissance, and intelligence group, or SRIG. An intelligence company headquarters was created over some of the intelligence-related "cats and dogs" units in order to better train, task, and coordinate them in support of the MEF's activities.

Although envisioned as a "type command" in the sense that it was to have a training, support, and "advocacy" role-as opposed to operational command-with regard to its disparate subordinate elements, the SRIG headquarters was provided a S-6/CEO position on the staff to facilitate and coordinate communications and information systems support of the force headquarters as well as to serve as a go-between for external equipment requests and related issues. Given that the section called for only a major communications officer and a master sergeant communications chief, its ability to give operational direction was quite limited, considering that it was "wedged" between the much larger operations sections of the MEF G-6 and the communication battalion S-3.

The Communication Battalion, FMF

Although not apparent from the title of its parent outfit, the communication battalion was the largest single subordinate unit of the SRIG. With a primary mission of providing the communications paths among the MEF or MEB CE and its major subordinate elements, the Corps' three communication battalions had, prior to the creation of the SRIG, often found themselves administratively subordinated to division or FSSG headquarters instead of being directly under the control of the MEF.

The communication battalion in 1990 consisted of 43 officers and 841 enlisted men and women organized into a Headquarters and Service Company of 13 officers and 86 enlisted Marines; a Support Company of 10 officers and 371 enlisted Marines; and two communication companies, each at a strength of 10 officers and 192 enlisted Marines.[1] These last two "letter" communication companies each consisted of a company headquarters section, a single- and multi-channel radio platoon, a wire platoon, and a communications center platoon. The headquarters company contained the battalion's motor transport, consolidated maintenance, supply, and headquarters platoons. The support company contained the construction platoon and the communication support platoon, which owned all of the battalion's long-range or "long-haul" satellite multi-channel communication equipment.

The battalion was organized in order to support readily either a single MEF CE or, alternatively, two separate Marine Expeditionary Brigade (MEB) command elements. In the latter case, each MEB CE would receive a communication company that was appropriately reinforced by elements from the battalion's headquarters and service and support companies. In this case, the battalion commander and his staff either stayed with the residual elements in the rear or located with the MEB which represented the MEF's point of main effort. Because of this concept of operations, each of the communication companies was provided a small operations section headed by a lieutenant in order to facilitate the planning of MEB missions independent of the battalion's S-3 section.

The Special Security Communications Team

Outside of the communication battalion and directly subordinate to the MEF G-2 was the Special Security Communications Team (SSCT). This team, which was composed of about a dozen specially trained communications and signals intelligence Marines, operated the terminal communications equipment for the MEF's Special Compartmented Information Facility (SCIF). This team used existing communications paths provided by the communication battalion, but once the signal was broken out from the transmission equipment it was physically isolated from the larger system and encrypted using special higher security codes.

The SCIF provided a sanitized work area in which highly classified intelligence material could be collected, stored, and communicated. To be properly secured, the SCIF needed to be both physically and electronically isolated from other spaces and systems. These stringent requirements for security often made communications installation, troubleshooting, and repair an unusually difficult process because few outside personnel possessed the appropriate security clearance necessary to work within the facility.

Marine Aircraft Wing Communications

As was the case with the MEF, the Marine aircraft wing staff contained a G-6 section headed by a colonel. The wing G-6 section included subsections for operations, information systems, and electronic maintenance, but the latter was tailored toward the support of wing unique air control equipment in addition to the ground common communications and electronics equipment found throughout the MAW.

Marine Air Control Group

Marine aircraft wings in 1990 had no one FMF-wide fixed organization, but consisted of a separate Marine wing headquarters squadron (MWHS), from two to five Marine aircraft groups (MAG), a Marine wing support group (MWSG), and a Marine air control group (MACG). Aside from the headquarters squadrons and the two stateside MACGs, none of these subordinate groups was exactly alike, as they reflected a task-organized approach that depended heavily upon the geographic location and likely mission assigned to each MEF.

The Marine air control group, which established and operated the Marine air command and control system (MACCS) for the wing commander, consisted of an array of specialized squadrons and battalions which reflected the disciplines of air control, air defense, air support, air traffic control, and communications. These disciplines were used by the group to execute one of the six functions of Marine aviation: control of aircraft and missiles.* To do so effectively, the Marine Corps provided for a sizeable network of communications personnel and equipment distributed throughout the MACG, although none of the former were assigned to the staff of the group commander.

The Marine Wing Communication Squadron

Outside of the SRIG, the largest dedicated communications unit in the MEF resided in the Marine aircraft wing. The Marine Wing Communication Squadron-as noted above, a subordinate element of the MAW's Marine Air Control Group-had the mission of providing the communications paths between the wing headquarters and its subordinate units. This mission in practice translated into two sometimes competing communications tasks. The first was to link the tactical air command center (TACC) with the subordinate agencies of the Marine air command and control system: the tactical air operations center and the

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* The other five are: offensive air support, antiair warfare, assault support, aerial reconnaissance, and electronic warfare.

direct air support center (DASC).* The principal means of communication among these agencies was through operator-to-operator "hot lines" over multi-channel radio links. The second task of the squadron was to establish communications from the Wing headquarters to its typically scattered subordinate Marine aircraft groups and Marine wing support group. This was also accomplished using multi-channel radio links, but common user telephone trunks rather than "hot lines" were meant to be the principal mode of communication among them. With limited numbers of multi-channel radio links, the competition for priority between "hot lines" and telephone trunks was often keen.

Like the communication battalion, the MWCS was organized to support the one MEF/two MEB concept in effect in 1990. Since the squadron's manning and organization fell under the auspices of the Deputy Chief of Staff for Aviation (DC/S Air) at Headquarters, U. S. Marine Corps, in practice this resulted in a significantly different structure than was seen in the AC/S C41-sponsored ground communication units.** The communications squadron was organized into two large (company-size) detachments of 11 officers and 191 enlisted Marines, two small (platoon-size) units of 2 officers and 44 enlisted Marines, and a squadron headquarters of 7 officers and 36 enlisted Marines, for a total of 539 personnel. Since each MEB was expected to consist of a composite MAG spread between a fixed-wing airfield and a rotary-wing airfield, and since it was assumed that the composite MAG headquarters, the TACC, and much of the logistics support would be based at the fixed-wing airfield, a "MEB slice" of the MWCS would consist of one communications detachment to support the fixed-wing site with its TACC and the MAG headquarters and one communications unit to support the presumably more austere rotary-wing site.

Similar to a communication company, the MWCS communication detachment consisted of the four "core" functional platoons of single-channel radio, multi-channel radio, field message center, and wire, although the multi-channel radio platoon contained "long-haul" (beyond line-of-sight) equipment not found in the former. Additionally, and in a fundamental contrast to the structure of the communication companies of the communications battalion, by table of organization (T/O) the communication detachments and (to a lesser extent) the communication units of the MWCS included their own organic communications-

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* The TACC, the senior Marine air agency, serves as the command post of the commanding general. The TACC supervises and directs the activities of the tactical air operations center and the direct air support center and tasks the MAW's subordinate aircraft groups. Although there was no fixed organization to a MAW, it was expected that each would consist of one Marine fighter attack (VMFA) group, one Marine attack (VMA) group, and two helicopter groups with a mixture of heavy, medium, light, and attack helicopter (HMH, HMM, HML/A) squadrons and fixed-wing observation squadrons (VMO).

**The designation for the Deputy Chief of Staff for Command, Control, Communications, Computers, Intelligence, and Information Systems.

electronics, utilities, and motor transport maintenance personnel as well as personnel for administration and supply. Thus, a T/O detachment in theory required no reinforcement from its parent squadron to perform a MEB-sized mission. The detachment headquarters included an operations section consisting of a captain, a warrant officer, and three enlisted Marines. The commander was also "dual-hatted" as the staff communications officer of the supported composite MAG. As in the case of the communication battalion, in a two-MEB split the MWCS commander would locate himself, his principal staff, and residual squadron elements where appropriate. The squadron and independent detachment commanders were in an interesting position in that the MACG, unlike the SRIG, exercised operational control as well as command over the wing's "long-haul" communications assets and thus was directly concerned with their tasking and employment.

Other MACCS Agencies and MACG Units

In addition to the MWCS, the MACG contained numerous other squadrons and battalions organized either to perform a function of Marine aviation or to support or direct an aspect of the operation of the Marine air command and control system. Each had some degree of unique internal communications requirements and, as such, each contained an organic communications section or platoon to assist in the accomplishment of its mission.

The headquarters and headquarters squadron (H&HS), which provided both the TACC facility (or the "bubble," as it was more commonly known) and the aviation ground officer and enlisted personnel necessary to ensure its proper smooth operation, possessed a small external communications suite designed specifically to transmit and receive Tactical Data Information Links "A" and "C" (TADIL A and C) from a broadcasting ship, aircraft, or ground radar station. Other than internal console-to-console communications and the TADIL A and C radio equipment, internal telephone and external single- and multi-channel radio communications connectivity to the MACCS' outlying agencies and units were provided to the H&HS by the MWCS. Field message center (FMC) service was to be provided by the MWCS through the main message center located with the MAW Headquarters.

A similar supporting relationship existed between the MWCS and the Marine air traffic control squadron of the MACG. The internal headquarters telephone service for the MATCS was provided by the MWCS, as were the paths for the various non-doctrinal "hot lines" linking air traffic control detachments at each of the wing's airfields. Message traffic service was provided through the field message center operated by the MWCS at each airfield, while tactical telephone service was operated and maintained by the telephone section of the Marine wing support squadron, also resident at each airfield.

The two Marine air control squadrons normally found in each MACG possessed a significantly more robust communications capability than that of the MATCS and H&HS, since they were not specifically tied to operating at or near airfield sites. While the MWCS provided the multi-channel radio paths between

the squadrons' TAOC and the TACC as well as the occasional link to a subordinate automated early warning and control (EW/C) site, internal telephone and external single channel radio circuits were established using organic personnel and equipment. When necessary, the MWCS provided a field message center section for the TAOC.

The MACG's light anti-aircraft missile (LAAM) battalion, which operated the all-weather Improved HAWK (I-HAWK) missile system, contained an organic communications platoon within its headquarters battery. This platoon operated single- and multi-channel radio paths among the battalion's operations center, its firing batteries, platoons, and units, and the TAOC. It was dependent upon the MWCS-provided FMC at the TAOC for record message traffic, but it operated and maintained its own telephone switchboard, often in conjunction with the TAOC near which it often was located. The Stinger missile-equipped low altitude air defense (LAAD) battalion also possessed an organic communications platoon, although its capabilities were limited to installing the single channel radio nets that connected the battalion to its missile batteries and to the TAOC. For field message center and tactical telephone service, the battalion was to "piggy back" off the TAOC or other neighboring units.

Finally, the Marine air support squadron (MASS), which established and operated the wing's DASC, also possessed a robust single-channel radio capability. The DASC was generally located with the MAGTF's ground combat element headquarters. The MWCS T/O also contained a field message center section for the DASC, but in practice the DASC tended to "piggy back" on the division or regimental command post with which it was normally collocated. Although the MWCS had multi-channel radio equipment used to link the DASC to a nearby airfield or MACCS agency, the DASC's collocation with the ground combat element headquarters created distances between it and the rest of the wing communications network which often exceeded the reliable operating range of the available multi-channel radio equipment.

The Marine Wing Support Squadron

The wing communication squadron by mission statement was responsible for inter-airfield and inter-agency communications, with the major exception being MAW and MACG headquarters support. Certain units within the MACG accessed the tactical telephone system through the resident Marine wing support squadron (MWSS). The same was true of Marine aircraft group headquarters and their subordinate aircraft and aviation logistics squadrons, which by table of organization possessed no organic tactical communications capabilities. In addition to tactical telephone service provided from the MWSS, the MAG would also receive ground-based tactical radios for its doctrinal group and squadron common radio nets.

In order to provide for internal MWSS and airfield communications, the MWSS by T/O included a communication section consisting of 22 Marines headed by a gunnery sergeant which had the mission of providing tactical telephone

and single-channel radio support to both the MWSS and other tenant units, including the resident MWCS unit. The MWSS communication section also possessed a limited communications-electronics maintenance capability for its organic equipment. Like the MAG headquarters, the Marine wing support group headquarters did not have an organic communications section, and thus it also "piggybacked" on one of its subordinate MWSS in the field. The group did have a billet for a communication chief to coordinate group-wide requirements.

Marine Division Communications

As was the case with the MEF and the MAW, the Marine division general staff included a G-6 section. Headed by a colonel with a lieutenant colonel assistant, the G-6 section included two majors and a captain as deputies for operations, electronic maintenance, and information systems management. Senior staff noncommissioned officers brought added depth and experience to each of these areas.

Communication Company, Marine Division, FMF

Located within the headquarters battalion of the Marine division, the division communication company's mission was to provide internal communications to the division headquarters as well as communications to its subordinate regiments and separate battalions ! Commanded by a major and with a strength of 14 officers and 317 enlisted Marines, the company closely resembled the MWCS communication detachment in its basic structure, although some important differences existed. Besides containing only line-of-site VHF communication equipment in its multi-channel radio platoon with which to link the division and regimental command posts, it had fielded since 1988 a position locating and reporting system (PLRS) platoon in addition to the "core" single-channel radio, wire, and field message center platoons. By table of organization it also contained an air and naval gunfire platoon, but this had long before fallen into a cadre or inactive status. Like the MWCS communications detachment, the company possessed its own limited intermediate communications-electronics, utilities, and motor transport maintenance platoon. It remained dependent for administrative and supply functions on the division headquarters battalion.

Regimental and Battalion Communications

Each of the Marine division's four regimental headquarters (three infantry and one artillery), their subordinate battalions, and the five separate battalions of the division possessed an organic communications platoon. In the case of the infantry regiments, each had a major as the regimental communications

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* Other subordinate units included the headquarters, military police, service, and motor transport companies and the division band.

officer with a lieutenant assistant and a platoon of 77 Marines. The platoon supported the regimental command post with tactical telephone, radio and field message center service and tied it with its subordinate battalions via single- and multi-channel radio equipment. The separate and subordinate infantry and artillery battalions were similarly configured, except that the former's communication platoons were generally headed by captains and the latter's lieutenants. None possessed a field message center or a multi-channel radio capability.

Force Service Support Group Communications

As was the case with the MEF, division, and wing staffs, the FSSG staff included a G-6 section, although the section head by billet was a lieutenant colonel as opposed to colonel as the other commands. In keeping with the two MEB per MEF concept, the FSSG also included two standing brigade service support group (BSSG) command elements, but like a composite MAG the staff was merely a nucleus and its communications expertise would be provided by the commander of the supporting detachment from the communication company.

Communication Company, Force Service Support Group

Located within its headquarters battalion, the FSSG's communication company was organized to suit the unique requirements presented by regularly deploying combat service support (CSS) elements. Commanded by a major and with a strength of 13 officers and 346 enlisted Marines, the company's mission was to provide support to the group headquarters or to smaller independent task-organized CSS elements and to connect those headquarters with their subordinate battalions and detachments. In order to perform this mission, the company was organized into five CSSE communication platoons of approximately 40 Marines (designed to support 2 BSSGs and 3 MEU service support groups), one communication support platoon of over 100 individuals which included functional sections of field message center, wire, single-channel, and multi-channel radio, and a combined limited intermediate maintenance platoon.

FSSG Subordinate Battalion Communications

Communications capabilities within the seven functional battalions of the FSSG varied greatly with the mission of the particular unit. The group's landing support battalion rated a large communications platoon of more than 80 Marines headed by a captain, while the engineer support battalion's platoon was only 30 Marines commanded by a lieutenant. The medical and motor transport battalions each had a communications section, although in the case of the former it was headed by a lieutenant rather than by a staff noncommissioned officer communication chief. The supply, maintenance, and dental battalions possessed no organ

is tactical communications means, and as such received their required support directly from the group's communication company.

FMF Communications Equipment

Introduction

The summer of 1990 found the Marine Corps on the verge of a fundamental transition in communications. Since the advent of radio early in the 20th century, the Corps had procured and adopted successive generations of both military and civilian radio sets in an attempt to meet the ever-increasing demand of the Fleet Marine Force for communications equipment suited to the requirements of expeditionary and amphibious warfare. Although the FMF communications equipment in wide use in 1990 represented a capability many times greater than that in use even a quarter century earlier, the vast majority of this equipment was designed for and ultimately limited by a foundation of analog electronics.

Satellite Communications Equipment

This analog foundation of FMF communications began to shift in the early 1980s with the introduction of both man-portable satellite communication (SATCOM) radios and vehicle-mounted ground mobile forces (GMF) satellite communication equipment into the FMF communication battalions. By the end of the decade, the frequency-hopping single-channel ground-air radio system (SINCGARS) also began to appear, albeit in small numbers for selected units. The GMF equipment suites fielded by each MEF consisted of one AN/TSC-85 set (or "hub") and four AN/TSC-93 sets (or "spokes"). With this equipment, the MEF could establish a point-to-point link using two TSC-93s, or if more than two locations were required to be connected, the TSC-85 would be used to communicate with multiple outlying TSC-93s (thus yielding the "hub-spoke" description). Each TSC-93 could transmit and receive a combination of discrete analog channels or digital 'information, depending on the available satellite bandwidth. Also present in the communication battalion were 30 sets of the PSC-3 man-portable single channel UHF SATCOM radio, which were generally used to carry the high-priority tactical command voice circuits among the MAGTF commander and his major subordinates.

Although the broadcast frequency (or carrier wave) of this satellite communications equipment was analog, the intelligible information carried by this analog wavelength was in digital form. However, once this information was received by this terminal equipment on the FMF end of the link, it was translated into analog form before it was switched and transmitted among major USMC ground tactical communications stations and nodes.

Switching and Technical Control Equipment

In August 1990 ground communications nodes were composed of a limited variety of basic equipment. At the heart of a major node such as a MEF, division, wing or FSSG main command post would be a TSQ-84A technical control (or TechCon) shelter. Within this shelter, trained technical controllers could manually patch a specific signal from a discrete channel originating from a radio or telephone at one point (or point "A") to another (point `B"). If the signal in question was relatively weak, it could be boosted by the technical controllers if desired using small amplifiers. The signal could also be filtered to remove excess noise, since the terminal equipment at point B-whether a Marine or a display scope-might otherwise find the signal to be unintelligible.

Depending upon its routing, after the signal left the TechCon van it might travel to a telephone on a desk via a switchboard over "hard" wire. The Corps operated both "automated" and "manual" tactical telephone switchboards. With the former, one could normally dial through to the desired number without the switchboard operator's intervention, while the latter required the signal to be patched manually down the desired path by the operator. If that path was a dedicated channel between two switchboards, that channel was called a telephone "trunk." In wide use in 1990 were two automated switchboards: the AN/TCC-38 telephone switching van, which could terminate some 300 assorted telephones, and the SB-3614, which was a "man-portable" switchboard capable of terminating 30 telephones. It could, by being "stacked" with two others, expand that number to almost 90 telephones. The manual switchboard in wide but declining use at that time was the SB-22. It had a capacity of only 12 telephones but could, like the SB-3614, be "stacked" with others of its type to provide additional capacity without an increase in switchboard operators.

Terrestrial Multi-channel Radio Equipment

Instead of going from a telephone switch directly over wire to a local telephone, a signal could also go to a switchboard or even a single telephone at a distant site (in which the latter was labeled a "long local") via multi-channel radio equipment. Another variation of this was a "hot line," in which two or more analog telephones were directly connected over wire or multi-channel radio without being routed through an intermediate switch.

Terrestrial multi-channel radio equipment used essentially two modes of radio wave propagation. The first mode was line-of-sight (LOS), in which the antennas of the transmitting and receiving equipment generally had to be within straight line distance of each other. Depending on other factors such as frequency, iron content of the soil, and electronic interference, this could be slightly shorter or longer than actual line-of-sight. The maximum LOS distance normally encountered in flat terrain was 30 to 35 miles, assuming that antenna heights were within a dozen or so feet of the ground. The second mode of communica-

tion was through troposcatter propagation, which consisted of reflecting or "bouncing" radio waves off the ionized portion of the earth's upper atmosphere between two ground stations. Thus, the ground stations could be beyond LOS distance apart and still be in communication range. The normal range for this mode of radio wave communication was from 40 to 120 miles.

The Marine Corps possessed several types of radio transceivers designed for the purpose of connecting widely separated sites and their associated telephone switches and technical control facilities. With an effective range of nearly 90 miles and the ability to transmit and receive simultaneously (known as "duplex" operation in the parlance) 12 distinct and separate channels of information on one frequency, the AN/GRC-201 Super High Frequency (SHF, or "microwave") radio system had served as the "backbone" of MEF internal communications for more than a decade. With two sets "slaved" at each end of the link, the GRC-201 could be operated as a 24-channel radio, with sets at each end operating on two frequencies as either dedicated transmitters or receivers.

With the introduction of the GMF satellite system, the GRC-201 had been relegated to a secondary means of tying together the MEF headquarters with its major subordinates, but it was still used extensively within the Marine aircraft wing (the only owner outside the communication battalion) to link its scattered air control agencies and aircraft groups. It was particularly valued by the wing for several reasons. First, it was not dependent on satellite access for its operation, so the level of coordination required for its employment was much less than the MEF's GMF terminals and it also was not subject to preemption by joint or other service SATCOM requirements. Second, the GRC-201's relatively slow installation time (normally several days at a minimum for the link to "settle down") was not likely to hamper wing operations, since the aircraft groups and air control agencies normally tied together with this equipment did not frequently or rapidly displace. Third, although not considered fully secure by National Security Agency (NSA) standards, the GRC-201 used bulk encryption devices that provided for at least a modicum of communications security (COMSEC) to the subscriber.

The more common piece of multi-channel equipment found in the MEF was the AN/MRC-135, an eight-channel, very high frequency (VHF), HMMWV- or jeep-mounted radio set with a maximum range of approximately 35 miles.* In service with virtually every FMF communications unit at or above the regimental level, this radio offered both advantages and disadvantages to the user, depending upon one's perspective. A MRC-135 link (or "shot") could be generally installed in a couple of hours, but it was highly vulnerable to enemy direction-finding units, and the signal that it broadcast was not encrypted. Its limited range could be easily outrun by maneuver battalions, and it also tended to overheat in hot weather.

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* The high mobility, multi-mission, wheeled vehicle, or HMMWV, replaced the M-151 jeep in the mid-1980s.

As one might expect, these latter qualities of the MRC-135 endeared it neither to its operators nor to those whom it was intended to support.

Single Channel Radio Equipment

In 1989, FMF units by and large communicated with each other via the same tactical VHF radios that they had for the previous 20 years. Known as the AN/VRC-12 family of radio equipment, it encompassed the mobile high-powered VHF radios found on tanks, AAVs, and communication vehicles. These were fully compatible with the PRC-77, which was the basic infantry battalion man-portable radio known to virtually all division Marines of the 1970s and 1980s.

This generation of radios was programmed to be replaced by the SINCGARS family of VHF frequency-hopping radios with embedded cryptographic circuitry. Although this was to start in the mid-1980s, a series of program setbacks repeatedly delayed this exchange so that by August of 1990 only one FMF unit-the 1st Light Armored Infantry (LAI) Battalion-was equipped with a version of this radio. Other LAI units operated the Bancroft KY 67 radio, which was non-frequency hopping but contained embedded VINSON cryptographic circuitry used by other units, while the rest of the FMF continued to use the VRC-12 radio equipment.

Field Message Center and Data Processing Equipment

Beginning in the middle 1980s, various Fleet Marine Force communications units sought to harness the capabilities offered by the expanding world of the microcomputer. The rapid growth in the use of networked personal computers throughout the Department of Defense, coupled with their declining size and cost and increasing power and flexibility, steadily highlighted their potential as tools for tactical military communications. By the end of the decade, successful field tests had been undertaken where computer-to-computer data transfer had been accomplished over a variety of tactical single and multi-channel radio systems in the FMF.

By the summer of 1990, these successes had in many ways bred problems of their own. Since military-specification (mil-spec) or "green" microcomputers had been purchased in relatively small numbers, much of the testing and exercise support of tactical communications had been conducted using commercial or "white" computers. The "green" microcomputers, known as the ANIUYK-83 and the AN/UYK-85, had been fielded by the Corps to support automated maintenance and supply management, personnel reporting, and limited word processing functions, but not for use as tactical communications instruments. FMF communications units still possessed an array of analog teletype equipment-ranging from technologically ancient "grey" gear mounted in deployable shelters to the relatively modem but increasingly outdated AN/UGC-74-to pass record message traffic to one another. While this series of equipment was increasingly

viewed by the FMF as anachronistic at best, the testing, procurement, and fielding of modern field-worthy microcomputers could simply not keep up with the FMF's growing demand for them. Even the relatively new TSC-96, which was a shelter-mounted message center that utilized a UHF WSC-3 satellite transceiver to access directly the shore-based naval telecommunications system, had fallen out of favor because of its limited data storage capability and its inability to accept from or deliver to the customer information via floppy disk.

Position Locating and Reporting System

Starting in 1988, the Marine Corps took delivery of a communication system that promised to change radically the way commanders at all levels viewed the battlefield. Called the position locating and reporting system (PLRS), it was designed as an electronic navigation tool that would provide subscribers outfitted with basic user units (BUUs) both absolute and relative bearing information. At higher levels (normally a division main or alternate command post), commanders equipped with a PLRS master station could monitor a visual display of the location of every subordinate unit possessing a BUU.

The PLRS network was operated and maintained by the PLRS platoon of the division communication company, although BUUs were distributed throughout the MEF. The system consisted of four master stations and up to 400 BUUs per MEF. BUUs were encrypted radios that could transmit, receive, and relay the location of any other BUUs within line-of-sight distance. The data from one BUU could be relayed through up to four other BUUs before it had to be processed through a master station. Thus, virtually every BUU could communicate with the master station unless it was more than approximately 20 miles from another unit. Short 10-digit numeric messages could be transmitted throughout the system along with navigational data.

PLRS did have certain drawbacks which made it unattractive to some commanders. The PLRS master station was normally mounted on the back of a five-ton truck, and had a number of support vehicles and generators in tow. The large physical presence of the master station was often not welcome in the small forward command posts favored by maneuver unit commanders. The BUU weighed approximately 40 pounds, a characteristic which made it understandably unpopular with many infantrymen. The BUU also had a hearty appetite for expensive lithium batteries. In a time of increasing fiscal constraints, this expense tended to limit the field exercise of PLRS in 1989 and 1990.[2]

Summary

The Fleet Marine Force entered the 1990s with a mixture of old and new equipment and communication organizations that had not been substantially changed in the nearly two decades since the end of the Vietnam War. Its communication personnel were adequately trained, with many of the officers and staff

NCOs having experience in both aviation and ground units. Duty with joint and other service commands had also served to broaden the horizons of more senior communications officers. Modem digital communications equipment was on its way to the FMF that promised to increase both the flexibility and the capacity of units to effectively support field commanders in the contemporary joint operations environment.

Notes

Information on unit T/Os contained in this appendix is taken from the Marine Corps T/O checklist recapitulation dated 14Jan91. They include T/Os 1096M (HqCo, Infantry Regt), 1101G (HqBtry, Artillery Regt), 1883G (CommCo, Marine Div), and 3131F (CommCo, FSSG). In addition, FSSG T/Os 3211F, 3311F, 3411F, 3511F, 3561F, 3611F, and 3661F of 14Jan91 provide strength information on the communication platoons in the headquarters companies of each FSSG battalion.

1. T/Os 4886A, 4863A, and 4883A respectively.

2. Capt Erik J. Knutila intvw, 23Jun94.

Appendix B
Glossary of Communications Equipment

The equipment descriptions below are extracted from those found in U.S. Marine Corps Technical Manual TN-2000-15/2B, *Principal Technical Characteristics of U.S. Marine Corps Communication-Electronics Equipment,* April 1993.

SINCGARS-V (Single-Channel Ground and Airborne Radio System)-A family of lightweight, very high frequency radios for infantry, fighting vehicles, and aircraft that provides high security against surveillance and jamming by using either single-channel offset or frequency hopping technology. The AN/PRC-119 is the baseline manpacked version of the radio.

Speech Security Equipment (Vinson), TSEC/KY 57-The KY 57 is a portable, tactical cryptographic device designed to provide security for VHF-FM and UHF-AM, half-duplex, radio and tactical wireline communications. The KY-57 is designed for manpack and vehicular applications.

Radio Set, AN/MRC-140-The AN/MRC-140 is a satellite communications system that provides the Fleet Marine Force Commander the capability for vehicle half-duplex two-way communications in both satellite (SAT) and line-of-site (LOS) operation using both voice and data formats. It allows the Landing Force Commander to have beyond LOS communications with the Amphibious Task Force Commander and it can serve as a Net Control Station (NCS) for up to 15 AN/PSC-3 radio sets.

Radio Set, AN/PRC-113(V)3-The AN/PRC- 113 is a tactical, short range, manpack, ground-to-air/air-to-ground radio for Forward Air Control (FAQ teams and Marine Air Command and Control agencies.

Radio Set, AN/PRC-77-The AN/PRC-77 is a short range, two-way, VHF portable radio transceiver which provides radio-telephone or voice communications. It operates with the VRC-12 family of tactical radios.

Radio Terminal Set, AN/MRC-11 0A-The AN/MRC-11 0A is a vehicle mounted AN/VRC-49 radio set which provides two-way, FM transmitting and receiving facilities in the VHF band. Two receiver-transmitters provide the capability for simultaneous operation on two different frequencies.

Airborne-Mobile Direct Air Support Center, AN/UYQ-3A(V)1/3A(V)2-The AN/UYQ-3 is a transportable shelter designed to control and coordinate the

employment of aircraft in the close support of ground forces. Seven operators within the DASC have front panel selection of voice radio communications in the VHF, UHF, and HF ranges as well as intercommunication with each other.
Central Office, Telephone, Automatic AN/1 ˙I'C-38(V)1-The AN/TTC-38 is a shelterized, automatic telephone switch that is designed to provide for connection of up to 133 simultaneous calls. The (V)2 has a line/trunk capacity of 600 terminations.

Central Office, Telephone, Automatic AN[FI'C-42(V)-The AN/TTC-42(V) is a sheltered telephone central office that provides automatic switching service and subscriber service functions to the TRI-TAC family of four-wire, digital secure and non-secure voice terminal telephone instruments (DSVTs) and four-wire digital trunks, including both single channels and Time Division Multiplexing (TDM) groups. The AN=C-42(V) allows automatic and semi-automatic switching for selected analog loops and trunks and is sized so as to provide switching among 150 channels.

Communication Technical Control Center, AN/TSQ-840-The AN/TSQ-84() is a transportable communication technical control center used to monitor, test, condition, and control tactical telecommmunication circuits at DIV, MAW, FSSG, and MEF levels. It provides the capability to coordinate alternate routing and restoration of tactical circuits. It is capable of interconnecting and interfacing various types of communication systems, both voice and teletype. It is used with the AN/TTC-38 to provide usable tactical telecommunication circuits.

Communications Central, AN/MSC-63A-The AN/MSC-63A may be used for either General Service (GENSER) or Defense Special Security Communications System (DSSCS) access circuits. It provides eight secure full-duplex and eight unsecure local remote circuits, all of which are adjustable from 75Bd - 16KB (dependent upon distance, capability, and path type and quality), and two secure voice links.

Communications System, AN/TSC-95-The AN/TSC-95 provides two full-duplex high frequency RF paths used in long haul voice and data communications for the MAGTF headquarters. It also provides the capability of terminating two secure full-duplex 75 baud (100 words per minute) teletypewriter circuits. The system meets the requirements for long-haul communications access to the Naval Telecommunications System.

Digital Message System (DMS), AN/PSC-2-The AN/PSC-2 is a lightweight, handheld communications message processor. It is operator interactive with an LED display and key entry for composition and read-out messsages. The DCT provides the user with point-to-point and netted communications over a variety of military radios and secure equipment. The message processor performs all tasks of message composition, address coding, error control, error checking, as well as

net control. The PSC-2A is the expanded-memory version of this device.

Facsimile, Lightweight Digital, AN/UXC-7-The AN/UXC-7 is designed to provide analog and digital transmission and reception of black and white graphical hard copy material in a tactical environment.

Fleet Satellite Communications Central, AN/TSC-96(V)-The AN/TSC-96(V) provides terminal and transmission equipment in two shelters for three UHF satellite communications channels. One channel is secure, half-duplex teletype for Naval Modular Automated Communications. One channel is secure, half-duplex digitized voice. One channel may provide either four multiplexed fleet broadcast channels from a group of 15 or an additional secure voice channel.

Ground Mobile Forces Satellite Communications, AN/TSC-85B-The AN/TSC-85B is a tactical communications terminal that provides the user the capability of transmitting voice and data signals via a Super High Frequency (SHF) carrier from a remote or co-located multiplexer van. It also provides the user the capability of receiving up to four SHF carriers simultaneously, demodulating the carriers, and then supplying digital data to either the self-contained multiplexing equipment or remote van. The unit may be used with the AN/TSC-93B satellite communications terminal. The AN/TSC-85A is an older, less capable version of this terminal.

Ground Mobile Forces Satellite Communications Terminal, AN/TSC-93B-The AN/TSC-93B is a sheltered, 512 kilobits per second (kps) terminal which provides voice, data, and teletype communications to the ground, air, and logistics elements of a landing force. The terminal operates in conjunction with the AN/TSC-85B to enable the user to transmit or receive channels of voice communication and order wire. It also digitally interfaces with the externally multiplexed TRI-TAC group. The interleaver allows for substitution of 16/32 Kb/s of data in each of the voice channels. The AN/TSC-93A is the older, less capable version of this terminal.

Manpack Satellite Communications Terminal, AN/PSC-3-The ANIPSC-3 supplies the system user in a tactical environment with satellite and Line of Site (LOS) two-way, half-duplex, FM digital communication facilities (voice communication is available only for extremely high priority special missions). The ANIPSC-3 may be used to communicate with the AN/MRC-140 or with another AN/PSC-3 terminal or with other UHF SATCOM terminals. Selective call is provided and may be used to page units in the field. The terminal is compatible with TSEC/KY 65 and TSEC/KY 57 encryption devices.

Position Locating and Reporting System (PLRS) Master Station, AN, AN/TSQ-129A-The AN/TSQ-129A is an automated tactical navigation aid which provides accurate and reliable 3-dimensional, near real-time position, navigation, and conflict avoidance information to Landing Force Control agencies in display form

for fire support planning, command and control functions, and coordination purposes. The radio system operates in the UHF band and is cryptographically secure. The system incorporates a family of radios such as: AN/PSQ-4 Manpack, AN/USQ-1 Vehicle, AN/GRC-210 Ground Forces, AN/ASQ-177(V)1 Airborne (Fixed Wing), and AN/ASQ-177(V)2 Airborne (Helicopter).

Radio Set, AN/GRC-201-The AN/GRC-201 is a modified AN/TRC-97C used with the AN/TCC-72A to provide tactical two-way FM communications by means of troposcatter, line of sight (LOS), or obstacle gain diffraction propagation. Pulse coded modulation and time division multiplexing is utilized to provide up to 24 channels of voice, data, and facsimile for transmission over distances of 1 to 100 nautical miles. Secure voice transmission is possible if a TSEC/KG-27 is used with the AN/TCC-72A.

Radio Set, AN/VRC-12-The ANNRC-12 family of radio sets provides short range, two-way, VHF FM, radio communications. It is capable of monitoring two channels simultaneously or operating full-duplex. It is a basic radio set which requires additional equipment and a 25-volt (nominal) DC power source to complete its function. NOTE: The ANNRC-12 family of radio sets include one or two receiver-transmitters and, in some cases, one or more receivers (R-442/VRC). The receiver and receiver-transmitter are compatible.

Radio Terminal Set, AN/MRC-135A-The AN/MRC-135A is a mobile telegraph-telephone set which provides two order wires, eight telegraph and eight telephone channels between two terminal sites. It operates in the VHF FM range using components of the ANNRC-12 family of radio equipment.

Radio Terminal Set, AN/TRC-170(V)-The AN/TRC-170(V)3 is a transportable, self-enclosed troposcatter terminal (multichannel) capable of transmitting and receiving digital data over varying distances (up to 100 miles). This terminal is comprised of modular electronic equipment in various configurations with GFE multiplexers and cryptographic items all housed in a modified S-250/G shelter.

Switchboard, Telephone SB-3614(V)/T F-The SB-3614(V)/TT provides cordless service to two-wire Common Battery Signalling (CBS) lines, 20Hz ringdown (RD) lines or trunks, common battery dial pulse or DTMF lines, and four-wire tone signalling trunks over 15 links in a non-blocking matrix arrangement. The unit itself has 30 lines/trunk, but interconnection with 2 additional SB-3614s provides 60 or 90 lines/trunk respectively. The unit is designed to be team-transportable for tactical field use.

Switching Unit, Telephone, Automatic SB-3865(P)TTC-The SB-3865(P)TTC is a team-transportable telephone switchboard that provides automatic switching service functions to the TRI-TAC family. This unit provides switching service to

and from a variety of digital and analog loops and trunks. A single unit can provide automatic switching for 30 lines and up to 90 lines by stacking the units. It will be used at the Regiment/Group level and above within the FMF.

Index

Abu Hadriya, 34
Admire, Col John H., 27, 62, 69
Ahmed Al Jaber Airbase, 72, 75-76, 78, 80-81, 83-84
Al Jubayl, 11, 17, 19, 21, 23-27, 30-32, 35, 37, 39, 43-45, 47, 50-54, 56, 62, 74, 86
Al Jubayl Naval Air Facility, 23, 25, 29, 39, 42, 46-47, 49, 58-59, 72, 84
Al Jubayl Police Station, 57
Al Khanjar, 67, 69-73, 76, 82-84
Al Qaraah, 59-60, 67, 69
Al Wafra oil field, 79
Amos, BGen Granville R., 36, 71
Arabian-American Oil Company, 46, 58-59
Ash Shuaybah, 83
AV-8B Harrier, 25

Bahrain, 17, 24, 28, 86
Bahrain International Airport, 17, 25
Beirut, Lebanon, 31
Bell Textron AH-1 W "Super Cobras," 19
Bell UH-1N "Hueys," 19
Bioty, Col John R., Jr., 25
Boeke, Maj Gerald A., 7, 17, 25
Boomer, LtGen WalterE., 10-11, 25, 31, 37, 44-46, 56, 66-67, 71, 73, 75-76, 84
Brabham, BGen James A., 4, 25-26, 43, 52
British Army Commands and Units
  1st Armored Division, 51, 59
  7th Armored Brigade, 31, 38, 42
Bradley, Capt Scott G., 54
Bradley, LtCol Gary R., 9, 45-46
Brockett, CWO-2 Daura L., 76
Bryan, Capt Don E., 46
Burgess, Col Glen F., 10
Bush, President George W., 38, 40, 43

Camp 15, 27, 34, 38-39, 49-50, 62
Camp Lejeune, 10, 14, 37, 49, 51-53, 86
Camp Pendleton, 1-2, 8-10, 15, 22, 26, 29, 32, 34, 36, 46, 60
Cantu, LtCol William V., 54
Ciaston, Maj William M., 46, 56, 67
Civil Reserve Air Fleet, 11
Cobb, LtCol Henry C., Jr., USA, 52
Compton, Maj Harold L., 46
Copley, Maj Stephen H., 18, 54
Cougill, BGen Roscoe M., USAF, 16, 32

Defense Communications Agency, 16

Della-Corte, Col Joseph, 25, 71
Diego Garcia, 11
Doyle, Col James J., 10
Draude, BGen Thomas V., 60, 67
Duer, Maj Leslie F., 18, 36, 47
Duke Field, 6

Eglin Air Force Base, Florida, 3, 15
Elsasser, Maj George P., 24
Exercise Devil Dog I, 42
Exercise Display Determination `90, 7-9
Exercise Gallant Eagle `88, 6
Exercise Internal Look `90, 2-4, 6-7, 15, 29
Exercise Teamwork/Bold Guard `90, 9-10, 14

Faylaka Island, 83
Febuary, Maj William S., 8, 17-18, 21, 39, 46, 67
Fort Buckner, Okinawa, 29
Fort Hood, Texas, 51
Fort Huachuca, Arizona, 28
Fulford, Col Carlton W., Jr., 9

Garrett, Col Larry T., 25
Gedeon, MSgt Dennis W., 81
Gray, Gen Alfred M., 4

Hackney, Capt Ricardo S., 18, 26, 37
Halicki, Capt Mitchell F., 9
Hall, LtCol John B., 4, 15, 58
Hamashin, Capt Lloyd J., 71
Hampton, Col Thomas E., 26
Hand, Maj John F., 10, 53, 64-65, 71
Hill, Col Robert G., 1-2, 6, 15-17, 31-32, 44-45, 57-58, 66, 73-74
Himes, LtCol Timothy J., 9, 18, 23, 25, 42, 47-48, 58
Hobbs, Col Thomas A., 10
Hoey, Maj Kevin A., 6, 48, 57
Hoffman, 1stLt Stephen T., 48
Hopkins, MajGen John I., 7-8, 11-12, 17, 19
Horner, Gen Charles A., USAF, 11
Howard, Col Patrick G., 27, 35
Hurd, CWO-2 Danny A., 28, 46

Imminent Thunder, 42, 44
Iran-Iraq War, 2
Iraq, 1, 7, 73-74

Jastrzebski, Maj Mateusz K., 27
Jenkins, MajGen Harry W., Jr., 9, 12-14, 30, 53, 65, 73
Johnson, Maj James M., 27, 34, 43

Joint Communications Support Element, 5-6, 15-16
Joint Forces Command-East/Eastern Province Area Command, 56
Joint Interoperability Test Directorate, 28

Karr, MSgt Kevin R., 78
Keys, MajGen William M., 63, 66, 80
Khafji, 60, 62, 64, 67, 69
Kibrit, 56-58, 60, 62-64, 67, 70-72
King Abdul Aziz Naval Base, 17, 22-25, 36, 39, 42, 47-48, 58, 72
Klinger, Capt Bryan E., 18
Kowalcyk, Maj Rudy B., 46
Krulak, BGen Charles C., 52, 64, 67
Kuwait, 1, 7, 10-13, 69, 73-74, 76, 78, 81, 86
Kuwait City, 66, 72, 75, 82
Kuwait International Airport, 78-79, 82, 84

LaPlante, RAdm John B., USN, 65
Learn, Capt Timothy G., 4, 15, 32, 39
Lee, Maj Beverly G., 46
Lewis, Maj Edward B., 16
Liberia, 13
Lockheed C-141B "Starlifters," 11
Lockheed C-5A "Galaxys," 11
Lockheed C-5B "Galaxys," 11
Lonesome Dove, 72, 81, 84

MacDill Air Force Base, Flordia, 15
Manifa, 37, 39, 74
Manifa Bay, 29, 43, 49, 57, 60
Marcy, Capt Douglas A., 76
Marine Corps Air-Ground Combat Center, 7
Marine Corps Commands and Units
  1st Battalion, 11th Marines, 60
  1st Battalion, 12th Marines, 62
  1st Battalion, 23d Marines, 50
  1st Battalion, 25th Marines, 50-51, 59-60
  1st Battalion, 3d Marines, 27, 79
  1st Battalion, 5th Marines, 19, 27
  1st Battalion, 6th Marines, 10
  1st Battalion, 8th Marines, 50-51, 62
  1st Force Service Support Group, 3, 8, 18, 22, 24-26, 29, 34, 37, 43-44, 53, 56, 84
  1st Light Armored Infantry Battalion, 29
  1st Marine Division, 3, 11, 24-26, 34, 36, 42, 49, 53, 56, 59, 66-67, 74, 78, 80, 82, 84
  1st Marine Expeditionary Brigade, 23-24
  1st Marines, 60
  1st Radio Battalion, 57
  1st Reconnaissance Battalion, 29
  1st Surveillance, Reconnaissance, and Intelligence Group, 3, 84
  1st Tank Battalion, 60

2d Battalion, 24th Marines, 51
2d Battalion, 3d Marines, 62, 79
2d Battalion, 4th Marines, 50, 62
2d Battalion, 7th Marines, 19, 60
2d Battalion, 8th Marines, 50
2d Force Service Support Group, 10, 14, 45, 52-53, 71
2d Light Antiaircraft Missile Battalion, 36, 81
2d Light Armored Infantry Battalion, 64, 69-70
2d Maintenance Battalion, 52
2d Marine Aircraft Wing, 10, 14, 31, 45
2d Marine Division, 14, 45, 49, 51-54, 56, 59, 62-63, 66-69, 74-75, 78, 80, 83-84
2d Marines, 10, 14, 50
2d Reconnaissance Battalion, 63
2d Tank Battalion, 70
33d Combat Communications Squadron, 30
3d Battalion, 12th Marines, 60
3d Battalion, 23d Marines, 51, 62
3d Battalion, 24th Marines, 51
3d Battalion, 3d Marines, 27
3d Battalion, 7th Marines, 60
3d Battalion, 8th Marines, 50
3d Battalion, 9th Marines, 19, 34, 60
3d Light Antiaircraft Missile Battalion, 81
3d Low Altitude Air Defense Battalion, 81
3d Marine Aircraft Wing, 3-4, 7, 18, 24-25, 28-30, 35-36, 42, 47-48, 56-58, 65-66,70 71, 81, 84, 87
3d Marines, 24, 27, 49, 69
4th Assault Amphibian Battalion, 50
4th Marine Division, 50
4th Marine Expeditionary Brigade, 9-11, 14-16, 30-32, 37, 40, 44-45, 53-54, 56, 65-66, 70, 73, 83, 87
4th Tank Battalion, 50, 62
5th Battalion, 10th Marines, 64
5th Communication Battalion, 1, 87
5th Marine Expeditionary Brigade, 8, 17-18, 32, 46, 54, 65, 83, 87
5th Marines, 54
6th Communication Battalion, 46, 87
6th Marine Expeditionary Brigade, 10
6th Marines, 50-52, 70, 80-81
6th Motor Transport Battalion, 52
7th Communication Battalion, 29, 87
7th Marine Expeditionary Brigade, 7-12, 15-18, 21-25, 31
7th Marines, 8-9, 17, 19
8th Communication Battalion, 9, 14, 44-46, 50, 56-57, 63, 67, 74, 84, 87
8th Marines, 50-52, 62, 70, 81, 84
8th Tank Battalion, 50
9th Communication Battalion, 4-6, 8, 15, 17, 19, 21, 23, 25, 27-29, 32, 39, 46, 54, 57-58, 71, 76, 84, 87
10th Marines, 52, 80

11th Marine Expeditionary Unit (Special Operations Capable), 18
11th Marines, 27, 34, 43, 49, 59
13th Marine Expeditionary Unit (Special Operations Capable), 10-11, 30, 53, 65, 83
24th Marine Expeditionary Unit, 53
Amphibious Squadron Five, 10, 30
Brigade Service Support Group 1, 24, 26
Brigade Service Support Group 4, 10, 53, 65
Brigade Service Support Group 5, 54, 65
Brigade Service Support Group 6, 53
Brigade Service Support Group 7, 7-8, 10, 14, 17, 19, 22, 26
Combat Service Support Detachment 141, 34, 43
Combat Service Support Detachment 111, 43
Company B, 7th Communication Battalion, 24
Company Team Sierra, 86
Detachment A, Marine Wing Communication Squadron 28, 10, 14, 18, 24
Detachment A, Marine Wing Communication Squadron 38, 8, 10, 18, 22, 28, 35, 54
Direct Support Command, 52-53, 64, 66, 70-71, 76, 82, 84, 87
Direct Support Group 1, 26, 43, 53, 64
Direct Support Group 2, 53, 64, 84
Fleet Marine Force, 2
Fillet Marine Force, Atlantic, 13
General Support Group 1, 26, 52
General Support Group 2, 44, 52
Headquarters and Headquarters Support Squadron 28, 72
Headquarters and Service Group 1, 26
I Marine Expeditionary Force, 1-3, 6-7, 10-11, 16, 24-27, 29-32, 34, 38-40, 42-46, 51,54, 56-58, 60, 63, 66-73, 76, 78, 82-84, 87-88
II Marine Expeditionary Force, 9-10, 16, 43, 45
III Marine Amphibious Force, 1
III Marine Expeditionary Force, 16
Marine Aircraft Group 50, 65
Marine Air Control Squadron 1, 19, 36
Marine Air Control Squadron 2, 36, 58
Marine Aircraft Group 11, 8, 25, 28, 36, 56, 88
Marine Aircraft Group 13, 25, 72
Marine Aircraft Group 14, 31
Marine Aircraft Group 16, 25, 29, 36-37, 42, 58-59, 71-72, 81-82, 84
Marine Aircraft Group 26, 42, 48, 58, 67, 71, 84
Marine Aircraft Group 40, 10, 31, 65, 83
Marine Aircraft Group 50, 54, 83
Marine Aircraft Group 60, 10
Marine Aircraft Group 70, 7-8, 10, 17-19, 21-23, 25
Marine Attack Squadron 331, 83
Marine Aviation Weapons and Tactics Squadron 1, 9
Marine Corps Air Station El Toro, 8, 48
Marine Corps Air Station New River, 48
Marine Corps Air Station, Cherry Point, 10
Marine Corps Air Station, Yuma, Arizona, 9
Marine Corps Logistics Base, Albany, 39

Marine Light/Attack Helicopter Squadron 369, 19
Marine Service Support Group 24, 53
Marine Wing Communication Squadron 18, 72
Marine Wing Communication Squadron 28, 48, 72, 84
Marine Wing Communication Squadron 38, 18-19, 25, 40, 42, 47-48, 57-58, 71-72, 81-82
Marine Wing Support Group 37, 47
Marine Wing Support Squadron 174, 24
Marine Wing Support Squadron 273, 72
Marine Wing Support Squadron 374, 24
MEU Service Support Group 11, 18
MEU Service Support Group 13, 18
Regimental Combat Team 3, 27, 34, 43, 59-60
Regimental Combat Team 7, 19, 27, 35
Regimental Landing Team 2, 14, 65
Regimental Landing Team 5, 54, 65, 83
Regimental Landing Team 7, 17, 21, 23, 25, 27
Regional Automated Service Center, 26
Marine Corps Digital Information Network, 22
Mauz, VAdm Henry H., USN, 11
McDonnel Douglas KC-10 "Extenders," 11
McKee, Col Sam C., 4
McKnight, Maj John E. III, 32, 54
McMillan, Maj Edward S., 46, 86
Mikolajczak, Maj Frank E., 19, 46
Military Airlift Command, 11
Military Sealift Command, 13
Mishab, 42, 44, 48-49, 52, 57-59, 60, 62, 71, 83
Mogadishu, Somalia, 65
Monahan, MajGen John P., 3, 10-11
Moore, Col John R., 15
Moore, MajGen Royal N., Jr., 3, 18, 25, 36, 42, 71
Morehead City, North Carolina, 14
Morgan, Maj Robert, 65
Mundy, LtGen Carl E., Jr., 9
Myatt, BGen James M., 11, 27, 36, 59, 69

National Security Agency, 30
North Arabian Sea, 10

O'Brien, LtCol Phillip J., 18, 36
Olszowy, Capt David P., 76
Operation Sharp Edge, 13
OV-10 Bronco, 25

Pelfrey, Maj Darus G., 9
Petronzio, Maj Nicholas C., 50
Powell, Col Alexander W., 8, 26

Quinn, Capt John T. II, 25, 48, 58

Radio Communications and Equipment, 5, 8, 21, 23, 25-27, 31, 34-37, 39, 44-45, 51, 57-60, 62-64, 67-73, 76, 78, 80-83, 87
Ramsperger, Col Sepp D., 49, 52, 81
Reed, Maj William A., Jr., 29
Regan, Capt Patrick C., 50, 63, 70
Remis, Capt Martin P., 24, 26
Remote Multiplexer-Combiner, 5-6
Rhas Al Ghar, 25, 72
Rietsch, Col Manfred A., 8, 25
Riyadh, 11
Robben, Col Joseph W., Jr., 18, 58
Rodgers, Maj Carl E., 46
Rowe, BGen Peter J., 54
Rowe, Capt Ken L., 10, 14
Rusch, Capt Robert L., 9, 14, 46

Saddam Hussein, 11, 38
Safaniya, 56-57, 67
Sarmiento, Capt Daniel A., 9, 18
Satellite Communications and Equipment, 13, 16, 19, 21-23, 27, 29-32, 38-39, 44-45, 48-50, 52-54, 56-60, 62-64, 66-70, 72-76, 78, 80-82
Saudi Arabia, 21, 24, 56, 64, 86-87
Schade, Capt Lisa R., 46
Schmidt, Col Larry S., 62-63, 70
Schmitz, Capt Richard M., 48
Schwartzlow, Col Gene D., 15
Schwarzkopf, Gen H. Norman, USA, 2, 11, 25, 29, 83
Sea Soldier I, 37
Sea Soldier II, 44
Sea Soldier III, 40, 44
Sea Soldier IV, 66
Shaikh Isa Air Base, 17, 21-23, 25, 28, 30, 36-37, 40, 42, 47, 56, 58
Shea, LtCol Robert M., 4, 8, 15, 17, 21, 32, 39
Sizemore, lstLt Scott R., 64
Smith, Capt Michael J., 24, 27, 43, 62, 69
Smith, LtCol Rodney N., 34, 69
Snyder, Capt Ronald W., 48, 72
Soroka, Maj Thomas S., 10, 14
South Carolina Air National Guard, 38-39
Sparrow, LtCol Linwood W., 22, 43
Spencer, LtCol William X., 10, 14
Steed, Col Billy C., 67
Sylvester, Col John B., 51

Tanagib, 42, 58, 71-72, 81-84
Task Force Cunningham, 36
Task Force Grizzly, 60, 69, 78

Task Force King, 60, 68-69
Task Force Papa Bear, 60, 69, 78
Task Force Ripper, 35, 43, 69, 78
Task Force Shepherd, 29, 43, 59-60, 69, 78
Task Force Taro, 60, 62, 69, 78-79
Task Force Troy, 67
Task Force X-Ray, 79
Telephone Communications and Equipment, 4-6, 15-16, 21-23, 26, 28-32, 34, 37-40, 45-46, 48-49, 51-52, 57, 60, 64-65, 71, 76, 84, 87-88
Tri-Service Tactical Communication System, 4-5
Troffer, LtCol Lawrence E., 22, 37, 43
Tulaney, lstLt Charles V., 24
Turk, Maj Alan A., 48
Twentynine Palms, 7-9, 17, 76

U.S. Air Force Command and Units
Ninth Air Force, 6, 11
U.S. Army Commands and Units
11th Air Defense Signal Battalion, 38, 42
142d Signal Battalion, 52, 63
1st Brigade, 2d Armored Division, 51
1st Cavalry Division, 51, 70
92d Field Artillery, 64
Third U.S. Army, 11
XVIII Airborne Corps, 32, 42
U.S. Atlantic Command, 2
U.S. Central Command, 1-3, 6, 11-13, 15-16, 32, 44, 73-74, 76, 86
U.S. Navy Commands and Units
3d Naval Construction Regiment, 64
Amphibious Group 2, 10, 13
Amphibious Group 3, 65
Maritime Prepositioned Ship Squadron 1, 50-51, 53
Maritime Prepositioned Ship Squadron 2, 11
Maritime Prepositioned Ship Squadron 3, 24
Naval Amphibious Base, Little Creek, Virginia, 9
Naval Mobile Construction Battalion 5, 48
U.S. Pacific Fleet, 65
U.S. Second Fleet, 13
U.S. Seventh Fleet, 11
USS Blue Ridge, 13
USS *Guam*, 65
USS Mt. Whitney, 13
USS *Nassau*, 13-14, 72-73, 83
USS Princeton, 83
USS *Tarawa*, 65
USS Trenton, 65
USS Tripoli, 83

Vietnam, 1

Waggett, Maj Donald L., Jr.,.1
Weiss, Capt William J., 9-10, 18, 23, 25, 48
Weldon, Maj Christopher M., 8, 18, 26, 37, 76
Wesley, Capt Paul G., 46
William, LtCol Glenn R., 9, 13, 30-31, 66, 72-73
Worldwide Military Command and Control System, 14

Yeosock, LtGen John J., USA, 11
Yokota, Japan, 29

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The device reproduced on the back cover is the oldest military insignia in continuous use in the United States. It first appeared, as shown here, on Marine Corps buttons adopted in 1804. With the stars changed to five points, the device has continued on Marine Corps buttons to the present day.