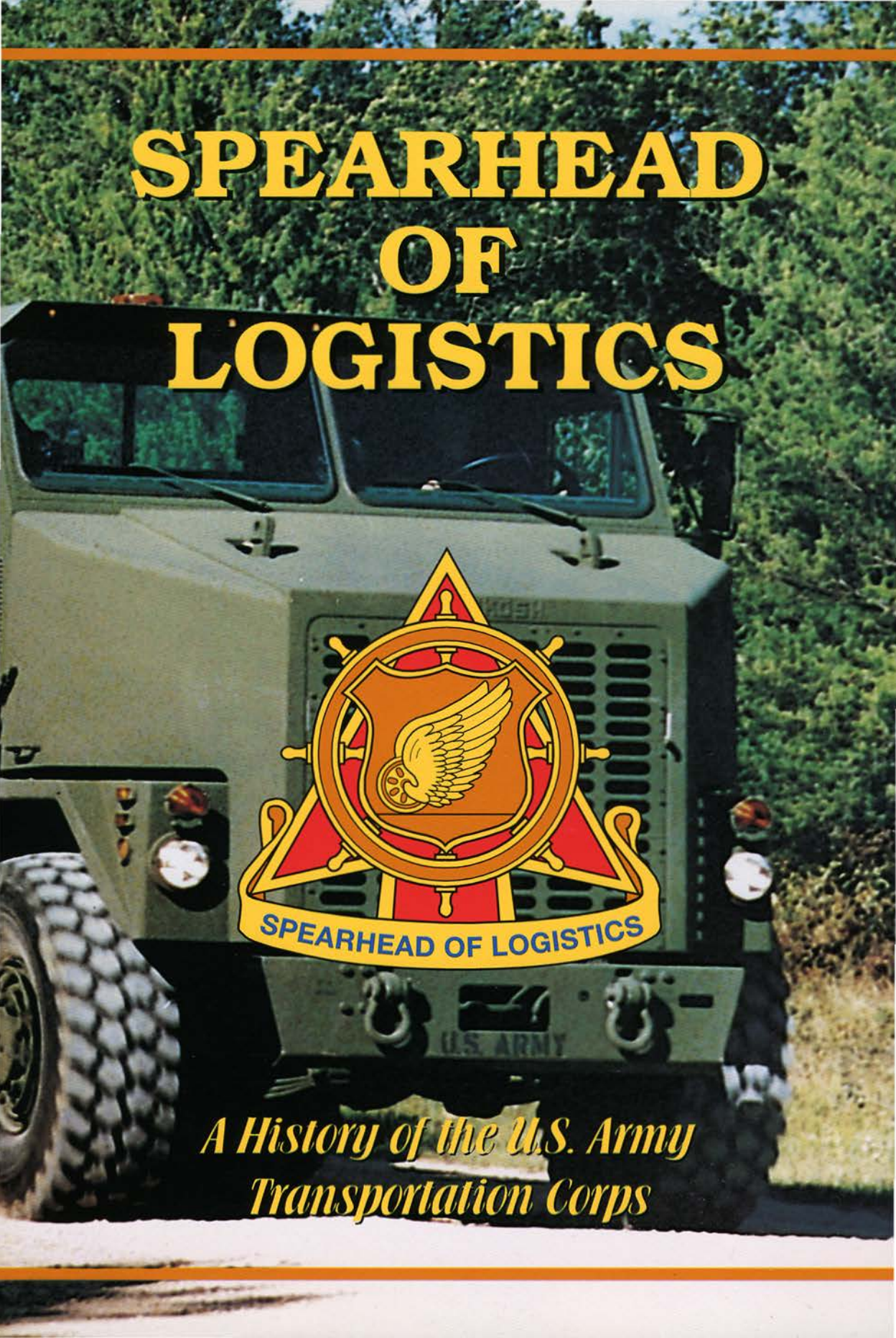
SPEARHEAD OF LOGISTICS



A History of the U.S. Army Transportation Corps

SPEARHEAD OF LOGISTICS

A HISTORY OF THE
UNITED STATES ARMY
TRANSPORTATION CORPS

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Fort Eustis, Virginia
and
Center of Military History
United States Army
Washington, D.C., 2001

FOREWORD

To the 2001 Edition

War is movement. Success in war requires transportation onto the battlefield and within it. Even before the guns sound, organizations of trained specialists are working hard to deliver troops and materiel where they are needed at a rapid rate. Within the U.S. Army such specialists are the members of the Transportation Corps. Their task has grown in magnitude and complexity over time, particularly once the nation started to fight its wars overseas. Supply lines have lengthened significantly to support expeditions abroad during the last hundred years. Lead time for preparation has not kept pace, chiefly because peacetime constraints kept resources available to a minimum. Thus most overseas deployments came initially as military emergencies, challenging our transporters' skills and ingenuity as they grappled to make effective use of ports, airfields, rail systems, and highways at home and in distant theaters, while at the same time keeping track of the great mass of cargo surging forward to the fighting forces. This situation is likely to recur—and has actually been predicted in plans and studies designed to assess the Army's contemporary mobility. This further underscores the importance of understanding military transportation and the extraordinary importance of the United States Army Transportation Corps.

We are pleased to reprint *Spearhead of Logistics.* First published in 1994 as a branch history, it will now be available to the broad community of scholars and military students and leaders who are interested in transportation and movement issues during the course of expeditionary operations. It also records the proud heritage and contributions of the men and women of the United States Army Transportation Corps.

Washington, D.C.
24 April 2001

JOHN S. BROWN
Brigadier General, USA
Chief of Military History

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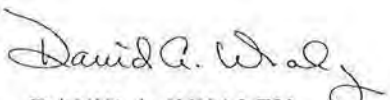
FOREWORD

Spearhead of Logistics, A History of the U.S. Army Transportation Corps is a unique book. It is not just a chronicle of events, but a story of how Army Transporters from the Revolution to Desert Shield/Desert Storm have prevailed against equipment and personnel shortages, enemy forces and hostile environments to provide the kind of support that ensures victory. Because of the way ***Spearhead of Logistics*** presents our story, it is useful to Transporters today and those in generations to come.

Lessons learned and lessons relearned abound in its pages. Because war is chaos, the same types of problems must be solved regardless of the technology. Transporters responding to Desert Shield/Desert Storm faced challenges similar to those of their predecessors in previous wars and solved them with the same skill and determination. In addition to providing a compact history of problem solving, ***Spearhead of Logistics*** also addresses the issues facing the Transportation community currently and in the future by placing them in their historical perspective.

Spearhead of Logistics will be considered the standard work on the history of the Transportation Corps for years to come and should be read by everyone who has a stake in military transportation. It is useful for both officers and noncommissioned officers who can take examples from the past and apply the same successful principles to future operations, thus ensuring a continuing legacy of Transportation excellence, an excellence which has proved time and time again that the Transportation Corps is truly "The Spearhead of Logistics".



Fort Eustis, Virginia
1994

DAVID A. WHALEY
Major General, United States Army
Chief of Transportation

PREFACE

Today's U.S. Army Transportation Corps has proved itself a winner on every battlefield and peacekeeping operation since its establishment in 1942. However, Army transportation began with the birth of the Quartermaster function in the Army in 1776 and continued in that role until World War I.

In every war of the 18th and 19th centuries, a corps of transporters was created from whole cloth to meet the Army's transportation needs, and after each conflict, it was disbanded. Routine transportation matters were assumed by contractors supervised by the Quartermaster Department. In the First World War, the responsibility for military transportation was combined in the hands of a single group of specialists dedicated to the mission of transporting the myriad of requirements of a modern army from the manufacturer to the soldier in his foxhole. This is a story of dedicated men and women overcoming tremendous obstacles to get the job done from Washington's teamsters to Desert Shield/Desert Storm. The chronicle that follows was inspired by dozens of transporters, many of whom were Chiefs of Transportation, supporting the idea of a history of the Corps that would provide a narrative of lessons learned for future generations of soldiers.

The authors are indebted to many for both substantive and moral support. We would like to thank Col. John B. Tier (Ret), Lt. Gen. Jack Fuson (Ret), Maj. Gen. John Murray (Ret), and Maj. Gen. Thomas Rice (Ret) for taking time to share their experiences with us. We thank the Transportation officers at the Army War College, the Industrial College of the Armed Forces, and the Naval War College for reviewing the initial draft of this book.

We are grateful to Ms. Marion Knihnicki, head librarian of the Transportation School Library and her staff, Ms. Diane Forbes, Ms. Valerie Fashion, and Ms. Michelle Masias; and to Ms. Barbara Bower, Director of the Transportation Museum and her staff, Mr. Frank McGrane, and Ms. Carolyn Wright for their assistance in gathering research for this book. We would like to thank Ms. Mary Kazarnowicz, Director of Information Management, who provided needed computer equipment and software. Ms. Bonni Benham and Ms. Jan Frank for editorial assistance. We are grateful to Mr. Dan Altman, the Deputy Chief, Fort Eustis Training and Audiovisual Support Center, who openly provided his resources, and skilled staff, Ms. Mary Jane Squires, Mr. Robin Sigler,

Mr. Robert Beaman, Mr. Troy Smith, Ms. Allison Hillerman, Ms. Ellen Mayo, Ms. Elizabeth Lopez, and Ms. Barbara McMichael, and countless other behind-the-scenes personnel whose graphics and desktop publishing support had an immeasurable impact on the quality of the book. We thank Mr. Mark J. O'Konski, Department of the Army, Deputy Chief of Staff for Logistics, Col. Fred Perkins and Col. John Race for the use of their manuscript on the movement of XVIII Corps in Desert Storm; Dr. John McLeod, Historian of Military Traffic Management Command (MTMC) and Mr. Mason Schaefer for the use of their notes; former Command Historians of the U.S. Army Transportation Center and Fort Eustis, Mr. James Shepard and the late Mr. Carl Cannon; Col. Donald Parker and Mr. Zbigniew "Joe" Majchrzak, Joint Strategic Deployment Training Center; the officers and soldiers of the 7th Transportation Group and the 8th Transportation Brigade; Col. Jonathan House, Cpt. Stewart Wiggins, 2nd Lt. John Acuff and Cpt. Scott Douglas of the U.S. Army Transportation School; Col. John E. Riley, Chief of Staff, Fort Eustis, and Maj. John Lambusta for providing administrative and command assistance; John L. Romjue, Chief, Historical Studies and Publications, United States Army Training and Doctrine Command, for his professional assessment of the final draft; and last but not least, Ms. Judy K. Rexrode, our secretary, who had to cope with three types of scribbling and as many types of software.

In the inspirational area we must thank Dr. H. O. Malone, Chief Historian of Headquarters TRADOC, and Dr. Lynn Simms, Historian of Combined Arms Support Command for their unwavering support. Lastly, we must thank our wives and families for their understanding and support during the entire project. If we failed to thank any individual who helped complete this book, we apologize for the oversight. The authors take full responsibility for any errors of omission or commission within these covers.

Fort Eustis, Virginia
1994

Mr. Benjamin King
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MAPS

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CHARTS

CHARTS

Charts 14-17, courtesy Department of the Army; Chart 18 is from the 7th Transportation Group Desert Shield/Desert Storm After Action Report. All others courtesy Center of Military History, United States Army.

PHOTOGRAPHS

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The photographs on pages 414 through 431, 440 and 457 courtesy of Brig. Gen. Daniel Brown; the photographs on pages 400 and 447 courtesy of Department of Defense, the photographs on pages 490 through 495 are from the Quartermaster Manual of 1916 and all others courtesy of the U.S. Army Transportation Museum, Fort Eustis, Virginia.

This book is dedicated
to all transporters

past, present, and future.

CHAPTER I

Beginnings

"Where are the men? Where are the
provisions? Where are the Cloaths?"
George Washington to Gouverneur Morris,
10 December 1780.

OVERVIEW

The history of military transportation in the modern world is not a long one. Until the 17th century most armies lived off the land, taking what they wanted and laying waste to the rest, a cruel and wasteful practice that kept an army constantly on the move in search of supplies. In the Thirty Years War, Gustavus Adolphus of Sweden attempted to regularize supply arrangements to eliminate looting and win the "hearts and minds of the people," but was only partially effective. His opponent, the Imperial General Wallenstein, successfully established magazines and depots that fed and clothed Imperial troops in whatever region they happened to be. All his transportation arrangements were made through contractors, a practice which continued until the end of the 18th century.

At the end of the 17th century, most armies typically had a wagonmaster in their military organization. In 1645, a "Waggon-Master-General" was appointed to the New Model Army in England. In 1690, King William III had a "waggon train" of twelve vehicles regularly paid for from army funds,[1] though this was, no doubt, for his personal baggage rather than for any greater use of the army. Throughout the 18th century the British Commissary General was responsible for arranging transportation. It was this heritage that the fledgling Continental Army adopted during the War of Independence when the quartermaster general became the chief supply officer and transportation officer of the army. The 18th century concept of quartermaster was far different from that of today, because he was not a supply officer, but the chief of staff responsible for operational requirements. In 1794, the British Army established the Royal Corps of Waggoners and within the next twenty-five years most European armies

established some sort of military train. It would be more than a century before the United States Army would see a similar organization.

Even by mid 18th-century European standards, the transportation network in the North American Colonies was inadequate. Along the Atlantic coast was a small strip of settlements unconnected by any appreciable road network. Cities and towns were small and the population was relatively stationary, except for some adventurous settlers going west. For those trading with other colonies, it was faster and cheaper to go by ship. The continent's northern interior consisted of wilderness and small farms, and in the south, wilderness, small farms, and plantations. Rivers were heavily relied upon for inland traffic, even though boats and canoes had to be ported around rapids. The Saint Lawrence, the Ohio, the Susquehanna, and the Monongahela were main lines of traffic to the farmlands in the west. Traveling overland meant walking, riding, or traveling by wagon.[2]

The warfare carried out on the American continent was very limited because the wooded terrain hampered the employment of large numbers of troops. Engagements in the colonies were skirmishes or raids involving very small forces. The political consequences of a military action might be considerable, but they did not involve a great many men or a lot of resources. In the open fields of Europe a commander could hope to control 50,000 men with some degree of success. In the woods of North America, effective command was more difficult. If a European Army wanted to transport thousands of European troops to North America, it could not deploy them in a decisive mass. European armies needed large supply trains which carried flour and ovens to bake bread. Even then, subsistence had to be obtained from the countryside. Horses were another matter. A horse of average size consumed from twenty-eight to thirty-two pounds of fodder each day it could not graze, and required at least eight gallons of water. The tens of thousands of horses needed by a European army would have perished quickly in the woods of North America. Artillery needed roads or flat open terrain upon which to travel; consequently, only the lightest pieces could be employed in the interior. The light raiding party of a few hundred men easily moved through the woods carrying what few supplies it needed and using nothing but its own feet and perhaps canoes for transport. Hence, there was less need for a transportation infrastructure.[3]

Under the best of conditions, the colonies were a four-week transatlantic voyage away from Europe, which meant that troops committed to the American continent could not quickly be recalled. Europe was the main theater of war and what happened there affected what happened elsewhere. Both Britain and France were heavily committed on the continent. The French lost their colonies in the

New World and India in the Seven Years War (1756-1763), not just because they lost the war in North America but primarily because they lost in Europe. Britain had powerful allies on the continent who helped defeat France and the Royal Navy which enabled Britain to project power across the Atlantic and prevent France from reinforcing and supplying her colonies.

Four major wars were fought on the American continent before the War of Independence, each an extension of a war fought in Europe. As could be expected, the colonists had different names for them. The War of the League of Augsburg (1689-97) was called King William's War; the War of the Spanish Succession (1702-13), Queen Anne's War; the War of the Austrian Succession (1744-48), King George's War; and the Seven Years War (1756-63), the French and Indian War. To many colonists the current war was the "French War" and the previous war was known as the "Old French War." Battles and sieges were few. Most actions were raids in which settlements were burned and the inhabitants either killed or taken captive. Both sides made alliances with the various nations of Indians, and most operations included a large proportion of Indian warriors.[4]

The major wars and the dozens of actions with Indians did much to shape the English colonists' attitudes toward the French, the mother country, warfare, and themselves. In the colonists' view, the French were the enemy and were responsible for stirring up the Indians along the frontier. The French were considered a great evil that had to be expelled from the continent before the colonies could have peace. England was the mother country, but by the middle of the 18th century, an American character had already begun to develop, as had an American language, and an outlook that differed from European attitudes. The colonists perceived the English as "different." It was not yet the America of "Manifest Destiny,"[5] but the seeds had been sown. Because they were constantly involved in conflict with Indian and French raids, Americans believed that the colonial militia could handle nearly any emergency in a short time and get back to their civilian occupations. Additionally, many high ranking, aristocratic British officers of good reputation in Europe did not do well during the colonial wars. Examples were Maj. Gen. Edward Braddock, who died in the unsuccessful attempt to take Fort Duquesne (later Pittsburgh), and John Campbell, Earl of Loudoun, who failed to take Fort Carillon (later Fort Ticonderoga) in New York.

England often promised to assist the colonies, but the troops and ships seldom arrived. The campaign against Quebec was a notable exception, but it was an "English" operation that did not rely on the colonists. This lack of assistance confirmed the colonists' opinion that they had to rely on their own

resources and led to several attempts at collective security. In the long term, none were successful but it was a concept that would eventually lead to the Continental Congress.

It was not until William Pitt became secretary of state that the British government pursued a consistent policy in the colonies. Pitt believed that France could be defeated by depriving her of her colonies. While this view is questionable, it led to the ultimate defeat of the French on the North American continent. Had France been victorious in Europe, it is likely that most, if not all, of her colonies would have been restored. As it was, France suffered humiliating defeats in Europe and through her failure to resupply and reinforce French forces in Canada, she lost her settlements in North America.

THE AMERICAN REVOLUTION

The demise of French power in North America took away the main stumbling block to expansion and trade in the colonies, and colonists looked forward to an era of peace and prosperity. The king and Parliament shared a far different view. The Seven Years War had been an expensive undertaking and they did not expect to be left with the entire bill. The colonies would have to pay what England considered their fair share. The fact that the colonies had provided the lion's share of the manpower for the war in North America was not a consideration. There was a new empire to administer, which meant further effort and expense. There were also the Indians to consider because many of them had been allies in the the long wars against the French. What followed was a series of policies that legislated the political and economic life of the colonies without asking their advice or consent. Neither the king and his ministers nor Parliament saw anything wrong with this. England of the 18th century was hardly a representative democracy and since the colonists were English subjects, there was no reason why Parliament should ask their consent. The colonists, on the other hand, felt they had the rights of Englishmen. The situation was fraught with the potential for conflict.

The first policy to stir the colonists was the Stamp Act of 1765, which put a fee on every legal transaction, newspaper, and contract in the colonies, and was expected to bring in roughly 60,000 pounds sterling a year. The colonists overwhelmingly opposed the Stamp Act, and after demonstrations, boycotts, and riots, the act was repealed. The Stamp Act did two things: In England, it created an attitude that the colonists were too independent and needed to be brought to heel. In the colonies, it led to the organization of the "Committees of

Correspondence," groups who found common cause in sharing information and opposing the oppressive acts.

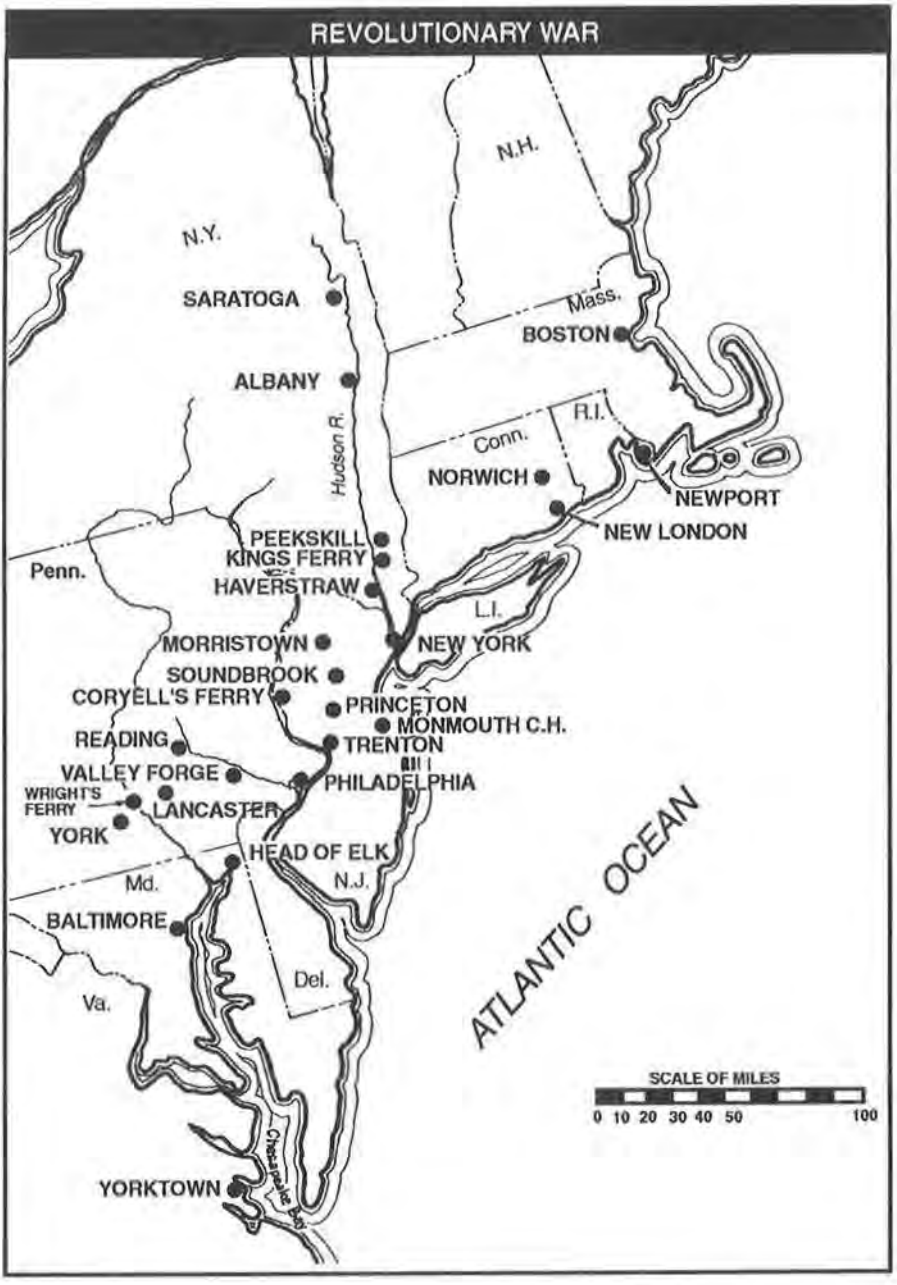
Other policies also brought the colonies and mother country closer to conflict. The Crown declared everything west of the Alleghenies Indian country and colonists were not permitted to settle there. Coin was in short supply and the colonies were forbidden to print paper money. Rules and regulations on trade and shipping were made for merchants in England, and colonial merchants found themselves put out of business at the stroke of a pen. For example, colonists had long been trading American barrel staves to the Portuguese for Madeira wine. The authorities in London ruled that according to the long standing Acts of Trade and Navigation, the colonists could only buy Madeira from licensed distributors and could not trade directly with the Portuguese. Profitable businesses were threatened and the colonists were forced to pay artificially high prices. Custom duties that had been previously ignored were now vigorously enforced by the Royal Navy. Citizens in the colonies were required to quarter soldiers in their homes and businesses. The Townshend Acts attempted to tax paint, lead, paper, and tea. After the colonists protested, the taxes were repealed except for that on tea. The main purpose of the tax on tea was to bolster the faltering East India Company, but soon the colonists began a tea boycott. In Boston, a group of citizens organized a different form of protest. On the night of 16 December 1773, several hundred "Sons of Liberty," dressed as Mohawk Indians, boarded three tea ships anchored in Boston and dumped their cargo into the harbor.[6]

After additional "tea parties," the authorities in London determined to put an end to the colonists' disobedience. In March 1774, Parliament passed a bill closing the Port of Boston on 1 June 1774. This made the colonists even more hostile. After more protests and boycotts, militia units began preparing for possible conflict. In September 1774, the first Continental Congress convened. On 18 April 1775, General Thomas Gage, the British commander at Boston sent 700 troops under Lt. Col. Francis Smith to seize militia supplies at Concord. The following morning the Lexington militia blocked their path. Just who fired the first shot no one will ever know, but after the first volley eight Americans lay dead and ten wounded. The militia from surrounding communities marched to the area forcing the British to retreat to Boston with heavy casualties. The American War for Independence had begun.[7]

The war was what few envisioned. To the English it was little more than a domestic dispute. They intended to teach a small minority of their disobedient subjects a much needed lesson, which wouldn't take much in the way of time or

resources. The colonists were torn between those who demanded absolute loyalty to the Crown and those who felt the time for independence had come. Even after hostilities commenced, many were undecided. On 5 July 1775, the Continental Congress sent an appeal known as "The Olive Branch Petition" to the king and Parliament requesting reconciliation. On 23 August 1775, weeks before he received the petition, King George III declared the colonies in rebellion. From that point what has become known as the American Revolution assumed a broader character. First, it was not just a grievance against England about taxes and other acts, it was a war for outright independence and it forced people to take sides. Although they were not radicals, many Americans opted for independence. One aspect of the war that changed very quickly was its local nature. The American Revolution started just prior to the outbreak of the War of the Bavarian Succession in Europe. It would draw France, Spain, and Holland into the war on the side of the emerging nation. These powers had less love for liberty than the Americans, but they wanted revenge against their old enemy England, and the war in America was a golden opportunity to get it. The war became truly international in 1778, when France recognized American independence. A month later, a French fleet sailed to New England to support the new nation. Throughout the war, the French sea and land force augmentations and logistical support were critical to the American war effort. Even before French recognition, the European officers who volunteered to serve on the American side lent an international flavor to the war. Most of them were adventurers with questionable talent, but a few like Marie du Motier, Marquis de Lafayette, Tadeusz Kosciuszko, Johann de Kalb, and Baron Friedrich Wilhelm von Steuben proved invaluable. Enlisted foreign volunteers were limited by the high cost of passage to the colonies. (Map 1).

The colonists' first task was to build an army. The thought of a professional army was an anathema to Americans, and it would be 1778 before well-trained, long-service, Continental soldiers could stand up in battle to British infantry. The Continental Army evolved from the militia organization of the colonists and reflected many of its strengths and weaknesses. Most colonists felt they could serve for a short term and return home, and expiring enlistments were a major problem when George Washington took over the Continental Army in 1775. One of the positive aspects of the colonial militia was the fact that a great many men could use firearms and had some experience during the numerous Indian campaigns. After the actions at Lexington and Concord, the Massachusetts Provincial Congress raised a militia of some 13,000 under Artemus Ward, a veteran of the French and Indian War, and laid siege to Boston.


REVOLUTIONARY WAR
N.H.
N.Y.
SARATOGA
Mass.
BOSTON
ALBANY
Hudson R.
R.I.
Conn.
NORWICH
NEWPORT
NEW LONDON
PEEKSKILL
KINGS FERRY
Penn.
HAVERSTRAW
L.I.
MORRISTOWN
NEW YORK
SOUNDBROOK
CORYELL'S FERRY
PRINCETON
MONMOUTH C.H.
READING
TRENTON
VALLEY FORGE
PHILADELPHIA
WRIGHT'S FERRY
LANCASTER
YORK
HEAD OF ELK
Md.
N.J.
BALTIMORE
Del.
Va.
ATLANTIC OCEAN
SCALE OF MILES
0 10 20 30 40 50 100
Chesapeake Bay
YORKTOWN

Map 1.

In June 1775, the Continental Congress took over the New England Army besieging Boston and reinforced it with militia from Pennsylvania, Maryland, and Virginia, the first soldiers drawn from outside New England. The Continental Congress thereby established the Continental Army and asked George Washington to become its commander in chief.[8]

The Revolutionary War encompassed most of eastern North America, from Montreal and Quebec in the north, to the southern colonies of South Carolina and Georgia where strong Loyalist sympathies and support of British efforts resulted in a civil war. In the west, British Lieutenant Governor of Canada Henry Hamilton sent Indian warriors to pillage the frontier settlements in present day Kentucky and Illinois, and earned the sobriquet "Hair Buyer" by paying a bounty on settlers' scalps. For the first two and a half years of the war, settlers in the Ohio Valley suffered terribly from Indian plundering. The frontiersmen fought back, but to no avail, until a 25-year-old Virginia militia officer, Col. George Rogers Clark, organized them. In a daring series of attacks, Clark and his men gained control and pushed the British out of what later became the American Northwest Territory. In the south, there was limited activity. In 1776, the colonists drove off a British force attempting to seize Charleston and defeated the British at Sullivans Island. The Southern Department operated as a more or less independent command under Maj. Gen. Charles Lee and later Maj. Gen. Robert Howe until 1779.[9]

During the early years of the war, the main elements of the Continental Army and supporting colonial militia under Washington fought mainly in the New England and Middle Atlantic department areas. After driving the British from Boston, Washington marched to New York to keep that important area from British control. Supported by the Royal Navy, Maj. Gen. Sir William Howe rapidly defeated the inexperienced Continental Army and drove it from New York and New Jersey. Washington showed his understanding of the political and military situation by refusing to become decisively engaged unless he had a good chance of winning. His surprise attack at Trenton on Christmas Day 1776 and his victory at Princeton drove the British from New Jersey and provided fresh inspiration for the colonists. Washington also supported two abortive invasions of Canada in the last half of 1775 in an attempt to influence Canadian support of the Revolution, but the Canadians remained loyal to the king. In the spring of 1777, Washington was forced to send some of his best leaders and soldiers north to counter a three-pronged British invasion. The main thrust consisted of an advance by Maj. Gen. John Burgoyne south along Lake Champlain. Lieutenant Colonel Barry St. Leger was to move east along the

Mohawk, and Howe was to proceed north from New York. The objectives were Albany and the Hudson River. British control of the Mohawk and Hudson would split New York from New England and the northern colonies from New Jersey and points south. Initially, the plan worked well and the British took Fort Ticonderoga, but Burgoyne's movement slowed rapidly due to inadequate transport, insufficient supplies, and bad weather. Howe, instead of supporting Burgoyne, moved south to besiege Philadelphia. After suffering severe losses at Freemans Farm and Bemis Heights, Burgoyne withdrew to Saratoga where he was forced to surrender. The political consequence of this American victory was an alliance with France. From that point on, the north became a theater of secondary importance, troubled only by raids made by Tories and Indians.[10]

The British continued to win tactical victories but suffered heavy losses and were unable to destroy Washington's army. The continued survival and occasional victories of the Continental Army provided an inspiration to the colonial population. Even more importantly, the lengthening war was consuming British resources that were needed elsewhere. Washington's tactics also restricted the British from moving at will through the area and from using the countryside as an effective source of supply. In 1779, the stalemate in the north and the entry of the French into the war on the colonists' side compelled the British to shift the focus of their efforts to the south.

A southern strategy offered a number of distinct advantages, one of which was the large number of Loyalists in the south. In December 1779, the British, under Lt. Col. Archibald Campbell, seized Savannah and overran the rest of Georgia. After much maneuvering and several battles, Sir Henry Clinton finally laid siege to the city of Charleston in April 1780. A spirited defense of the city was conducted by Maj. Gen. Benjamin Lincoln, but the city fell in May. Lincoln was partly influenced by the city fathers who didn't want to see the city destroyed. The fall of Charleston was a severe blow to the colonists and the harsh terms of surrender deprived them of over 5,000 troops and much needed war material. It also encouraged those with Loyalist sympathies to actively come forward and support the British. Clinton's base in the south was established and he tried to exploit the situation by offering a pardon to all who actively supported the British. This measure backfired by requiring colonists to choose sides rather than being noncommittal, as many were.[11]

Clinton returned to New York, leaving Maj. Gen. Earl Charles Cornwallis, an experienced officer, in charge. The situation looked favorable to the British, but shortly after Clinton left, the area erupted into civil war pitting the British regulars and Loyalists against the American regulars and the local Patriots.

However, the bulk of the fighting occurred between the Patriots and Loyalists rather than between American and British regulars. A strong leader was needed to rebuild the southern army and Washington wanted Nathanael Greene for the post, but the Continental Congress did not consult Washington and appointed Horatio Gates, the "hero" of Saratoga to the position. Gates proved to be a poor choice. He fought his first battle in the south against the British at Camden, South Carolina, on 16 August 1780, against the advice of his subordinate, de Kalb. Gates fled the battlefield after the initial assault, leaving his subordinates to their fate. The American loss was 800 men killed (including de Kalb) and wounded, and 1,000 captured. The loss at Camden and at Fishing Creek two days later ensured British control of South Carolina and paved the way for the British invasion of North Carolina. The only bright spot during this period was the Battle of King's Mountain in which a colonial force of 1,400 men killed, wounded, or captured 1,000 Tories under British Maj. Patrick Ferguson, effectively crippling the Tories in the Carolinas.[12]

In December 1780, the Continental Congress appointed Maj. Gen. Nathanael Greene to command in the South. Greene, a proven combat commander, had been serving as the Army Quartermaster General since early 1778. He was the right man for the job and his appointment proved to be the turning point of the colonists' fortunes in the South. In a series of battles at Cowpens (17 January 1781), Guilford Courthouse (15 March 1781), and Eutaw Springs (8 September 1781), as well as many smaller engagements, American forces caused the British heavy losses. The British army was so weakened that it could not continue the campaign and was forced to retire to Charleston and Savannah. By September 1781, Cornwallis' army was where it had started a year and a half before with nothing to show for its efforts but months of hard campaigning and heavy losses.[13]

Early in 1779, Cornwallis recognized that Virginia was the key to splitting American forces and made strong recommendations to Clinton, in New York, to open a Virginia Peninsula campaign. Clinton was not convinced and did not want to leave New York open to attack by General Washington, but he did send an 1,800-man force that pillaged the area and occupied Portsmouth. Later a force under Benedict Arnold, now a British brigadier general, sailed up the James River to Westover and burned much of Richmond. That action was followed by a 2,600-man force under Maj. Gen. William Phillips on a raid into Petersburg, which Phillips' force sacked. Washington reacted by sending Lafayette, with 1,200 men, to prevent Phillips from further burning Richmond. Washington later sent a force under Anthony Wayne to augment Lafayette. The total force then

reached about 5,000. In May 1781, Cornwallis arrived with a force of 3,500, and after some sharp skirmishing with Lafayette, occupied Yorktown which provided a deep water port for the British fleet and troop debarkation area for planned reinforcements.[14]

Meanwhile, Washington and the French commander, the Comte de Rochambeau, concluded that an attack on Clinton in New York could not be successful. The French fleet, in the Battle of the Virginia Capes, defeated the British fleet, which returned to New York. This opened the possibility of trapping Cornwallis' forces on the Peninsula. Washington, in great secrecy, moved his American troops and the French force under Rochambeau from the mission of investing New York to the Virginia Peninsula to join Lafayette. The combined force, further augmented by 2,500 soldiers landed by the French fleet, was more than sufficient to undertake a siege of Cornwallis' force in Yorktown. The success of the siege compelled his surrender on 19 October 1781. Washington designated General Lincoln, who had been humiliated by the British at Charleston, to give the surrender instructions that were made as harsh as those imposed on Lincoln.[15] The surrender at Yorktown did not end the war but caused the downfall of the Lord North ministry. In the subsequent Peace of Paris on 3 September 1783, the British Crown acknowledged the United States "to be free, sovereign and independent."[16]

COLONIAL TRANSPORTATION

With an inadequate transportation system, the colonies developed independently, were self-supporting, and were accustomed to solving their own problems. Stage lines connected major ports and the largest towns; however, trafficable north-south roads were scarce. An exception was the Great Philadelphia Wagon Road that followed the Appalachian Warriors' Path which extended west from Philadelphia to Hagerstown, Maryland then south through the Shenandoah Valley and the Carolinas to Georgia. The road was the main artery for thousands of English, Scotch-Irish, and Germanic settlers who migrated to America and claimed lands in the interior. Many key battles of the Revolution were fought along its route, which became the western front of the war in the South. A portion of Washington's line of communication (LOC) followed the road.[17] None of the improvements in roads helped much in terms of overland communication. For example, a messenger from the Southern Department in Charleston, South Carolina, took over thirty days to reach Washington's headquarters, whereas the British, with their control of the seas could sail from Boston to Savannah in eight days.

In the western and Canadian areas, human bearers, pack horses and sometimes wagons, canoes, and bateaux provided the primary transportation modes. Some rivers required frequent portaging of rocky stretches and falls that greatly reduced the throughput on those routes. Not only were travelers required to man-carry the contents of each craft, but the craft itself. The climate had a substantial impact on transportation operations. In winter, snow and ice made poor roads worse. Navigable rivers and bays were frozen, and animals were prevented from grazing. In summer, the heat lowered productivity, but did not stop operations as in winter.

The need to organize, control, equip, and man transportation resources was evident as soon as the war began. Until Congress decided to form an army from all of the colonies, no organization had been required. Logistics support of militia had been the responsibility of the British Army when colonists served as auxiliaries to British regulars. When the British Army was not involved, the colony or the individual militiaman was responsible for support. The militiaman habitually carried his own food and water on his back. Sometimes a small supply train was provided, but more often support was contracted. Sutlers also followed the troops. In some instances, the colonies appointed a temporary commissary general or quartermaster to manage support for a campaign.

The British model of organizing staffs for administrative and logistical support was adopted by the Continental Congress because it was the one used during the colonial wars and was described in military texts available at the time. On 16 June 1775, the Second Continental Congress authorized a Quartermaster General (QMG) for the Army as well as other administrative and technical staff officers such as the engineer.

The largest and best organized civilian managers of transportation were the ship owners and merchants in the ports and large towns. The merchant served as the shipper, banker, wholesaler, retailer, warehouseman, and insurer. More and more as the colonies matured, merchants acted as agents for others and employed specialists in key areas. These merchants usually owned or contracted for land transportation of their goods and passengers. The Continental Congress and the Army drew heavily on the merchant class to provide not only the resources but also the teamsters and vessel crews.[18]

No substantial technological improvements in transportation occurred during the span of the wars for empire in North America and the Revolution. The Continental Army did make improvements in managing transportation by centralizing control of some resources, planning requirements in advance, and staging assets. European forces had long used those techniques effectively, but

they had not been well exploited in the dispersed colonies. Throughout the war, the soldier, carrying a pack of about sixty pounds, was the main source of transportation for his own logistical support. He carried rations, cartridges, spare clothing (if any), and water. Many of Washington's surprise maneuvers and withdrawals to avoid potential disaster depended on foot-soldiers rapidly marching 10 to 30 miles, frequently in the dark. "Shanks mare" was a primary source of transportation.

The colonies used water transportation extensively and effectively, particularly in coastal and international commerce. Transportation to the interior areas served by navigable streams or rivers, and between coastal ports, was almost wholly by water. The Continental Congress recognized the advantages of water movement by directing the Army to use this method as first choice in mode selection. Sloops and schooners were used on large rivers and for coastal movement. On less navigable rivers and lakes, canoes, skiffs, bateaux, and flatboats carrying forty passengers or cargo provided lift. In rare instances, such as operations on Lake Champlain, large vessels for naval warfare and logistics were built on site and provided a significant capability.[19] The time and effort required to travel along marginally navigable streams made some of the routes as costly as road movement for military forces. British control of the oceans impeded American movement on the high seas, but the vast distances in America provided substantial opportunities to evade British interdiction, particularly in intercostal and river movement. Washington's line of communication and reserve depots were generally above the head of navigable rivers to provide some protection from British water-borne raiding parties, while capitalizing on water transportation for the preponderance of the journey inland from coastal supply sources. In spite of its advantages, water transportation did not play a major part in troop support in most campaigns other than ferries across water barriers, because of British control of the seas. Tactical movements by water were limited to situations where it was the only solution or security was ensured. Movement of supplies by water was used whenever possible and contributed measurably to the logistical support of Revolutionary forces.[20]

Horses were the main source of motive power for cavalry, artillery, and logistical support. Ox teams were also used when available, particularly to transport large, heavy loads such as siege guns and bateaux. Using animals for transport required hay and fodder to maintain them. The challenge to keep horses in food took proportionately more effort in colonial times than it would today to keep a modern mechanized unit fueled. For example, in 1778 the Continental Army's organic horses (artillery, cavalry, officer mounts, and unit

wagons) ate more than 253,000 bushels of grain and 2,500 million tons of hay, a consumption rate of over 6,800 tons a day for a small army. In carrying capacity, that was the equivalent of more than 1.3 million gallons of liquid fuel, enough to keep a modern armored division on the move for a day.[21] Since hay was light, it would fill the wagon to capacity long before it reached the weight limit, resulting in the need for more wagons.

The massive need for wagons to support army units was not recognized in the early years of the Revolution. Most citizens built their own wagons using lumber they timbered and dressed into planks. They could barter or pay for the services of a wheelwright or blacksmith to shrink on the iron tires, but building a wagon was in the same general category of building a house, canoe, or bateaux. The skill was an essential requirement for living on the frontier. Small manufacturers made carriages, special animal-drawn vehicles and wagons for those whose time was too valuable for such chores and who could afford the price. The *Cadillac* of wagons was the Conestoga, which would later contribute to the opening of the West. Manufactured in the Conestoga Valley of Pennsylvania it was available for general purchase. However, with an empty weight of up to 3,500 pounds, and a prewar price of about $250 plus $1,200 for a six-horse team, it was too bulky and costly for Army needs.[22]

Both Washington in the north and Major General Charles Lee, in the south repeatedly asked for funding for wagons to move supplies, unit ammunition, and impedimenta. In early 1777, Washington authorized the purchase of one wagon per eighty men. The authorizations were filled very slowly and haphazardly, but as the wagons became available they lessened the soldier's load. Washington also authorized wagons to each battalion for baggage, ammunition, and entrenching tools, thus greatly improving unit mobility. He also ordered the development and purchase of lightweight, strong, two-wheeled wagons to carry artillery and regimental ammunition that would not encumber movement as heavy and unwieldy wagons did. Brig. Gen. Henry Knox, the Army Chief of Artillery, and Quartermaster General Mifflin initiated both procurement and in-house production—an early research and development (R&D) initiative. An example of the magnitude of animal-power required was the Chief of Artillery's estimate of the need for horses for 1778 campaigns: One-thousand and forty-nine horses to pull 106 field pieces, 50 ammunition wagons, and 60 spare ammunition wagons, along with necessary harnesses. By any standard, that was not a large artillery train, but it illustrated the large number of horses required for just a few guns and vehicles. [23]

A chief of staff was not appointed because in the practice of the 18th century, the quartermaster performed that role. The course of the war demonstrated that a strong coordinating officer was essential to relieve the commander in chief from the massive paperwork; however, the idea of a chief of staff as a manager was a concept foreign to the 18th century. The Continental Congress departed from the British model by not authorizing an independent executive agency similar to the War Office in London. Throughout the war, the Continental Congress was unable to get the colonies to agree on the scope of authority and support the operations of the centralized Board of War, a Congressional agency first established in mid-1776. Due to this lack of agreement and the fact that plans and orders for support of the Army depended totally on the allocations of funding, the Congress managed support of the war "by committee." This was a major frustration that Washington and his semi-independent commanders in the South had to face throughout the war.

The Continental Congress generally allowed Washington to appoint his own staff officers, although it sometimes reserved that privilege for itself. On 9 August 1776, Washington appointed John Goddard of Massachusetts as Wagonmaster General and five days later appointed Maj. Thomas Mifflin of Pennsylvania as Quartermaster General. Mifflin later appointed Goddard as one of the wagonmasters in the three-unit structure he established to provide quartermaster support. Mifflin and subsequent Quartermasters General had difficulty finding and recruiting effective wagonmasters general. That was one of the crucial factors contributing to land transportation problems in the early years of the war. A wagonmaster was also authorized as an element of the Quartermaster General for the headquarters of each division of the Army. The Army followed the Continental policy of hiring wagons for "general" transportation use and initially had no organic resources. The wagonmasters acted as contracting officers, allocators of limited resources, and the agency to impress wagons from the populace in emergencies. The system limped along, but its weaknesses were recognized by Washington and his commanders. The wagon situation became acute following the hasty withdrawal of Washington's main army from Long Island in late 1776, when almost all wagons were left behind. Only by impressment were enough wagons obtained to support the subsequent evacuation of New York City.

When General Washington authorized organic wagons to improve unit mobility, the Quartermaster General and Chief of Artillery procured the materials and began in-house fabrication of them. This was a real milestone in enhancing Army mobility, but it was not until May 1777 that the Continental

Congress took the first step in the direction of a "transportation corps" by authorizing a Wagon Department headed by a wagonmaster general and a wagonmaster in each military department. However, the officials continued to have authority to acquire wagons only after direct approval by the Commander in Chief, or the Quartermaster General and his principal assistants. Filling the jobs with competent people continued to be a problem. Key positions remained vacant for months. The breakdown of wagon transportation at Valley Forge resulted in a congressional committee report that almost every species of camp transportation was performed by men, who patiently pulled homemade carriages, or loaded wood and provisions on their own backs. The Continental Congress again attempted to correct the situation, but were thwarted by the reluctance of the individual colonies to support measures for the general good of the men. Instead they pointed at inefficiencies and corruption in the military.

The appointments of James Thompson as Wagonmaster General in December 1777 and of Nathanael Greene as Quartermaster General in March 1778 resulted in improvements in organization, reporting, and accounting, thereby making requests for support more credible.[24] Innovative methods were attempted to improve supply and transportation, but most failed because of inadequate funding and unreasonable congressional limits on the prices the Army could pay for goods and services. Civilian teamsters would not work for the pay scale allowed, so soldiers were detailed from line units to drive the wagons. Few soldiers had experience in military wagon driving and no attempt was made to train them. To make matters worse, the soldiers detailed hated the assignment and often abused both the animals and equipment, further reducing lift capability. While the abuse stemmed mainly from ignorance, it was sometimes done to get the soldier released from the detail. Pervasive funding shortfalls drove commanders and staff officers to all manner of expediency. Some went into personal debt, while others sold part of the shipments to pay for moving the remainder. At a critical time in 1781, Washington personally diverted part of the funds received to pay troops to transport food to troops in the field.

For the remainder of the war, there were never enough wagons to meet requirements, and the Army's mobility and resupply efforts suffered despite herculean efforts by subordinate commanders and Wagon Department personnel. Regardless of the tribulations, organization and development of policies and procedures continued in the Wagon Department, and authorizations for some organic personnel were funded. By 1780, the Wagon Department, the genesis of the Transportation Corps of today, had expanded to include offices

not only with the main army and geographical military departments, but some offices with the deputy quartermasters general assigned to districts. There were 11 deputy wagonmasters general; 108 enlisted wagonmasters, along with three from the line and two hired civilians; 256 enlisted wagoners, 104 from the line and 272 hired civilians; 45 hired packhorse masters; and 26 hired pack horsemen. All were employed on a salary. In 1780, the monthly payroll was $72,371 a very respectable showing for the first "Transportation Corps," as the bulk of its lift capacity was obtained by contract.[25]

The appointment in February 1781 of Robert Morris, a businessman, as Superintendent of Finance to head the Treasury Department was a principal factor in transportation success in the closing campaigns of the war. Morris' exceptional organizational abilities and thorough knowledge of business operations made it evident to him that the first order of business to solve the country's financial problems was straightening out Army logistics. Morris was the catalyst in the successful move of 2,000 American and 4,000 French forces to Yorktown. The French Navy and financial support throughout the campaign were indispensable to Washington's achievements at Yorktown.[26]

No military operation or war in the two centuries since the Revolution encountered problems of the magnitude faced by Washington, his limited staff, and his commanders. The most significant problem was the instability and continuing depreciation of the Continental dollar, coupled with the lack of funding for necessary staffing. The second most serious problem was the failure of colonies to provide support, associated with congressional interference with policies and procedures threatening to bring operations to a halt. Those challenges were overcome by inspired leadership using every wile and source of support for resources. Continuing prioritization of requirements and deferral of non-urgent needs involved belt-tightening to the level of semi-starved, ill-fed, ill-clothed, poorly shod and badly housed soldiers with limited ammunition. All this was mitigated by support from patriots and colonial governments, other than that levied by the Continental Congress, but it was never enough. [27]

Campaigns in which transportation played a crucial role generally involved small forces, were of limited duration, and covered comparatively short distances. Long-range campaigns were almost impossible to support. The Canadian campaign involved two different routes and forces of about 1,000 men traveling several hundred miles by road and water. Other campaigns followed the pattern of most frontier campaigns—small march elements, maximum use of navigable water routes, small unit trains transported by boat, and maximum load carried by the troops. These campaigns demonstrated the need for planning,

advance preparation, careful route reconnaissance, internal communications, and competent leadership. The 450-mile march to the Virginia Peninsula was the biggest long-distance move of troops and impedimenta in the war.[28]

Fundamental lessons were learned from the study of Revolutionary War transportation. The management of military forces had to be handled by an executive agency, apart from Congress, and with the authority to allocate funds from congressional general appropriations. The use of civilian contractors to perform services required legislation by Congress to make civil contracts enforceable. The colonial structure, with individual colonies and their delegates to the Continental Congress developing operating rules and authorizing funding was unworkable. Regardless of how well meaning the participants might be, personal and individual colony interests overrode or blocked support of painful and expensive courses of action which were best for the nation as a whole.

The detailing of line troops to perform service functions without proper training and motivation demoralized the troops, wasted equipment and supplies, and failed to provide the continuity and reinforcement of skills gained by sufficient staffing. An executive agency was needed to manage support through realistic authorizations and missions. The Army could not be expected to operate with the reduced resources and a declining currency depreciating in value. Support of the Army by expropriation and impressment of civilian resources turned many patriots away.

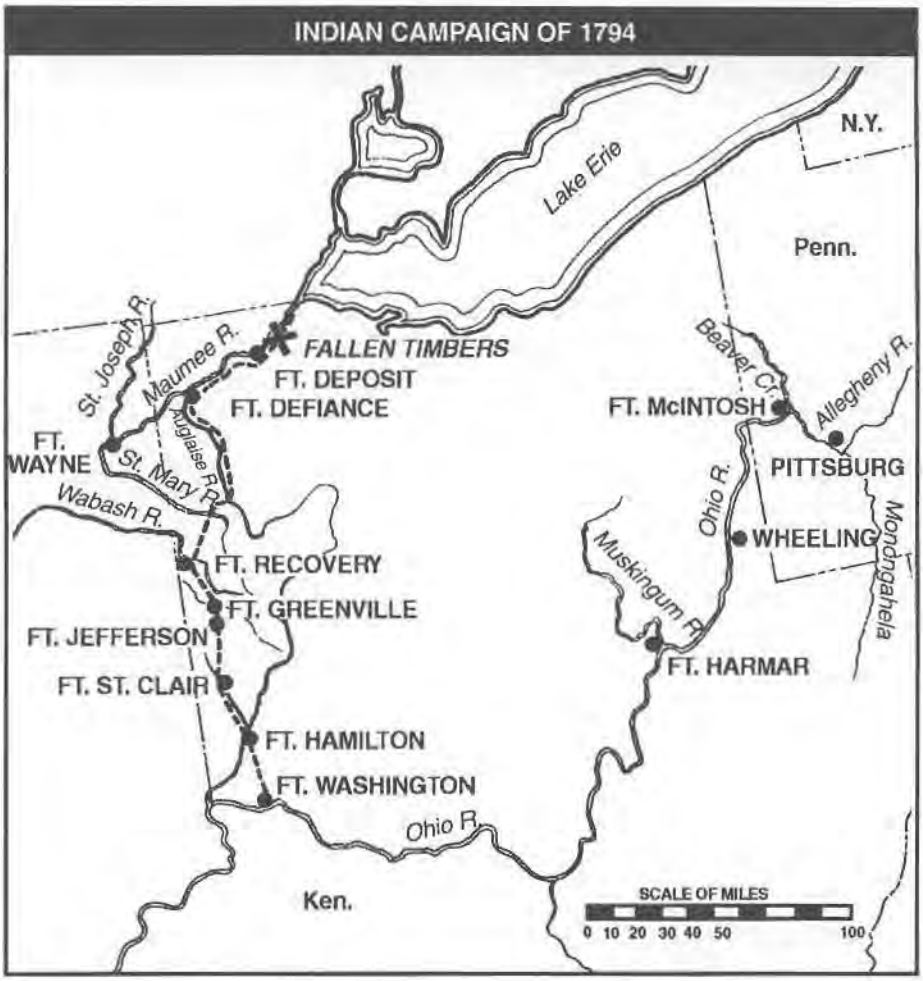
POST-WAR OPERATIONS

The Yorktown Campaign was adequately supported and highly successful and should have been the model for logistical support of future operations by the Army, but this was not the case. Even though the British still had large forces in the country, and the war did not officially end until September 1783, the Continental Congress moved quickly to disband the Army. The fear of a standing army was still strong, and the desire to curb spending was overwhelming. By mid-1784, the Army was virtually disbanded. The Continental Congress authorized a force of 25 privates to guard supplies at Fort Pitt and 55 more to guard stores at West Point and "other magazines." No officer higher than a captain was to be appointed. The defense of the nation was to be provided by the militia of each state, called to federal service. The office of the quartermaster general was abolished in 1785 in keeping with the European and Colonial concept that a staff was unnecessary in peacetime. The Wagonmaster General also disappeared at that time.

The Articles of Confederation, the first attempt at establishing a government, became law in 1781. The Articles gave the national government the power to manage the affairs of the nation, but it could only do so with the unanimous approval of the states. This arrangement quickly proved unworkable. In 1787, a convention held in Philadelphia resulted in the drafting of the Constitution, which was ratified in 1789. The War Department was established the same year, initially with limited authority including responsibility for military stores. However, with no guidance on the composition of the Army or its funding, the Army began to grow and by 1792 reached a strength of 5,000. Over the next decades, logistics concepts and procedures developed and matured gradually with the growth and activity of the Army. Staff positions still were considered only a wartime need.[29]

Congress ignored the fact that the British continued to hold frontier posts that were supposed to be given up at the end of the Revolutionary War. Allied with the British were the Indians, who continued to raid settlements on the frontier. Campaigns against the Indians in late 1790 (Map 2) made it increasingly evident that logistics management would have to be bolstered. A combined force of 320 regulars and 1,133 militia were badly defeated by the Indians at Fort Wayne, primarily because commanders ignored logistics lessons learned in the Revolution. A prime mistake was attacking too late in the year and not providing fodder for the animals to make up for their inability to graze after frost killed the grass. Other errors could have been prevented by elementary logistic planning. A second similar expedition in 1791, under Maj. Gen. Arthur St. Clair, governor of the Northwest Territory, fared even worse due to the negligence of the supply contractor, poor logistics planning, and poor timing of the attack in early winter with no forage for the animals. St. Clair's force was defeated with a loss of over 600 men. The Indians' victory gave them hope of regaining their lands to the east and they formed a new confederation. They were also led to believe they would receive support from the British. Settlers began to evacuate the frontier.

The Army, reduced by lack of funds, was in terrible shape. It was lax, undisciplined, and riddled by desertion. It was up to Maj. Gen. Anthony "Mad Anthony" Wayne to correct the situation. In 1792, on Washington's recommendation, Wayne was placed in charge of the Legion of the United States. It was not an easy task, but he whipped this new force into shape, instilling it with discipline, esprit de corps, and training it for combat. His mission was to defeat the Indians and make peace. Supporting Wayne and his troops was James O'Hara, a Pittsburgh businessman appointed Quartermaster



Map 2.

General who was intimately familiar with the problems in the west. Also, Congress authorized Wayne an even more valuable asset—time to make preparations and train his troops. O'Hara made exceptionally thorough, timely, and complete plans. In late 1792, he added a Wagonmaster General responsible for all public teams and drivers. He also added a superintendent of packhorses to ensure past heavy losses of horses were stopped. This was done by following specified procedures for each march, through inspections and other preventive measures.[30]

Wayne continued his preparations through September 1793. When he was notified that efforts to make peace with the Indians had failed and military action was the only option, Wayne moved his forces to Fort Jefferson and encamped

nearby. The Secretary of War ordered him to establish winter quarters, as President Washington did not want to risk attacking too late in the campaigning season. There was also the problem of support. Despite O'Hara's excellent preparations, the contractors either did not fulfill their obligations or fulfilled them so slowly that requirements were barely met. Wayne reported the "absolute necessity of some effectual and certain mode of supplying the Army than that of private contract."[31]

Training, advance preparation and good leadership finally prevailed. When the Indians began their attacks in the summer of 1794, Wayne engaged and defeated them at the Battle of Fallen Timbers. Casualties on both sides were light, but the Indians lost their sense of invincibility and found the British would not support them by openly fighting the United States. Wayne established forts to sustain peace, as set forth by the Treaty of Greenville in August 1795. The Jay Treaty signed in 1794 had already provided for the British evacuation of all their northwestern posts. With these two actions, the settlers in the area enjoyed security for the first time.

From 1798 to 1812, the Secretary of War dominated logistics operations. Troops were dispersed in company strength to forts along the frontiers in the western and Great Lakes areas. Most troop support was provided by contractors, including such services as procurement and delivery of rations and other supplies. Contractors also furnished quarters and provided transportation for recruits. The Army's organic procurement and storage capabilities were centered in Philadelphia, so the transportation function was also located there. Transportation management increased dependence on the knowledge of traffic management and contracting. Supplies for outlying posts were moved to maritime posts by commercial coastal vessels, contracted wagons, or packhorse (in winter) to Pittsburgh. They then went by Army flatboats that carried 25 to 30 men and 3 to 4 tons of cargo to posts on the Ohio and Mississippi Rivers. For posts on the Great Lakes, cargo went to New York and then by water to Albany.[32]

In 1802, the budget ax again fell on the office of the Quartermaster General when Congress eliminated Army staff positions and substituted military agents in each of the Revolutionary War geographical departments. The agents directed transportation of shipments from origin to storage or the posts. All contracts for rations were arranged by the Secretary of War, and for other supplies, only as approved by the Secretary of War or the Purveyor of Public Supplies of the Treasury Department. The Louisiana Purchase in 1803 greatly expanded U.S. territory in the west and required further dispersion of the Army of about 3,000

men. The system of close control by the Secretary of War was workable during peace for a small army but would be unable to support wartime requirements, as was proven in the War of 1812.

The War of 1812 found the United States totally unprepared even for the limited conflict that was to take place. The Army had been cut back and operations were limited to peacetime routine. In May 1812, Congress reestablished the Quartermaster Department under a Quartermaster General, who had a staff and a corps of officers, but the reorganization took time. Once again, the War Department relied on contractors for the majority of its transportation and was once more disappointed. The transportation challenges and obstacles during the War of 1812 were little different from those of the Colonial and Revolutionary Wars, and the war ended without any significant change in either transportation doctrine or transportation equipment.[33]

CHAPTER II

1815 - 1848

"With our depots farther from the sources of supply
than is Algires from Toulon or Marseilles, we have accomplished
more in the first six months of our operations in Mexico,
than France, the first military power in Europe,
had accomplished in Algeria in seventeen years."
Brigadier General Thomas S. Jesup,
QMG Annual Report 1847.

OVERVIEW

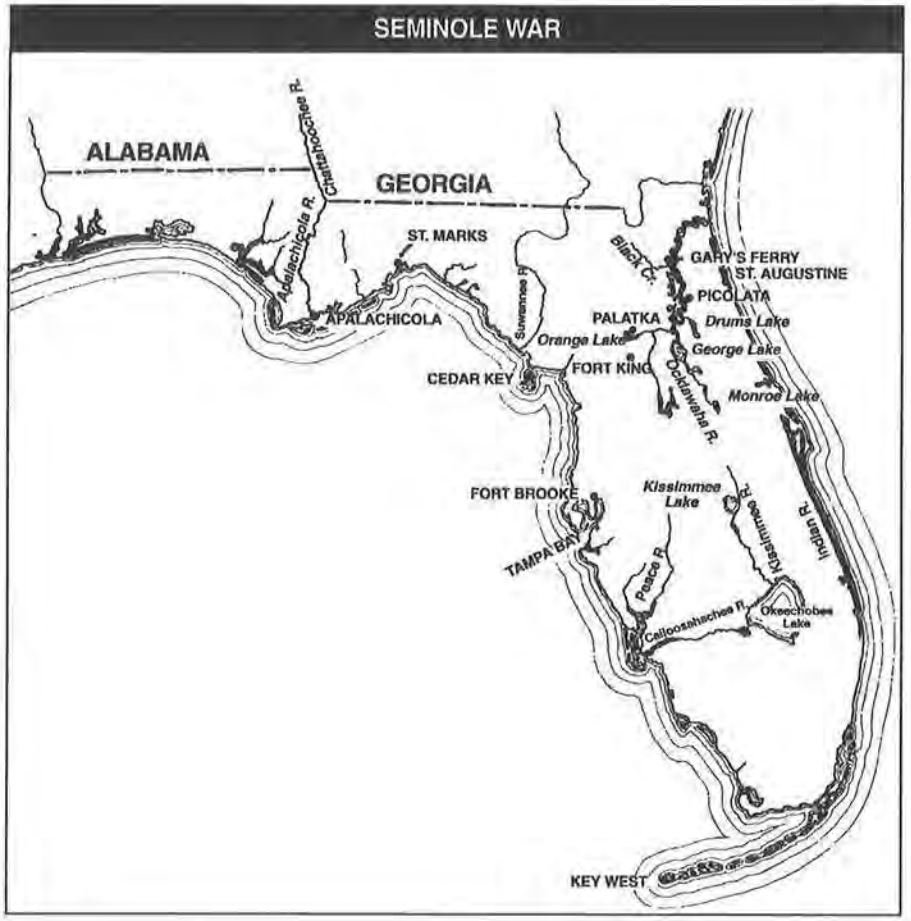
At the end of the War of 1812, Congress hastily dismantled the Army by cutting its strength from 60,000 to 10,000. Three decades after the Revolution, Congress and the people were still wary of any large military establishment. Furthermore, a large army was seen as an unnecessary expense. An attempt to return the Army to its prewar configuration was thwarted by William H. Crawford, Secretary of War from 1815-16, and his successor, John C. Calhoun, who was Secretary of War from 1817-25. Both were strong and imaginative men who recognized the need for a permanent Army staff and kept the issue before Congress. In 1818, Calhoun convinced Congress to pass a law that provided for the organization of the Quartermaster, Subsistence, and Medical Departments. This law had a profound effect on Army supply and services for decades to come. Calhoun strongly believed in a permanent peacetime staff and successfully opposed attempts to return to the contract system, which had proved deficient.[1] Even so, 10,000 men were too few for the Army to perform its assigned tasks well. No permanent staff was authorized, but several developments were underway that provided the Army with a solid organizational foundation to support it in the Second Seminole War (1836-42) and the Mexican War (1845-47).

In May 1818, Calhoun selected a 29-year old Colonel of Infantry, Thomas S. Jesup, for the post of Quartermaster General. Jesup, known as the "Father of the Quartermaster Corps," served as Quartermaster General for 42 years,

eventually reaching the rank of major general. He was a man of action who viewed his position, in an 18th century sense, as that of a commander and chief of staff. During the Seminole War, he actually commanded troops in the field. A man of great vision, he placed the supply of the Army on solid footing and spent extensive periods in the field monitoring Quartermaster General support and interfacing with line commanders in both peace and war. [2]

Trouble in Florida began in the War of 1812 when the Seminole Indians and a large number of runaway slaves fought on the side of Great Britain. Florida was a Spanish possession, but Spain was an ally of Great Britain in the war against Napoleon. At the end of hostilities, the British abandoned their allies but left them very well armed. The relationship between the Indians and the blacks was complicated. The Seminoles were fragments of tribes who had gone to Florida to escape hostile whites and Indians. In Florida, they found a haven with fertile land and prospered. They welcomed runaway slaves who brought new farming and mercantile techniques and who were willing to fight alongside them. In some cases, the runaways were slaves of the Indians, but were treated much better than they were by whites. However, a large proportion of them were free. After the War of 1812, there was a raid, counter-raid syndrome, typical of border areas, but the main objection to the Seminoles came from slave holders who were fearful because Florida provided a haven for escaped slaves. As long as Florida lay under the political control of Spain, this combined culture flourished in relative peace. But once Florida was ceded to the United States in 1819, those who feared it welcomed the opportunity to destroy it. The military significance of the war was its role as a training ground for senior officers who successively tried to drive the Seminoles from Florida until it was finally decided to leave them in place.

Two key commanders of the Seminole War (Map 3), Winfield Scott and Zachary Taylor, were later to win fame in the Mexican War. Scott went on to become General in Chief and Taylor became President. The war also vindicated Secretary Calhoun's reorganization of the staff almost two decades earlier. The planning procedures instituted by Jesup were modified and improved during the Seminole War. Steamboats, a key factor in logistical and troop movements for the rest of the century, were first used for support in Florida. Supply shipments from northern depots were moved by steamship via the Atlantic. In the interior of the combat zone steamboats were used for both troop and logistics movements.[3]



Map 3

THE MEXICAN WAR

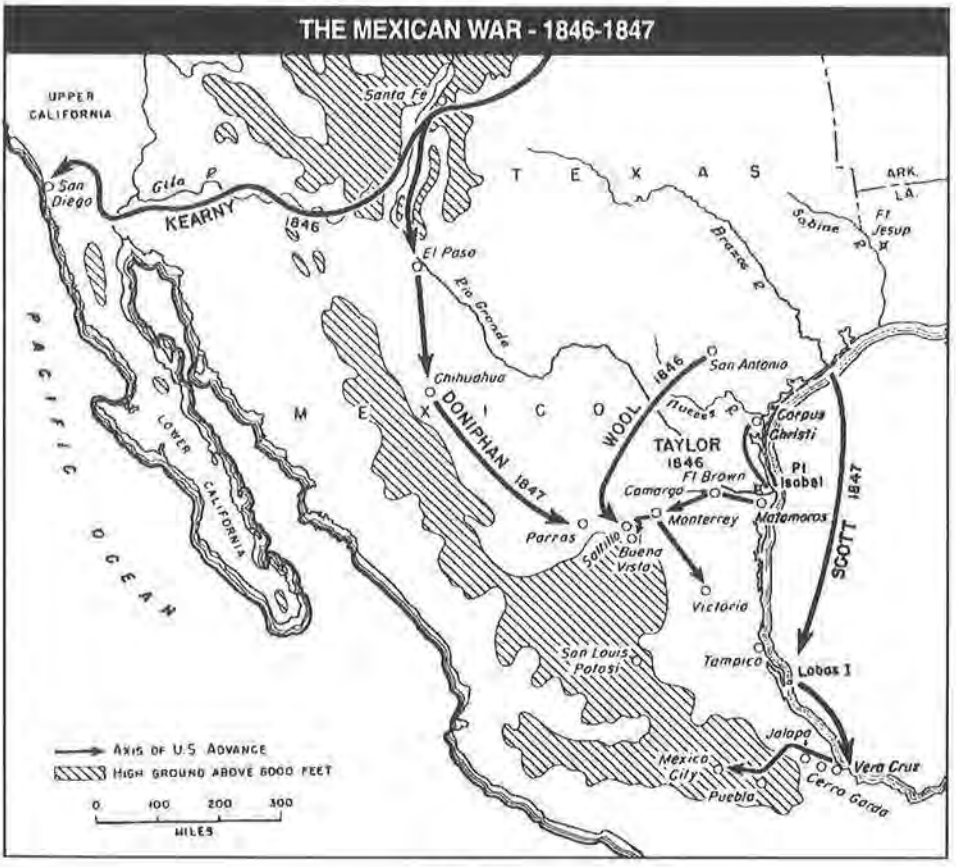
The Mexican War was mainly a result of the concept, popular in the United States, of "Manifest Destiny," which envisioned a United States stretching from the Atlantic to the Pacific and from Canada to the Rio Grande. This vision ran headlong into historical Mexican sovereignty over New Mexico and California. On both sides, there was opposition to war. There were many diplomatic efforts to substitute negotiation and reimbursement for military action, but each attempt heightened tension and moved the two nations closer to war.[4]

TACTICAL OPERATIONS IN MEXICO

In July 1845, General Zachary Taylor's army began moving from western bases where it had been marshaled, to New Orleans, thence to Corpus Christi. As each attempt at negotiation failed, the army moved closer to the planned border with Mexico, finally settling in at Fort Texas on the north bank of the Rio Grande opposite Matamoros to observe the Mexicans. Military operations began on 24 April 1846, when Mexican Maj. Gen. Arista, commanding the army across the Rio Grande from Taylor's Army of Observation, notified Taylor that hostilities had begun and soon after attacked. In a series of engagements between 24 April and 9 May, Taylor's army repelled Arista's assaults and successfully counterattacked Mexican forces in the Battles of Palo Alto and Resaca de la Palma. The effectiveness of the American artillery was one of the main reasons for Taylor's success. Operations ended with both forces in essentially the same positions they occupied before the Mexican attack. Congress finally declared war in May 1846, which meant that funds for the war could be authorized and volunteers called up. It also legalized Taylor's subsequent victorious engagement with Arista's forces in the battle of Matamoros. This was the first U.S. large-scale war not initially dependent on callup of militia because of the prohibition of their deployment outside the borders of the U.S. Instead, levies of volunteers made on the states were used to supplement the miniscule Regular Army.[5]

The Mexican War involved U.S. forces in four principal campaigns (Map 4) planned to seize and occupy the lands in the west and southwest, the objective of the war. Although some operations penetrated deeply into Mexico, there were no designs on Mexico itself. The aim was to bring Mexico to the peace table to facilitate negotiations on annexing California, New Mexico, and Oregon.

During Taylor's operations from the Republic of Texas into Northern Mexico, he successfully attacked and occupied Matamoros, Camargo, Monterey, and Saltillo through November 1846. He subsequently controlled Northern Mexico and subdued Mexican guerrilla operations throughout 1847. The operations of the separate Center Division of Taylor's Army, under Brig. Gen. John E. Wool, from October to December 1846 had the initial objective of Chihuahua. On 17 December, Taylor called off Wool's planned attack against Chihuahua while the division was in the town of Parras to divert them to join the main force to meet an expected Mexican attack on Saltillo, which proved false. Wool continued to operate under Taylor's command thereafter and assumed command of the Army in late October 1847, upon Taylor's departure to the United States.[6]



Map 4

The Army of the West under Col. Stephen W. Kearny, commander of the 1st Dragoons at Fort Leavenworth, was directed by orders personally drafted by President Polk to establish a temporary civil government in the conquered areas and to retain "all such of the existing officers as are known to be friendly to the United States, and will take the oath of allegiance."[7] Kearny's force, of less than 3,000, included volunteers from Missouri, a battalion of Mormons recruited from emigrants to Utah, and other units to supplement his regulars. Kearny was also authorized by the Army General in Chief Maj. Gen. Winfield Scott to recruit as required on the way to his final objective. He established a military and civilian government in New Mexico and moved on to California. There his orders helped resolve immensely complicated political problems and jurisdictional disagreements between U.S. Army and U.S. Navy commanders concerning the governing of California. Various appointed and self-styled commanders generated political problems that could not be easily resolved

considering the time required to obtain decisions from Washington. Kearny and the senior Navy officer on the west coast, Commodore W. Branford Kubrick, mutually settled the problems by issuing joint proclamations on 1 March 1847. Kearny left for St. Louis on 31 May, arriving on 4 November.[8]

A small but important campaign was conducted by the 1st Missouri Mounted Volunteers, an element of Kearny's Army of the West. Commanded by Col. Alexander Doniphan, it joined Kearny along the route to Santa Fe and was subsequently dispatched on an incursion into Navaho territory to put down Indian uprisings. By the time Doniphan had quieted the area, signed treaties with Navaho and Zuni leaders, and moved his forces to Valverde, New Mexico, on the Rio Grande, Kearny was en route to California on the second stage of his mission. By then, Donihan had 846 battle-hardened, well-mounted troops, with Maj. Meriwether Lewis Clark's six-gun artillery battery of 100 soldiers attached. Kearny directed Doniphan to march to join Wool's forces destined to attack Chihuahua. Alone, Doniphan's force captured Chihuahua, then moved to Saltillo, fought Indian and guerrilla raiders en route, and joined Wool at Buena Vista. The Missourians, whose enlistments expired on 1 June, were sent by boat to New Orleans and discharged. They had marched about 3,500 miles and fought two major battles in what was probably the most difficult trek of the war, even though many other units also made long and arduous marches.[9]

The campaign that successfully ended the war was led by Maj. Gen. Winfield Scott, who developed the strategic and tactical concepts for the amphibious operation at Vera Cruz. Scott, General in Chief of the Army, was the leading American general of his generation and one of the great military leaders in the nation's history. The Vera Cruz landing was the first projection of a major force outside the borders of the United States and one of the most successful amphibious operations in American annals. On 9 March 1847, 8,600 men landed between the hours of 1530 and 2300 in specially built amphibious craft, with no casualties. Even today this would be an impressive achievement. Much of the success of the landing proper was due to close planning with the commander of the supporting Navy squadron, Commodore David Conner, who was succeeded by Commodore Matthew Galbraith Perry. Scott placed Vera Cruz under siege and the garrison surrendered on 27 March 1847.[10]

After subduing guerrilla elements around Vera Cruz, Scott's forces seized the route to Pueblo on 1 April, winning the Battle of Cerro Gordo. During the battle, the army suffered light casualties while inflicting heavy losses on the enemy, forcing the Mexicans to withdraw. After taking Pueblo on the 15 April, Scott consolidated all available forces, including most of those guarding his lines

of communication, and temporarily cut loose from his logistical support base. With some reinforcements and masterful tactical employment of his army, Scott breached the defenses of Mexico City on the 16th and took the city's surrender on 17 September 1847. The Duke of Wellington, Europe's most distinguished soldier said Scott's "campaign was unsurpassed in military annals. He is the greatest living soldier." Only MacArthur's Inchon-Seoul Campaign of 1950 compares to Scott's Mexico City campaign in concept and audacity.[11]

Although the war generated considerable political turmoil at home, it was decisively won by American arms. Logistics support must be credited with a good part of the success. While not perfect, it far surpassed the quality of support in prior wars and demonstrated that some commanders were learning the necessity of planning logistics as well as strategy and tactics. Like the Seminole War, the Mexican War served as a training ground for many of the commanders and senior officers of the Civil War. Grant, Lee, Sherman, Jackson, and scores of others served as junior officers in Mexico.

TRANSPORTATION IN THE MEXICAN WAR

Technologically, the Mexican War marked the emergence of modern warfare. Steam-powered vessels, railroads, and the telegraph were revolutionizing transportation and long distance communication. Also significant was the use of India Rubber cloth to sheath wagon beds and make pontoons for bridging rivers. The Mexican War also saw the first widespread use of ether for anesthetizing combat casualties for surgery. The Battle of Buena Vista was the first time in which both combatants were armed with percussion weapons. While the percussion ignition system was far superior to the flintlock it replaced, percussion caps had to be manufactured and transported carefully because they were sensitive to shock. This development changed the transportation of ammunition forever.[12]

Steamships were used to some degree in the Seminole War, but in the Mexican War they were indispensable. They were used for the projection and ongoing support of large forces outside the United States, as well as troop and resupply movements on rivers such as the Rio Grande. The steamship, not dependent on the vagaries of wind and tide for power, made large amphibious operations possible. Scott's Vera Cruz and Mexico City campaigns demonstrated the feasibility of amphibious landings and continuing logistical support of deep inland objectives. The barges used to land the combat forces tactically and then for logistics support were designed by Quartermaster General Jesup and procured for the landings. Other special shallow-draft craft for river

operations were also obtained, frequently well in advance of the field commanders' identification of the requirement. Steamships also provided rapid and reliable retrograde of most of the forces in the theater. During the war, the Army acquired and used 38 sailing ships and 35 steamships and chartered a far greater number.[13] The ships were not necessarily comfortable for troop movements. One Missouri volunteer wrote after his first night aboard "for suffering, I have not experienced its equal in all my peregrinations through life."[14]

Railroads in the United States were not yet well developed during the Mexican War. There were only a few lines east of the Mississippi and none west of it. Railroads were used for mobilization when available and for moving supplies and materiel from manufacturers to ports in the northeast, but not for moving troops or supplies movements in the theater. Jesup, in the fall of 1845, recommended construction of a rail line to connect the Point Isabel/Brazos Island area with the Rio Grande for onward movement by river steamboats. The railroad was not built since funding was not available. But the recommendation demonstrated how innovative Jesup was. Similarly, the telegraph connected Washington, Philadelphia, and New York and enhanced contact between those centers of support, particularly for procurement. However, it was not yet sufficiently advanced to bridge the immense distances between Washington and field commanders in Texas and Mexico or within the theater where operating forces sometimes were separated by hundreds of miles.[15]

In spite of the addition of mechanical transportation for support, military operations still depended on animal-drawn transport and the individual soldier for transportation during a campaign. The terrain of Northern Mexico was arid and crossed by rivers that were either dry or in flood. To operate in such terrain, commanders had to plan well for their logistics support. For example, when General Wool joined Taylor, after his recall from the attack on Chihuahua, he was carrying in his trains 60-days rations, 400,000 cartridges, and 200 rounds of artillery ammunition.[16] Army transporters in the field continued to be faced with the fact that animal transport depended on the terrain and weather. In field operations, a two-horse wagon team could haul an average of six barrels of flour or 1,332 pounds of supplies, while a four-horse wagon team could carry ten to twelve barrels of flour or 2,100 pounds. In an area like Mexico, where grazing was limited, each payload had to be reduced by twelve pounds of forage per horse per day and three pounds of food per wagoner per day. On a 10-day haul, the payload of a two-horse wagon team would be displaced by 20 percent if forage and food for the return trip were available at destination. If not, the payload was reduced by 40 percent to "fuel" the team and driver for the

round-trip.[17] This need complicated planning as well as execution and did not take into account events such as flash floods. A small fluctuation in weather or season could drastically change the number of wagons and animals required or extend the time to go a certain distance by a factor of days.

Quartermaster General Jesup provided guidance and direction to transportation doctrine throughout his long career. He was aware of the needs of the soldier in the field and, in many instances, anticipated those needs before the commanders had thought of them. Many of his army transportation procedures endure today. Unlike most of his predecessors, Jesup considered his office a military one. He staffed it with young, active, and intelligent officers. Moreover, in a letter to Secretary Calhoun, he said he wished to prepare his office to be efficient in time of war and to ensure responsibility in all its branches in both peace and war. Within a month after taking office, he drafted rules and regulations covering the functions of his office and the duties of its officers. The department objectives were established to "insure an ample and efficient system of supply, to give the utmost facility and effect to the movements and operations of the Army, and to enforce a strict accountability on the part of all officers charged with monies and supplies."[18] Taking complete control of the department, he directed all correspondence, set deadlines, reviewed invoices personally, and prohibited any quartermaster from participating in trade. He established total accountability, personally supervised a central disbursing system, and directed assistant quartermasters not to purchase items that other bureaus could or should provide.[19]

One of Jesup's major innovations which is still used today is the travel allowance. The allowance was for officers travelling without troops and the amount was based on the distance travelled, computed from Melish's, *The Travellers Directory*, a standard geographical reference that Jesup adopted for the department.[20] In other transportation functions, Jesup showed foresight far beyond the thinking of the time, engaging in what is now known as research and development. In the Seminole War, he field tested two-horse wagons pulled by four horses to limit the weight and keep the wagons from getting stuck in the boggy terrain. Wagons lined with India rubber cloth for flotation and flatboats pulled by steamboats were also ideas he tested. Later, these ideas were refined and practically applied in the Mexican War and after. Jesup required department officers to spend time with the army in the field during both the Seminole and Mexican Wars.

Jesup wisely used the frontier as a model for wartime support. As settlements proliferated, the need for security expanded. Transportation

requirements grew and made it increasingly difficult to supply posts. All forms of transportation, from steamboats to packhorses, were used to supply posts in the west. Railroads were first used in 1833 but would not be the main source of transportation in the west until late in the century. The lack of wagon roads made it almost impossible to provide security for settlements, resupply the posts, or reinforce them promptly. Jesup decided to solve the problem by initiating a massive road-building campaign, joining posts between the Indians and frontier settlements from the upper Mississippi to the Red River in the south. The project, known as the Great Military Road of 1836, was begun in that year and completed five years later.[21] Jesup's interests and improvements were not limited to quartermaster functions. As early as 1829, he advocated putting a portion of the infantry on horseback. This led to the creation of a battalion of mounted rangers, then finally to a regiment of dragoons.[22]

By the time the United States went to war with Mexico, Jesup had been the Quartermaster General for 28 years. He successfully militarized the department, organizing it for both peace and war, and instituted positive control procedures for supply and transportation. The Quartermaster General trained his staff in field operations and prescribed regulations which he made sure were followed. By 1846, he achieved the goals he set for his department upon taking office in 1818. The Army had standard doctrine and an existing staff structure ready to provide support in peace or war.

Although the Quartermaster Department was firmly established, it faced an unusual challenge before the war with Mexico. The Army was deployed nearly a year before the actual declaration of war, so there were no wartime funds upon which to draw. The Quartermaster General had to support from existing funds the marshaling of Taylor's army, its move to Texas, and the Army's first major engagement. Not only did the situation provide a drain on the quartermaster budget, it also precluded advance ordering of wagons, boats, and other impedimenta that Jesup and his quartermasters in the field desperately needed. Col. Trueman Cross, who was Jesup's quartermaster in the West and initially the quartermaster of Taylor's army, clearly recognized the need. He recommended Jesup procure a standby train of 300 to 400 wagons, made from a common pattern with interchangeable parts to meet emergency movement requirements. He also recommended strongly that the Army be authorized a corps of enlisted drivers, arguing that under the existing system of contracting transportation, civilians could quit or strike for higher wages at will, leaving the Army with little recourse. The plan was a good one, but Congress never authorized the funds to establish the train or the driver corps.

Jesup and his deputy, Col. Henry Stanton, who acted as Quartermaster General while Jesup inspected forts in the West in early 1845, responded to the approaching war by prioritizing the use of all available assets, including the staff of 37, only 15 of whom were fit for field duty. However, all were thoroughly experienced, most having participated in the 1812 and Seminole Wars. The first priority was support of Taylor's force en route to Texas. Col. Stanton transferred ten of the available officers to New Orleans to serve under Col. Trueman Cross. Among them was Lt. Col. Thomas F. Hunt, who had many years experience in New Orleans.

This small staff received, billeted, and staged Taylor's troops in New Orleans and arranged their coastal movement to Corpus Christi where they established a depot. The staff also received wagons procured by Col. Stanton in Philadelphia and augmented them by local purchase. They could not procure the necessary mules and substituted 600 oxen. As Col. Cross anticipated, drivers in the southwest were in short supply and those that were available were unreliable (especially when danger threatened), inept, and frequently unhealthy. A number of expedients were tried to make up for the lack of reliable contract drivers. Pack mules with Mexican drivers were hired at rates ranging from 50 cents a day to $25 a month.[23] Soldiers were used as drivers for wagons furnished to units for baggage, rations, and ammunition. Jesup even transferred funds appropriated for other items to procure the steamboats to move Taylor's troops and supplies to Camargo on the Rio Grande, where a general depot was established.

Shallow draft steamboats and barges were used to carry supplies for Taylor's army as far as Camargo. From there, they were transported by wagon and pack mules to Monterrey, Saltillo, and Buena Vista. En route to Monterrey, Taylor's force used 180 wagons and 1,900 mules with big wooden pack saddles to carry the bulk of the army's equipment. Each mule carried about 300 pounds of cargo which had to be unloaded each evening so the mule could graze and rest. Support from the Camargo depot was supplemented by local purchase of beef, flour, forage, and fresh food to supplement the field ration.[24] Support throughout the war to northern and western Mexico followed the general pattern of the initial support to Taylor with considerable improvement. Once war was officially declared and funding became available, the advance planning of Jesup and his staff paid off. Much of the support to U.S. forces in California and Oregon was through local procurement because those expeditions were far beyond the capability of the quartermaster to support. For long distance marches such as Kearny's and Doniphan's, commissary officers with wagons accompanied the expedition, carried food, issued it to the units, and replenished

it from military depots as much as possible. When depots were not within supporting distance, the commissary officers used local purchase, barter, or any expedient they could to support the troops.[25]

Major General Scott was a meticulous planner who paid particular attention to logistics, as the logistical support of his campaign to capture Mexico City demonstrates. Scott personally reviewed and revised support plans and followed up on progress. Jesup moved to New Orleans in September 1846 to assume direction of quartermaster affairs and from there supported Taylor's operations and later Scott's expedition. He found much of the criticism of the Quartermasters Corps uncalled for and took steps to improve support that was inadequate. He instituted an early ancestor of the Direct Support System (DSS) by directing water shipments to points closer to the lines of communication in Texas and Mexico. He requested waterproof packaging to reduce damage en route and in the field. He directed packaging of shipments in sizes that could be transferred from steamboats to pack animals without repackaging. Jesup also directed bridging installed to replace circuitous routing via fords to shorten the lines of communication and established repair and maintenance workshops at depots in the field.

The War with Mexico validated Jesup's organization and system of support. Troops and supplies were routinely moved by all available modes of transportation. Resources, for the most part, were anticipated by the experienced staff of the Quartermaster Department who planned, developed, and delivered supplies even before before the war began. Careful planning allowed the Army to move and sustain large forces over long distances. Quartermasters in the field were not deskbound. They insured routes were reconnoitered, even if they had to do it themselves, and they provided transportation where it was needed and used every means available. For example, Assistant Quartermaster Capt. S.H. Drum, in charge of a drove of 400 horses and 400 mules coming by steamship from the North, landed them at Vidalia, Louisiana, and drove them overland 615 miles to San Antonio.[26]

The war ended with the Treaty of Guadalupe Hildalgo, signed on 2 February 1848, and ratified on 30 May. About 41,000 troops and civilian hires had to be brought home and demobilized. Almost all were embarked at Vera Cruz and shipped to New Orleans, then to final destinations. Finally, there was the task of disposing of quartermaster property. Assistant quartermasters were instructed to sell the property that could not conveniently be brought back. However, sound, well-broken animals and serviceable wagons were returned,

with the best distributed throughout the southwestern posts and the remainder sold. Property from demobilization in the west was handled similarly.[27]

The period between the War of 1812 and the Civil War was significant for the Army and the nation. A small number of dedicated, knowledgeable, and imaginative individuals established and systematized logistics and transportation support of the Army. This allowed the Army to operate in difficult terrain like Florida without suffering lack of support and still operate thousands of miles away from its permanent bases and achieve victory in Mexico. Jesup is the central figure in this story. For 42 years, he served as quartermaster of the Army. During that entire period, he was always looking forward and constantly sought newer and more efficient ways of accomplishing his mission in both peace and war. Nearly singlehandedly, Jesup created the Quartermaster Department and within it the responsibility for transportation. Despite his long tenure, Jesup never became deskbound and ensured that he and his staff were in constant touch with "the line" as field soldiers were called. Jesup also encouraged line officers to take a hand in their own support, and the achievements of Generals Taylor and Wool in the arid terrain of Northern Mexico, showed that the line officers paid attention.

POST WAR TRANSPORTATION

For the decade following the war, the quartermaster was faced with lengthening supply lines as the frontier continued westward. Transportation costs consumed the greatest part of the budget. By 1850, posts ranged from the Rio Grande to the Pacific coast as far north as Puget Sound with a series of frontier posts in between. To garrison and supply these posts, troops and supplies for the west coast were sent by ship on the 5-month voyage around Cape Horn. Posts west of the Mississippi in the interior were supplied by steamboat and other means much as before the war, pending expansion of the rail network west. Fort Leavenworth, on the Missouri River, was the main frontier depot, supported by steamboat from St. Louis. From there, wagons had to travel 310 miles to Fort Kearny, 637 miles to Fort Laramie and 821 miles to Santa Fe. A depot was established at Indianola, Texas, about 540 miles across the Gulf of Mexico from New Orleans. From there, support went by wagon 420 miles to Fort Worth or 803 miles to El Paso. The support requirements of U.S. forces in the opening of the west were very similar to those required for war. By 1860, contract carriers, such as the famous western firm of Russell, Majors, and Waddell, were carrying the bulk of support forward from the depots. On most

routes, carriers used the huge 5-ton capacity wagons, made by Murphy and Espenshield in St. Louis and Studebaker in South Bend.[28]

An interesting sidelight shows the great interest taken in transportation by Secretary of War Jefferson Davis. He suggested that camels might help solve the problems of supplying posts in western deserts since they performed well in the deserts of the Middle East. In 1856, thirty camels were purchased and sent to posts in the Southwest. In that climate, a camel could carry nearly twice the load a horse could pull in a wagon, across terrain that no wagon could negotiate. Davis' successor, John B. Floyd, was an enthusiastic supporter of the camel experiment and asked Congress to fund the purchase of 1,000 more. Congress refused the request, and any attempt to further the experiment was interrupted by the Civil War. After the war, the completion of the transcontinental railroad made the camel unnecessary, and the surviving camels were sold to circuses or turned loose.[29]

The decade of the fifties was a time of great expansion and development of inland transportation, with much greater use of the western river systems and extension of the rail network. By 1860, of the more than 30,000 miles of rail trackage, about 21,000 was in the future Union states and 9,000 in the states that seceded to form the Confederacy. Northern vessels dominated the inland waterways, and Yankee shipping on the high seas nearly equaled that of the British Empire.[30]

CHAPTER III

The Civil War 1861-1865

"That single stem of railroad
[from Louisville to Atlanta], 473 miles long,
supplied an army of 100,000 men and 35,000 animals for a period of
196 days. . . That amount of food and forage. . . would have taken
36,800 wagons of six mules. . . each day, a simple impossibility. . . in
that region of the country."

Major General William T. Sherman, *Memoirs.*

OVERVIEW

The roots of the American Civil War lie in the very origins of the United States. At the Constitutional Convention of 1787, state representatives agreed not to discuss slavery in order to establish a workable government. They felt that slavery was unprofitable and would soon disappear. Little could they know that in a few years the invention of the cotton gin would make slavery very profitable and desirable. The framers succeeded in forming a government and were confident that future generations would solve the issue peacefully. Thus the seeds of the nation's most terrible conflict were sown at its very birth.

In the early years of the 19th century, the Industrial Revolution wrought enormous changes in the social and economic fabric that would eventually drive the North and South apart. The cotton gin meant that unlimited cotton could be processed if it could be picked in mass, and slavery provided a means of cheap labor. In the South, fortunes were made overnight as plantation owners acquired more slaves to till more land to grow more cotton. The South became an agricultural semifeudal society with an extremely wealthy class that viewed itself as an aristocracy providing much of the political and moral leadership for the nation. In the North, the society of small businesses and skilled laborers quickly gave way to a system of factories and mills, run by abundant water and steam power. Ironically, many of these factories revolutionized textile production, creating lower textile prices that greatly expanded markets for cotton. A large proportion of the workers in these mills were newly arrived

immigrants willing to work for much less than native-born Americans. Some 5 million new citizens arrived in the first half of the 19th century, most of them from Ireland and Germany. Because a majority were Catholic, ethnic friction occurred, but the North was on its way to becoming a capitalist, industrialized, and diverse urban society.[1]

After 1815, massive efforts were made by both federal and state governments to improve roads and canals. By 1850, over 3,700 miles of new canals were opened. In the same period, the steamboat came into its own for both inland and ocean traffic. The rail network breached the Appalachians and bridged the Mississippi, and by 1860, the United States had a larger rail network than the rest of the world combined. Similar results came from mechanization of the whole range of farm production with the transportation network providing fast distribution. Farmers increased productivity and specialized in money crops, thus reducing prices of farm products. Factories were mechanized and interchangeable parts were mass-produced, making many craft skills obsolete and manufactured products cheaper. Prices fell as rapid transportation of people and goods became commonplace. With increased industrial capacity and rapid travel came an improved standard of living. Nevertheless, in areas where the transportation revolution had not penetrated, the economy and living standards were much the same as they had been before the turn of the century.[2] Along with the changes in industry and agriculture came political and social changes.

In the North, the availability of cheap manufactured goods and farm products freed women from making cloth and candles, and mechanization reduced the need for them in the fields. They devoted more attention to their families and began to work outside the home. Even though they were not allowed to vote, they became politically active through church and literary groups which strongly influenced the abolition movement. The abolition movement worked to outlaw slavery and lobbied aggressively to prevent its spread. It also operated the "Underground Railroad" to assist escaped slaves to freedom in the North or Canada. On the other side of the slavery issue were the Southern politicians and businessmen who rebutted the barrage of criticism from the North. They maintained that slavery was a positive good and benefitted the slaves and the rest of the country. Southern authors postulated that Northern laborers were wage slaves, less well off than Southern Negro slaves. To them freedom in the North was a sham "with a servile class of mechanics and laborers, unfit for self-government, yet clothed with the attributes and powers of citizens."[3] As differences between the two sides deepened, a showdown became inevitable.

White House landing on the Pamunky River, 1862.

For nearly 75 years, compromises reached by Congress and the president kept slavery, with its complex social and political ramifications, from breaking up the Union. Expansion into the territories gained by the Louisiana Purchase of 1803 and the Mexican War of 1846-49 created further discord between the North and South. The discord occurred because the Southern pro-slave states had to maintain a number of senators equal to those from the Northern states. Less than an equal number meant they could not protect their interests because the north had a majority in the House. To maintain this balance, states had to be admitted to the Union in pairs, one slave, one free. A series of compromises, from the ratification of the Constitution to the Compromise of 1850, made sure this was precisely what happened, but in 1854 the entire fabric of compromise began to unravel. In that year Kansas was supposed to enter the Union as a slave state and Nebraska as a free state, but when the territorial legislature of Kansas opted for a "free" state, slavery sympathizers poured in to ensure Kansas would be pro-slavery.

In 1860, the United States had a population of almost 32 million, about 4 million of whom were slaves. It surpassed Britain and all European nations, except Russia and France, in population. That population was so mobile, innovative, and ambitious that American factories and farms were worldwide leaders in manufacturing. They exported not only manufactured goods, but techniques which the British named "the American system of manufactures."[4] It had survived crisis after crisis as persons of good will in the North and the South tried valiantly to compromise on the slavery question. But the new territories became a battleground between pro-slavery men and "freesoilers." "Bleeding Kansas" described the situation accurately. Freesoilers eventually prevailed in 1861 when Kansas was admitted as a free state, joining California, Minnesota, and Oregon whose entries since the Mexican War gave the North a four-state edge over the South in Congress. [5]

Despite the political compromises, a national fugitive slave law, and the Supreme Court's ruling in the Dred Scott Case that slaves were property and had no rights, the South had lost its equality in the Senate and began to see itself as a unique region with its way of life under attack. The political race of 1860 confirmed their worst fears as the Democratic Party split into a Southern and Northern faction and the Republicans, seen in the South as an abolitionist party, won the election. When Southern leaders saw that over 70 percent of the country's voters disapproved of slavery, they decided to make other political arrangements. Since President Buchanan was a lame duck until Lincoln's inauguration on 4 March 1861 and would take no positive action, the Southern states decided to act. Led by South Carolina on 18 December 1860, seven states seceded from the Union. They met in Montgomery, Alabama, on 4 February 1861, to establish a confederacy. They paid no attention to compromise efforts in Washington.[6] By then, the main Union goal was to keep the other Southern and border states, many with strong unionist elements and much lower percentages of slave owners from going out. In six days, the Montgomery Convention drafted a Constitution that turned itself into a provisional Congress. They unanimously elected Jefferson Davis of Mississippi as president and Alexander Stephens of Georgia as vice president and scheduled elections for November 1861. Davis was inaugurated on 18 February 1861 and immediately settled down to the heavy responsibilities of organizing a new nation.[7]

When Lincoln arrived in Washington for his inauguration, the seven seceded states were seizing all Federal property within their borders. The only Federal property still held in seceding states were three small forts in Florida and three in Charleston harbor. Lincoln treated these issues temperately in his

inaugural address, hoping to cool passions and allow the seeds of reconciliation to sprout.[8]

As soon as he took the oath of office as president of the Confederacy, Davis ordered Brig. Gen. P.G.T. Beauregard to assume command of militia troops at Charleston, South Carolina. Castle Pinckney, Fort Moultrie, and Fort Sumter, the installations the Federal government refused to surrender, were under siege by South Carolina milita. On 26 December 1860, Maj. Robert Anderson, commanding the small Federal garrison, abandoned the other forts and moved his troops to Fort Sumter because it was in the middle of the harbor and could not be attacked from land. The opposing forces busily improved their field works in the ensuing period. A Federal ship sent in January 1861 to replenish supplies at Fort Sumter was turned back by cannon fire and an uneasy truce prevailed until Lincoln's inauguration. When Lincoln refused to give up Sumter, the Confederates fired on the fort on 12 April 1861, forcing it to surrender the following day. Lincoln had forced the South to fire the first shot and begin what was to be the United States' bloodiest war. Neither side in the coming conflict had any idea what war would mean. Each side underestimated the will of the other and thought the conflict would be settled by a single battle.

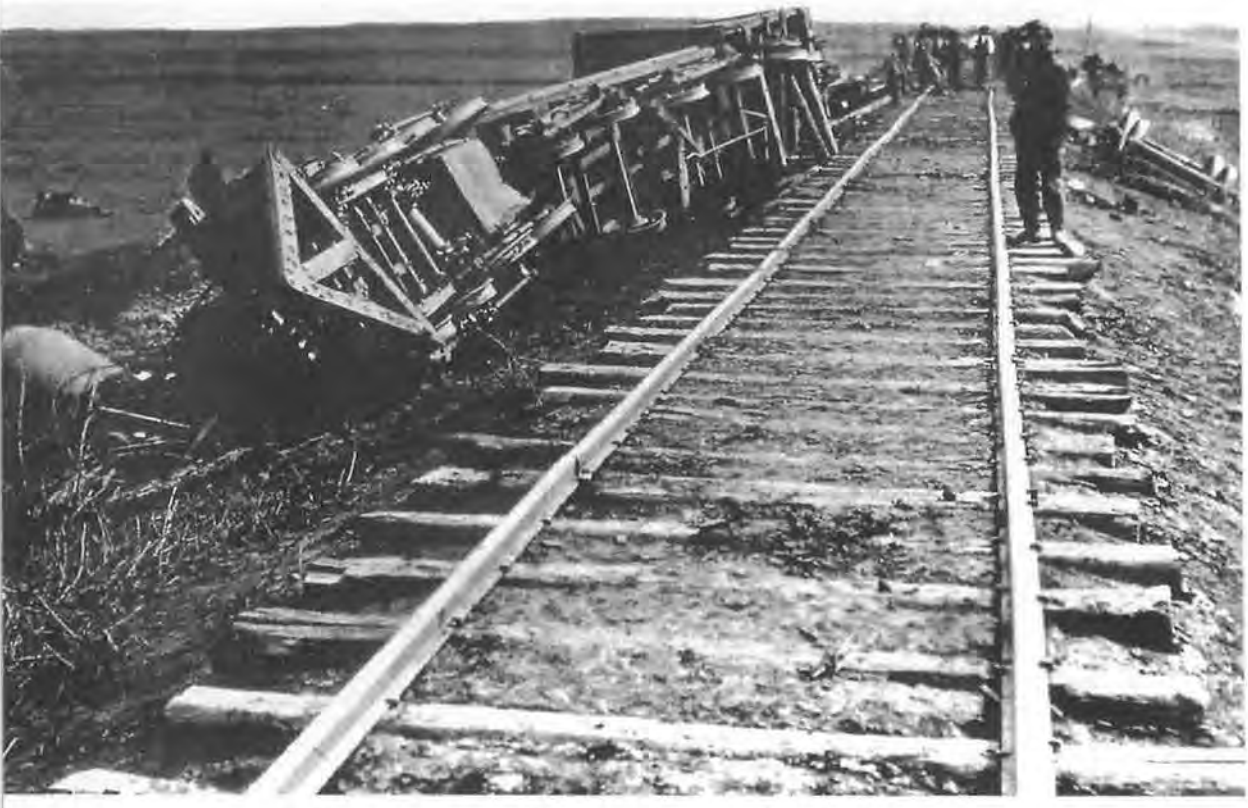
The first incidents of the war demonstrated how critical transportation would be in the coming conflict. Only a single rail line of the Baltimore and Ohio (B&O) Railroad extended to Washington City as the capital was known then. Surrounded by Maryland, which was heavily secessionist, and across the Potomac from Virginia, which was on the verge of seceding, the capital was extremely vulnerable. The defense of Washington was a key objective of Union strategy and it was almost lost before the war really began. On 18 April, troops from Massachusetts arrived in Baltimore and had to cross the city to take the train to Washington. They were attacked by a mob and the result was four soldiers and twelve rioters dead. Four days later, the mob tore up the tracks, bridges, and telegraph lines to Washington, isolating the capital. Maj. Gen. Benjamin F. Butler, commanding the Massachusetts militia, forestalled an attack on Washington by cutting the B&O line which Southern forces could use to enter Washington and Baltimore. He suppressed anti-Union riots in Baltimore and established ferry service by-passing sections of the B&O closed by destroyed bridges. Eventually, the rail lines were repaired so troops could travel directly to the capital. In doing so, Butler unknowingly laid the groundwork for the Union Military Railway Service that operated most of the railroads in the occupied areas of the Confederacy during the remainder of the war.[9]

Only six days after Sumter, the South also demonstrated that its military leaders understood the capabilities of the railroads. On 18 April 1861, Capt. John D. Imboden, of the Staunton (militia) artillery, with the approval of Virginia Governor Letcher and the cooperation of the presidents of the Virginia Central, the Orange & Alexandria, and the Manassas Gap railroads, collected a raiding force of militia companies in western Virginia and moved them by rail to seize the Federal arsenal at Harper's Ferry. When the Union commander learned of the force bearing down on him, he set fire to the arsenal and fled without a struggle.[10] The Confederate capture of the arsenal and its intact equipment, which was moved to more secure areas, greatly bolstered the South's ability to manufacture and repair small arms.

The Union's first strategic plan was conceived by Winfield Scott, the Army's 75-year-old General in Chief. He envisioned a major army, created in Northern Virginia, to protect the capital and tie down the main Confederate Army. A naval blockade would cut the Confederacy off from European military aid and domestic support while combined Army-Navy operations seized the Mississippi River and split the Confederacy in two. The objective of the plan was to show the Southern states their dependence on the North and demonstrate the futility of rebellion. Both Lincoln and Scott also recognized the strategic importance of the railroads and planned to exploit the North's large rail network. They understood the importance of railroads to the Confederacy and made them targets of early Union offensives.[11] Scott's plan did not advocate an early ground offensive because the spilling of blood was the surest way to prevent a reconciliation.

The public, convinced a single battle was the solution, labeled Scott's idea the "Anaconda Plan" because it was designed to crush the South slowly, rather than with a single massive blow. A ground swell of Northern opinion demanded that the government move immediately to seize Richmond, before the Confederacy could "get organized." The first battle of "Bull Run," on the outskirts of Washington, was fought between two ill-prepared and amateur armies. With casualties of almost 3,000 Union troops and 2,000 Confederates, it demonstrated to both sides that the war would be long and costly. Talk on both sides of a quick victory abated.

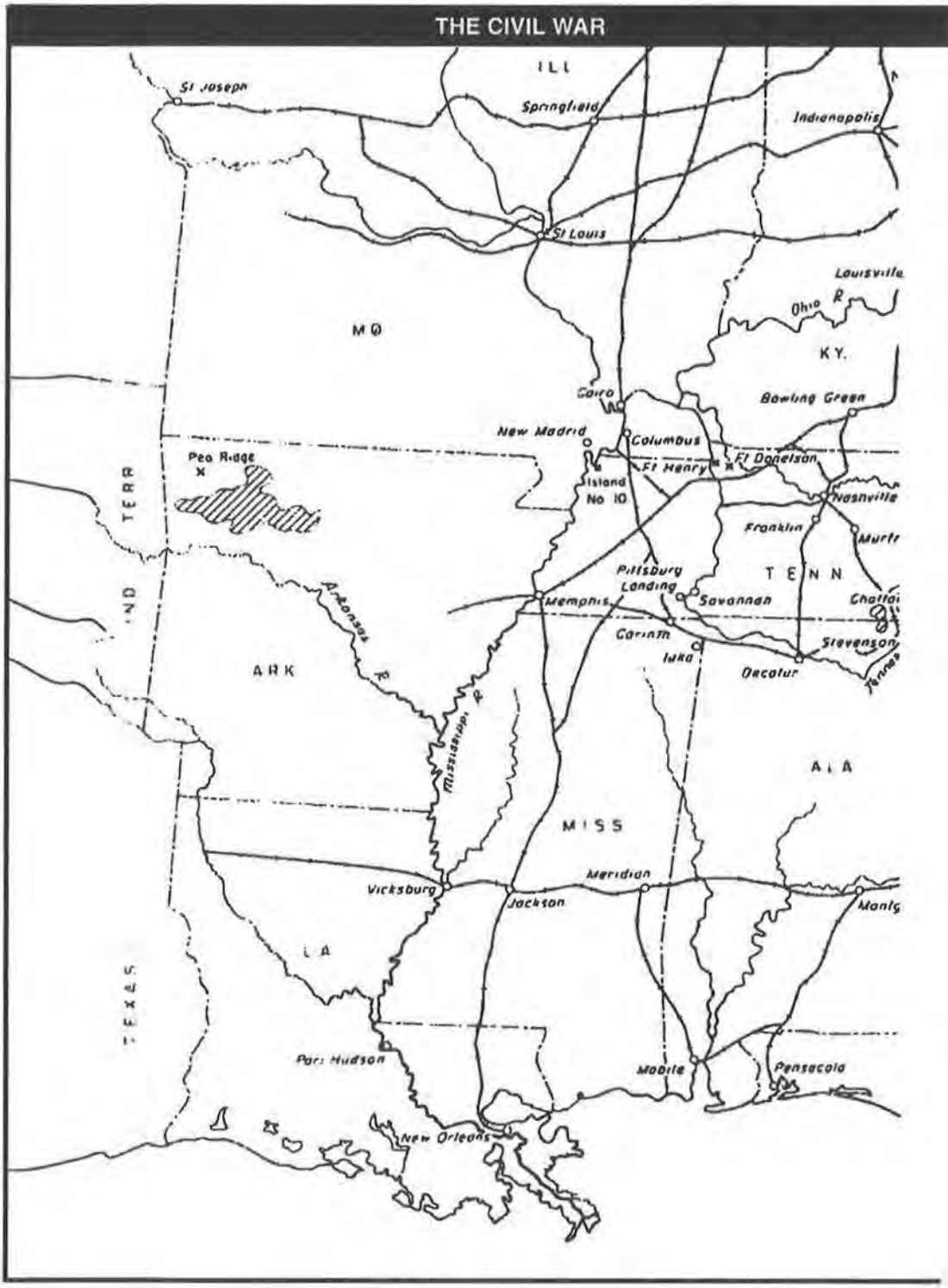
Jefferson Davis' strategic plan was to hold as much territory as possible to maximize the Confederacy's limited resources. The plan appealed to the populations of the small towns and villages on the fringes of the Confederacy and protected slavery which could not survive incursions by an invading army. The plan was well-suited to conditions east of the Appalachians and defined



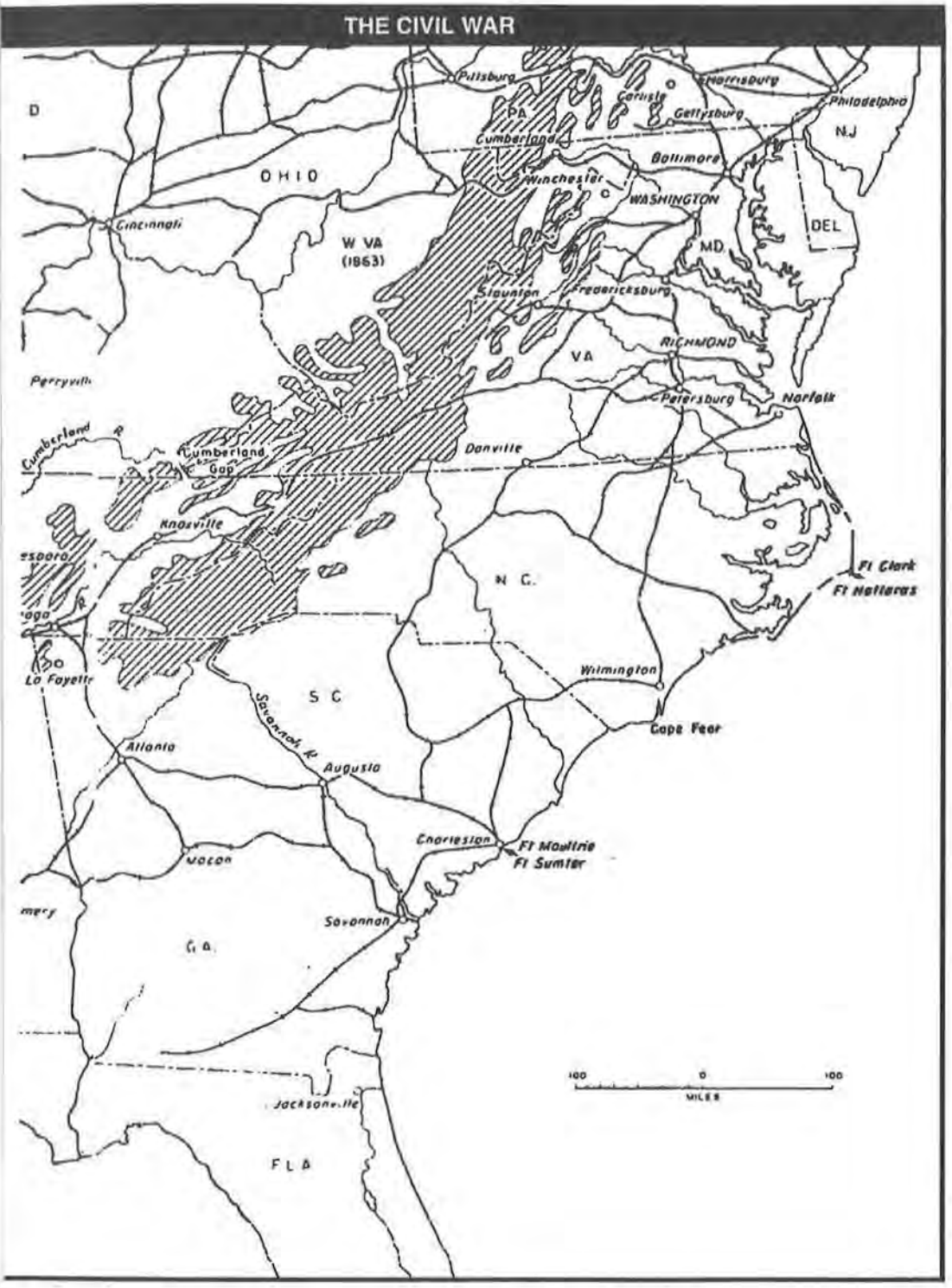
Railroads become a strategic target - destruction of rolling stock during Pope's retreat 1862.

militarily as the "offensive-defensive" strategy. It was likened to an outmatched boxer who by superior mobility and strategy avoids serious damage, wears his opponent down, and at the opportune moment, counterpunches him with a knockout blow.[12] General Robert E. Lee, who initially commanded only the forces of Virginia, was in full agreement with Davis' defensive concept and held to the basic offensive-defensive strategy when selected to lead the Army of Northern Virginia in June 1862.[13]

The incredible scope of the war is shown in Map 5. For most of the war, Union campaigns in the Eastern theater consisted of unsuccessful Union thrusts at Richmond. Most Confederate operations were defensive. The only exceptions to these were Lee's two invasions of the North, the invasion of Kentucky and Jackson's Valley campaign. Only the latter was successful.[14] The Confederacy was weakest in the west, where it consistently lost territory. This theater was larger and far more difficult to control with limited resources. The vastly superior Union Navy was able to dominate the Mississippi and other rivers in the


THE CIVIL WAR
ILL
St Joseph
Springfield
Indianapolis
St Louis
Louisville
Ohio R
MO
KY.
Cairo
Bowling Green
New Madrid
Columbus
Ft Donelson
Ft Henry
Island No 10
Pea Ridge
Nashville
Franklin
Murfr
Pittsburg Landing
TENN
Memphis
Savannah
Chatta
Corinth
Iuka
Stevenson
Decatur
Arkansas R
Mississippi R
IND TERR
ARK
ALA
MISS
Meridian
Vicksburg
Jackson
Manch
LA
TEXAS
Port Hudson
Mobile
Pensacola
New Orleans

Map 5


THE CIVIL WAR
Pittsburg
Harrisburg
Philadelphia
Carlisle
Gettysburg
PA
N.J
Cumberland
Baltimore
OHIO
Winchester
WASHINGTON
Cincinnati
W VA
(1863)
MD
DEL
Staunton
Fredericksburg
RICHMOND
VA
Perryville
Petersburg
Norfolk
Cumberland R
Cumberland Gap
Danville
Knoxville
Ft Clark
Ft Hatteras
N C
Wilmington
La Fayette
S C
Cape Fear
Savannah R
Atlanta
Augusta
Charleston
Ft Moultrie
Ft Sumter
Macon
Savannah
G A
100
0
100
MILES
Jacksonville
FLA

Map 5

west, use them as unbreakable lines of communication, and conduct joint operations, which included the capture of New Orleans in 1862. After the death of Albert Sidney Johnston at the battle of Shiloh on 6 April 1862, Jefferson Davis was unable to find a leader of similar stature and the Confederate Army in the west was plagued by command problems.[15] The two theaters were uncoordinated until Grant took command of all Union forces in 1864. At that time simultaneous offensives were launched in the east and west with the destruction of the Confederate armies as the ultimate objective. Resources and leadership eventually decided the issue after a long and costly struggle.

THE NAVY

The U.S. Navy contributed substantially to the North's victory by providing secure routes for logistical support and carrying out joint amphibious operations at will. Flag Officer David Farragut who commanded the West Gulf Blockading Squadron was a prime example. His squadron captured New Orleans on 25 April 1862 and transported Brig. Gen. Benjamin Butler's army to occupy the town, an achievement of enormous strategic significance. Farragut's promotion to be the first admiral of the U.S. Navy was well-deserved. The other three Navy squadrons blockading the East Gulf and the North and South Atlantic sectors also contributed mightily to limiting imports to and shipments from the Confederacy. One of the earliest successful military actions of the war was the seizure of Port Royal, midway between Charleston and Savannah in the zone of the South Atlantic Squadron. On 7 November 1861, DuPont's squadron reduced hastily erected Confederate forts protecting Port Royal Sound and occupied the area, while waiting for the arrival of the Union Army 12,000-man occupation force that had been delayed because storms drove the ships carrying their landing craft ashore. The Union Navy used the Port Royal Base for four years, but Union troops there did not interdict the Charleston and Savannah Railroad which crossed the head of the bay. This was a significant strategic error. Nonetheless, the ability of the Union Navy to seize any point on the coast at will caused General Lee to change his strategy of spreading forces along the coastlines. Realizing the Union had the flexibility to select objectives along the coasts, he felt the Confederacy's best option would be to consolidate forces inland and counterattack rapidly to destroy Union forces ashore. Thus, Navy control of the coastal areas gave the Union Army tactical and transportation planners a free rein in planning troop movements and a fully dependable supporting line of communication by water.

With only 36 ships, 13 of which were laid up when the war began, the Navy was unable to effectively blockade the coasts of the Confederacy. Even with the 600 ships it had by the end of the war, the Navy could not completely seal Southern harbors. Blockade runners and foreign flag vessels could still slip through and were a big factor in the South's ability to continue the war on a shoestring. Most of the cargoes carried by the blockade runners were luxury items which fetched exorbitant prices in the war-torn South, thus sacrificing hold space that could have been used for military cargo. The Union did not rely solely on the blockade to cut the South's commerce, and by 1864, Union troops occupied all of the South's ports on the Atlantic seaboard except Charleston, South Carolina, and Wilmington, North Carolina. Nevertheless, the blockade was a major contributor to the North's victory.

Equally important was the Navy's control of the Mississippi and other rivers in the west. From the summer of 1861 until the fall of Vicksburg in July 1863, amphibious warfare in the Mississippi Valley evolved from learn-as-you-go to a skillful routine. From the first flimsy wooden boats to the later ironclads, the Navy's gunboats were indispensable to Grant's succession of victories in the west. The Navy cleared the Mississippi of the Confederate fleet, cut the Confederate supply routes up the Red River and the Mississippi, and provided fire support that destroyed or tied down Confederate guns and forces that might have been employed against Union ground troops. The commanders of the river Navy, Andrew Foote, Charles Davis, and David Porter, cooperated fully with the Army. Their support was a timely benefit to the field quartermaster officers who contracted for the riverboats to transport troops and material support and arranged their movement under Navy escort. As Grant wrote in his memoirs of the last Vicksburg campaign, "The Navy under Porter was all it could be, during the entire campaign. Without its assistance the campaign could not have been successfully made with twice the number of men engaged. It could not have been made at all, in the way it was, with any number of men without such assistance." [16]

RESOURCES

The disparity in resources was striking.[17] The North had a population of 22 million, compared to the South's 9 million, of which about 4 million were slaves. The North also had a well-developed industrial base with a supporting financial system and a strong agricultural sector, while the South had, in cotton, a one-crop agricultural economy. The North had a relatively dense rail and canal network designed to support the industrial base and distribute its products, while

the South had a limited rail network focused on delivery of agricultural products to ports for transshipment. The Northern major waterways, the Ohio, Cumberland, Tennessee, Mississippi, and Potomac Rivers, along with the Chesapeake Bay, could serve as lines of communication for Union military operations aimed at the heart of the South. Many of the rivers in the Confederate States flowed west-east, so they could not be used as lines of communication. However, these rivers did provide excellent barriers for both tactical and strategic defensive operations, particularly in Virginia, and they strongly influenced strategic and tactical planning.[18] Some rivers in the west could be used as Confederate lines of communication with adequately powered steamboats and tactical control of the operational area.

The transportation requirements of the Union were far greater than those of the South. Most of the war was fought on Confederate soil, so the supply sources for Confederate forces were relatively close. Union forces had to maintain long lines of communication with all that a long supply line entailed, such as railroads, railheads, wagon trains, depots, and port facilities. The proliferation of railroads, and continued improvement of river boats and ocean-going ships powered by steam, as well as armored vessels, allowed Union forces to carry supplies and troops over longer distances faster than any army in western history. The wide use of the telegraph made this transportation more effective because assets could be coordinated over great distances. These technological advances and the ability to capitalize on them gave the Union an important edge over the Confederacy.[19]

While the railroad provided transportation for long hauls, the horse- or mule-drawn wagon continued to be the primary vehicle for logistical support for troops in the field. Army operations in enemy terrain required an average of one wagon for forty men and one horse or mule for each two soldiers, including those for officers, artillery, and cavalry.[20] Mules were used increasingly and by the end of the war were used almost exclusively for supply trains throughout the Army. As a planning factor, a campaigning army of 100,000 would require 2,500 supply wagons and 35,000 animals.[21] That factor was confirmed by Grant's army in 1864, requiring about 4,300 wagons, with a ratio of 33 wagons per 1,000 troops. The Quartermaster General required wagons to move supplies to forward depots and for the operation of each depot. The quartermaster of a field army also required large wagon trains to move supplies forward from depots, railheads, or ports to army area distribution points. The size of the trains depended on distances, road conditions, forage to be carried, and weather. For planning, wagon capacity for a good six-mule team in the best season of the year

was 3,730 pounds, plus 270 pounds of forage. Operations in the field seldom reached that level, and more realistic planning factors, considering poor roads and inclement weather, would be 2,000 pounds of baggage, 3,000 pounds of forage, or 2,600 pounds of ammunition or hospital supplies. The six-mule wagon was considered the most economical and reliable of any used.[22] Wagons and ambulances were much sturdier and durable than in prior wars and were more easily repaired in the field. Each large Union organization carried interchangeable spare parts and materials as well as portable forges and tools for blacksmiths, wheelwrights, carpenters, and saddlers. Repairs were made overnight, and units seldom abandoned a wagon.[23] When the Union Eastern and Western Armies gathered for a grand review in Washington in the spring of 1865, both forces drove wagons that had been with them the entire war.

Acquisition of animals was a major challenge to the Quartermaster General because of the many opportunities for trickery and fraud in their procurement. Nevertheless, the quartermaster developed effective systems during the war to the point that Chief Quartermaster Ingalls of the Army of the Potomac wrote in December 1864, "It is proper to state that the artillery and cavalry horses sent to the armies in the last three months have been the best received during the war." Similar comments were received from other units.[24] Forage was a tonnage and bulk problem throughout the war, as it had been in all prior wars. The factors in pounds per day for horses were fourteen of hay and twelve of grain; for mules, fourteen of hay and nine of grain. Human subsistence was three pounds per man as in the Mexican War, procured by the Commissary General for Subsistence, and transported to the field by the Quartermaster General.[25]

Except for changes in steam propulsion technology and metallurgy, water transportation changed little from the Mexican War. The experience of supporting posts in the west proved valuable. Steamboats and ships provided unlimited carrying capacity at lower cost than railroads. The principal river systems in the west favored Union operations because they flowed from north to south. Steamboats were less vulnerable to the type of guerrilla action that frequently put railroads out of action by tearing up tracks and bridges, but on rivers like the Mississippi, they needed gunboat escorts to protect them from the Confederate Navy. Confederate operations required transportation that enabled them to shift resources from east to west and the rivers became barriers rather than highways. In the east, rivers like the Potomac, York, and the James also favored the North. The disadvantages of river transport included ice in winter and seasonal low water that brought operations to a standstill. All this had to be considered in logistic planning. The chartering of river craft usually required

direct dealings with single owners because there were no large shipping companies from which the Army could hire large numbers of craft.

Planning factors for river transportation varied by sea or river conditions and the capacity of the craft, but a rule of thumb indicated that an Ohio River steamboat of 500 tons carried enough supplies on one trip to subsist an army of 40,000 for nearly two days. The same cargo carried by rail needed five 10-car trains. The difference in speed was negligible. A steamboat could travel the 702 river miles from Cincinnati to St. Louis in 70 hours, or roughly 10 miles per hour. The running time for a train along the 339 rail miles between the two cities was 30 hours (16 for passenger trains) or roughly 10.4 miles per hour, but the steamboat was doing it in a single lift. Western steamboats ranged in capacity from 250 to 1,700 tons. The total capacity was immense and able to meet both military and civilian requirements.[26] Ocean-going vessels followed the same pattern as riverboats and were used extensively by the North to support distant bases and amphibious operations.

The 1850s saw a remarkable expansion of the rail network in the United States. Although the expansion in the South was proportionally large, the overwhelming quantity of new lines was constructed in the North. This construction was the result of competition between the Erie, New York Central, Pennsylvania, and Baltimore and Ohio Railroads to tap the markets of the burgeoning states of the former Northwest Territory. Until rail linked them with the Atlantic coast, the only practical way for farms and businesses to get their products to market was along the major river systems which primarily flowed south. This created a commercial and social bond between the South and West. The railroads changed that relationship by opening the lucrative eastern markets of the nation's major population centers to the people of the West. In a short time, the West was tied to the Northeast by rail and telegraph. News took a matter of hours or days to reach the West instead of weeks and months as it had in the early 1850s. Thus, the West felt it had more in common with the North when the war began.

The Northern railroads were large companies interested in developing trunk lines to the West. In the South, the focus of the owners was local. Each rail line was designed to link agricultural areas with rival port towns and cities. They did not constitute parts of a rail system. As they generally were built in the interests of rival ports, they carefully avoided connections with other lines. By 1861, the beginnings of a rail system had been created, but in the Southeast, north-south traffic was slowed by the route configuration that required through traffic to follow arcs into and out of the main port cities. In the Mississippi

The rail yard at City Point, Virginia, 1865.

Valley, north-south traffic was more adequately developed; however, the dominant lines ran north and south servicing western and southern tier cities rather than east and west to permit easy contact with states east of the mountains.[27] In the South, several connecting lines, sometimes with different track gauges, had to be used to travel distances to the West comparable to those of the northern trunk lines.

In both the North and South, rail lines stopped and started in cities or towns with no direct connection with the next line. Cargo and passengers were unloaded and transferred to the next line by wagon or housed overnight. Local business, which profited from connecting transportation, temporary storage, or accommodating transient passengers, opposed the continuation of rails through towns. Differences in gauge, which varied from the "standard" 4 feet 8 1/2 inches to 6 feet,[28] also prevented throughput of cargo from one rail line to the

other. The situation was more prevalent in the South, but during the war, both sides wasted millions of man-hours transferring cargo because of mismatching gauges and a lack of connections. Some gauges were realigned during the war, and some lines added a third wheel per axle or third rail on their track beds, but the problem was not solved until after the war when a standard gauge was universally adopted and rail lines were connected throughout the country.[29]

Most rail lines were single track, with infrequent sidings. In 1861, rail was generally rolled wrought iron "T" section, weighing from 35 to 68 pounds per yard with some 80-pound rail laid in the North during the war. Rail iron was poor quality and some Southern lines still had main line tracks and sidings made of an iron strap affixed to a wooden "stringer" rather than solid iron rail. These wooden rails limited the capacity of the road. Forty-one miles of the Richmond and Danville Railroad and thirty-nine of the 151 miles of the Nashville and Chattanooga were still on stringers. Most rail was spiked directly to the ties without the benefits of tie plates, and the joints were secured using a British device called a "chair." This device weighed 12 pounds and was rolled to fit the tread of the rail, thus making a smooth joint. Ties were untreated and poorly ballasted, so roadbeds deteriorated rapidly, especially where drainage was bad. Bridges were frequently hastily constructed.

The most common locomotive was the "American" 4-4-0 type, with two leading wheels and two drivers of 4 to 5 1/2 feet in diameter on each side. Other characteristics were a balloon-type stack, a large cowcatcher, an oversize decorative oil headlamp, a square cab, and proportionately small boiler. There was no standardization in the size of locomotives or spare parts. A typical engine on southern lines weighed from as low as 9 tons to as much as 33 tons and on northern lines from 20 to 30 tons, depending on trackage, gradients, and load weights. The governing element in the speed of trains was usually the track. Southern trains seldom went more than 25 miles per hour. Northern freight trains, usually less than 20 cars long, averaged 11 to 20 mph. Passenger trains of five to ten cars averaged 33 mph for express and 25 mph for locals.[30] Most burned wood, although some Northern lines were experimenting with coal. A cord of wood and a ton of coal were generally equivalent in the distance they would drive a locomotive. Both fuels produced smoke and soot that descended on the passengers.

Cars were smaller than their modern counterparts but similar in appearance and function. They were made of wood with four-wheel trucks, joined with link and pin couplers, and depended on the engine for most braking. Hand-operated brakes were used for control in yards and sidings. Various uses of iron in car

construction were tested in the North. Passenger cars had open vestibules at each end, seated 50 to 60 passengers on straight-backed, wooden, sometimes upholstered two-person seats, and had oil lamps and a stove at each end. Dining cars were unknown, but some lines had sleeping cars that, according to some reports, were neither clean nor luxurious. Various models of freight cars (box, gondola, cattle, flat, dump, rack [for logs], and coal) were in use. Both sides used boxcars, cattle cars, and in an emergency, any type available for troop movements. The U.S. Military Railway Service rated boxcars to carry 10 tons or 40 men,[31] antedating the better known European "40 and 8" (men and horses) of World War I by 50 years. Light wood construction made rolling stock of 1861 easy for an enemy to burn or destroy and required frequent maintenance and overhaul. One of the most unique uses of railroads during the war was the hospital train. Initially, wounded were evacuated in empty supply cars or even cattle cars, which led to additional infection. Dr. Elisha Harris of the U.S. Sanitary Commission designed a special hospital car and "urged that special trains be operated under systemic procedures." [32] Regular hospital train service began between Washington and New York in the fall of 1862.

There were more than a dozen established locomotive and car manufacturers in the North, and they held a virtual monopoly on skilled railroad mechanics. Inventories of equipment, parts, and supplies were substantial in Northern railroads and were replenished with relative ease during the war. Northern trackage increased by some 4,000 miles from 1860-1865. This does not include rebuilding roads in occupied areas of the Confederacy or improving existing facilities. Southern lines imported most of their rolling stock, rail, tools, and spare parts from the North or from England. Inventories were marginal and heavy wartime use rapidly depleted stocks. The few manufacturers capable of building engines, cars, or rails also manufactured weapons and other military equipment. Rail, always in short supply, was also used to armor ships which increased the difficulty of repairing damaged road beds. Neither Northern or Southern lines began the war with adequate terminals, loading facilities, interchange yards, machine shops, engine houses, and storage facilities. However, the Northern lines were in much better shape than the Southern lines and were able to finance and construct some facilities to help meet the immense increases in wartime traffic, but the South could not.[33]

The Union's rail system was a key factor in the superior mobility and quality of logistics support of its armies. Nevertheless, in spite of its limitations, the rail system of the South provided the Confederate States the potential to

move troops and logistical support from one battlefront to another, a definite advantage for a smaller nation defending itself against a larger adversary.[34]

TRANSPORTATION ORGANIZATION

When Quartermaster General Jesup died on 10 June 1860, his department was authorized thirty-seven officers and eight storekeepers. In installations across the country, more than fifty regimental officers were post quartermasters. Most of these positions were filled by younger officers on the frontier who became key quartermaster leaders during the war. Infirmities and deaths of aged incumbents, resignations of Confederate sympathizers, appointments to combat commands, and long delays in bringing experienced officers in from the West left the Washington offices of the quartermaster severely understaffed at the start of the war. On 3 August 1861, Congress authorized the department sixty-four officers, the only increase during the war. Among those who resigned to join the Confederacy was Brig. Gen. Joseph E. Johnston, recently appointed to replace Jesup. His replacement was Col. Montgomery C. Meigs of the Engineer Corps. Meigs was well-known for designing and building the Washington City water aqueduct and superintending the construction of the wings and dome of the Capitol. At 45, he was promoted from captain to colonel of the 11th Infantry Regiment for his part in working with President Lincoln on the secret expedition to reinforce Fort Pickens in Pensacola Bay at the time Fort Sumter was under siege. Despite his desire for a combat command, he was appointed Quartermaster General on 12 June. Fortunately for the Union, his selection to the second most important position in the Army was equivalent to that of Jesup in 1818. Meigs, like his predecessor, was a man of impeccable character, a superb organizer, aggressive, and imaginative in taking on the massive tasks of wartime support of the Army. As General Scott stated, Meigs demonstrated "high genius, science, vigor, and administrative capacities." Much of the credit for the successful logistical support of the Union Army belongs to Meigs.[35]

Simon Cameron was a Pennsylvania politician who became Lincoln's first Secretary of War because his delegates supported Lincoln's nomination in the Republican Convention. Many of his fellow Republicans felt he was a man "destitute of honor and integrity,"[36] but Lincoln honored his obligation and appointed him. Cameron, intent on patronage, ignored the established supply and transportation functions of the Quartermaster Department and used personal appointees to perform some of those functions.[37] Cameron first reopened communications between Washington and the Northeast to bring in troops and protect the capital. Thereafter, he reestablished passenger and freight movement

to and from Washington. Cameron appointed Pennsylvania Railroad (PRR) president, J. Edgar Thomson; PRR vice president, Thomas A. Scott; and Philadelphia, Wilmington and Baltimore president, Samuel M. Felton, to coordinate and direct movement of troops and supplies to Washington. They were among the ablest railroad men in the country and quickly established alternate rail and water routes, aided initially by Butler's efforts.[38] Cameron subsequently appointed Scott Assistant Secretary of War in August 1861 and appointed John Tucker, a Baltimore businessman and railroad president, as general agent of transportation to the War Department, but his duties were later restricted, primarily to water transportation. These appointees acquired transportation through brokers instead of seeking competitive bids and paid the railroads high local rates rather than through rates. These procedures caused many problems for General Meigs who was trying to regularize procedures by having assistant quartermasters sign contracts for transportation.

The confusion of the early days of the war gradually gave way to sound management. In 1862, the House created a committee to investigate Cameron's activities, but Lincoln had sent him to Russia and appointed Edwin M. Stanton of Ohio as Secretary of War. Stanton, incorruptible and efficient, swept away every vestige of the Cameron regime and stopped the seat-of-the-pants method of management prevalent during the early period of mobilization. Under the new secretary, Meigs reasserted and tightened the Quartermaster Department's control of commercial railroad transportation use and rates. By then, the Northern economy was geared for war production, and Stanton and Meigs worked successfully to make the Union Army the best fed, most lavishly supplied, and best transported army in the world.[39]

The understaffed department managed the responsibilities of the Washington office and reviewed the thousands of accounts and reports submitted by quartermasters in the field, as required by law. By the time Meigs' requests to Congress for more clerks were granted, the responsibilities of the department had already outgrown the new authorizations. Meigs was responsible for three main areas: clothing and equipage, transportation by land and water, and regular and contingent supplies. To effectively control his growing responsibilities, he gradually instituted unofficial organizational divisions of responsibility within each area. In 1864, he received authorization from Congress to organize nine divisions in his office, each headed by a colonel and programmed to last the duration of the war plus one year. The transportation-related divisions were: first division - horses and mules; third division - ocean; fourth division - rail and river; fifth division - forage; and

seventh division - wagons and roads. The quartermaster divisions in Washington focused primarily on procurement while the operational responsibilities were assigned to the quartermasters in the field.[40]

Except for a few engineer, ordnance, and signal corps units, the Army had no specialized service troops. Transportation activities in the field were operated by quartermaster officers within the structure of the Army's geographical departments, which were sometimes grouped together in a geographical division. Often they were assisted by civilian employees who were contracted or hired directly by the local quartermaster. Mobile forces of a department were designated as an "army" or an "army corps," and the commander of the department was also commander of the army. This arrangement caused jurisdictional problems when a mobile army moved into an adjoining department. There was no general staff corps, but commanders had the rudiments of a general staff in the aides they were authorized, as appointed by the President with the advice and consent of the Senate. They moved with the commander when he was transferred. The heads of the War Department Bureaus designated their field functional chiefs, such as, chief quartermaster of an army corps, who stayed with that corps regardless of the reassignment of commanders. Armies, corps, divisions, and brigades all had officers assigned from each of the departments to act for the unit in the technical functional area, such as quartermaster (supply and transportation) and ordnance. Each regiment had a single supply officer (the regimental quartermaster), a lieutenant nominated by the regimental commander for appointment by the Secretary of War who obtained all supplies (and services) except ordnance. An ordnance sergeant was responsible for obtaining arms and ammunition for the regiment and keeping them in good repair. General depots were directly under War Department bureaus, but army commanders had the authority to establish depots in the field as needed. In the field, an army normally established a "grand depot" as a base which was accessible to transportation from rear and front, and remote enough from planned battle areas to be relatively secure from hostile action. During offensive operations, advance depots were established to reduce troop unit turnaround time. The grand depots of the armies were supported by the major depots of the supply bureaus, usually located in key cities. The huge quartermaster depot at Washington had twelve branches including those for acquisition of all forms of transportation to move supplies to the armies.[41]

President Davis, a former U.S. Secretary of War, created a Confederate support structure similar to that of the Union Army, modified to reflect the limited resources and the scope of operations of the Confederacy. The logistics

functions were hamstrung from the start. There was a significant lack of appreciation by the Confederate leadership of the magnitude of the task before them and they did little logistical planning. States that had just seceded from the Union because of too much Federal control were strongly opposed to the centralized control of resources by the Confederate government. Businesses such as the railroads also objected to central control. Most importantly, the South had insufficient resources and eventually had to rely on increasingly stringent measures, such as impressment, to meet troop needs, thereby alienating the populace.[42]

The Confederacy initially set up depots at Montgomery, San Antonio, Charleston, New Orleans, and Mobile. After the second secession, additional depots were established at Nashville, Lynchburg, and Richmond, to the immediate rear of the armies forming in Tennessee and Virginia.[43] They also established a forward depot at Manassas. The quartermasters of the field units were ostensibly appointed by the Richmond bureau chiefs, but they were actually selected by their commanders and felt first loyalty to them.[44] The effectiveness of support diminished as the distance from Richmond increased. Quartermasters in remote areas managed the best they could.[45] However, the Confederate States, as an adjunct to their strong states' rights position, also felt a responsibility for the support of their citizen troops. This took some of the pressure off the quartermasters and was an important factor in maintaining a marginal level of support. The greatest failure in the quartermaster organization was its management of field and rail transportation. Officials worked zealously to obtain animals and wagons and to repair worn equipment, but they could not keep up with requirements and inadequate field transportation contributed to the growing immobility of Confederate forces in the later years of the war. One of the most destructive practices in the Confederate Army was the requirement for cavalrymen to provide their own mounts. If a trooper lost his horse, he was sent home on furlough to procure another horse, or in the slang of the time, he was assigned to "Company Q." This meant that as many as 30 percent of a unit might be away at any given time. The Union Army avoided this by issuing horses. In spite of deficient resources and inadequate supply and transportation management and support, the Confederate government produced a workable system from scratch and for four years supported its armies in the field. Despite legends to the contrary, the Confederate Army was defeated by its inability to replace casualties, rather than by lack of support.

Both Union and Confederate Quartermaster Departments shared Jesup's half century of developing regulations, systems of accountability, and testing of

procedures in war and peace. However, there was no general staff, no strategic or mobilization plans, or any body of doctrine on either side. To make matters worse, experienced members of the department were spread thinly throughout the army. True to American tradition, both the Union and Confederacy began preparing for the war after it began. The Civil War was a political war, a war of peoples rather than of professional armies. Therefore, political leadership and public opinion weighed heavily in the formation of strategy and the allocation of resources. The experience needed to fight the war had to be gained during the war itself.[46]

TRANSPORTATION OPERATIONS

Transportation considerations were pervasive in the strategy and tactics of the war. There was scarcely a campaign, battle, engagement or raid in which transportation was not a major factor in establishing the objective, marshaling and maneuvering forces, and/or planning and executing logistical support. Objectives frequently were set to control or deny the enemy's use of railroads and junctions. Cavalry raids concentrated on the destruction of enemy rail and other transportation facilities. Imaginative use of transportation resources often provided the margin of success in campaigns. Early in the war, Union leaders recognized the need for governmental control of the unique new "military" transportation mode - the railroads. In January 1862, Congress authorized the President to seize any or all rail lines and make them a part of the military establishment. In May, Lincoln formally took military possession of all railroads in the United States and directed them to stand ready to transport troops and ammunition, but he wisely left their operation in the hands of their owners. Government operation was implemented only rarely, as in running the short lines around Gettysburg for that campaign. The Congressional authorization included railroads in the South, and those captured and constructed in the war zone were operated by the Military Railway Service. It was largely those military railroads, under the leadership of Col. Daniel C. McCallum, a former Erie Railroad executive and very efficient administrator, that performed the significant portions of large-scale support of the armies in the field. The organization reached a total strength of 25,000, including trainmen, dispatchers, and superintendents who were civilian employees of the government. The U.S. Military Railroad operated over 2,100 miles of railways with 419 engines and 6,330 cars.[47]

The successful operation of the military railroads was mainly due to the appointment of Hermann Haupt, colonel and Chief of Construction and

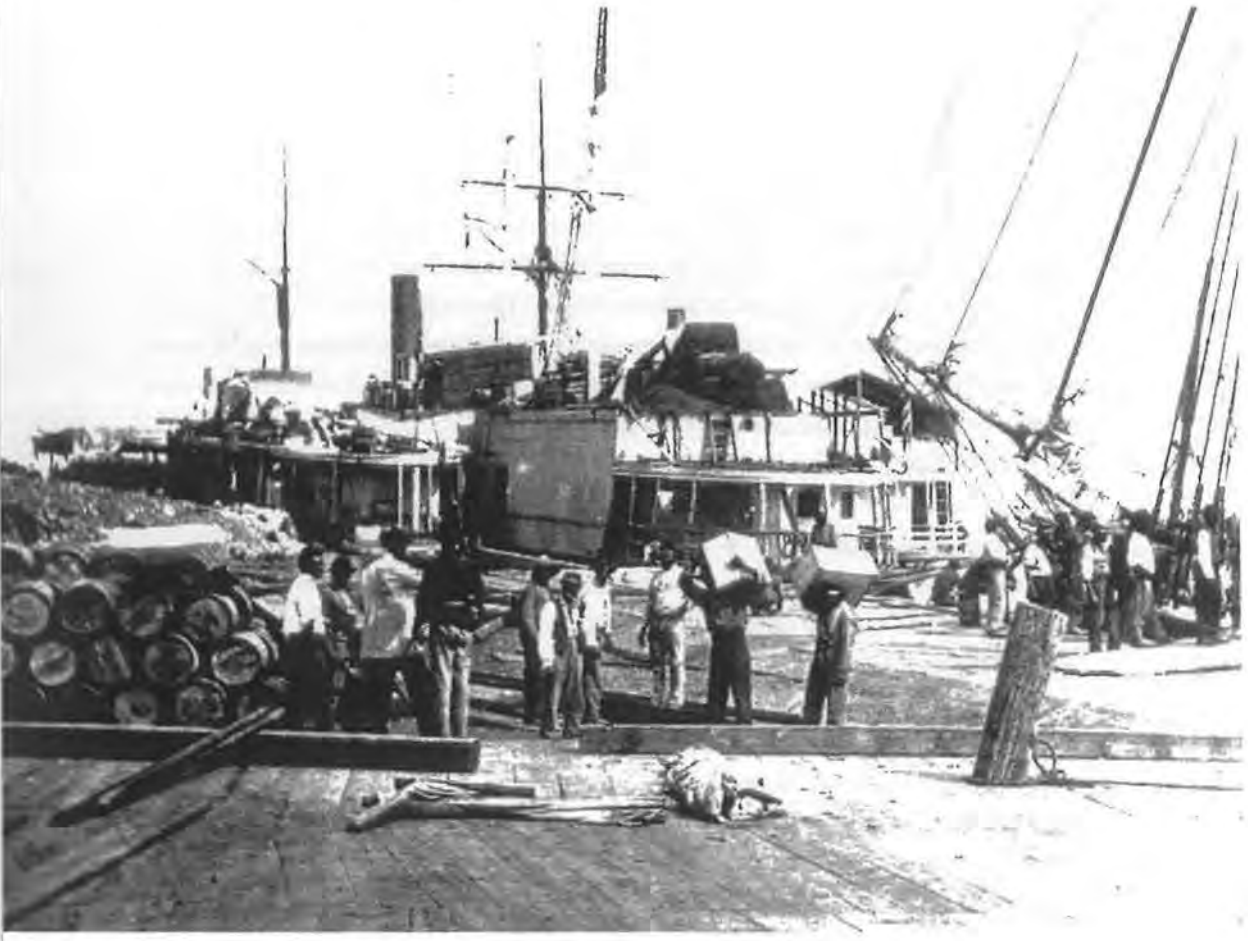
Transportation of the Department of the Rappahannock in April 1862. Haupt, a West Point graduate and former general superintendent of the Pennsylvania Railroad was an engineering genius. His reconstruction of the Richmond, Fredericksburg, and Potomac Railroad line from Alexandria to support an abortive campaign against Richmond bordered on the miraculous. The feat included bridging the 400-foot-wide, 80-foot-deep chasm of Potomac Creek. The destroyed bridges had taken a year to build, yet Haupt and his newly recruited, unskilled civilian work force built the cribbing, trestles, and track rising 80 feet above the water in 12 days. After looking at the bridge, Lincoln said "I have seen the most remarkable structure that human eyes ever rested upon. That man, Haupt, has built a bridge . . . over which loaded trains are running every hour and upon my word, gentlemen, there is nothing in it but beanpoles and cornstalks."[48] Haupt supported rail operations in Virginia and the Army of the Potomac campaigns at Antietam and Gettysburg until September 1863, when he was relieved by Secretary Stanton for complex reasons not reflecting his outstanding performance in the field. Haupt developed and instituted construction innovations and operational policies that markedly improved rail support. His influence was felt Armywide through the proliferation of his ideas, one of which was emphasis on the overriding necessity for prompt unloading of trains. This was periodically reiterated by the Secretary of War and by subordinates who moved to positions in the Western theater. [49]

Government supervision of railways in the South never approached that of the North. Two reasons for this failure were the emphasis on states' rights and the unwillingness of the railroads to come to contractual agreements on the exchange of rolling stock. Nearly every road represented a state, county, or municipal interest of the most vital sort, and it was difficult to develop united solutions to the complex problem of railroading in an intensely competitive environment.[50] President Davis appointed William S. Ashe, president of the Wilmington and Weldon Railroad, to the rank of major as assistant quartermaster in charge of rail transportation to Confederate armies in Virginia, the first of a series of coordinators who were never able to establish control of the Southern railway network. Ashe selected assistants of known ability and established regulations, but was unable to stop the use of freight cars, which were in short supply, for storage, nor was he able to cope with damage to rail lines from wrecks and Union raids. Ashe resigned to take a combat command in April 1862.[51] William M. Wadley, a self-made man and a recognized railroad expert and troubleshooter, followed Ashe in December 1862.[52] Wadley developed a number of practical proposals for controlling the railroads which

culminated in a strong railroad bill passed by the Confederate Congress in April 1863. For reasons never fully explained, Congress rejected Wadley as head of the Railroad Bureau and appointed his assistant Capt. Frederick W. Sims, to head the bureau. Inexplicably, Davis' government failed to implement the new law, but Sims was a capable administrator. Faced with a contracting and deteriorating rail system, he accomplished a great deal with few resources for the remainder of the war.

The South's limited railroads did not allow it to take full advantage of interior lines of communication. There were not enough lines, and those in existence were not well located to support operations. The system had gaps in design and mismatched gauges prevented continuous travel by rail for critical moves. The lack of equipment and the inability to repair damaged track and rolling stock were exacerbated by the Union blockade. The effects of those weaknesses were intensified by the government's failure to make the most of resources available.[53] Nevertheless, Confederate railroads performed some impressive troop movements. One occurred in June and July of 1862, when 25,000 troops of Bragg's Army of Tennessee covered a distance of 776 miles from Tupelo, Mississippi, to Mobile, Alabama, and then on to Chattanooga, over a total of six railroads, while the horse-drawn elements moved overland. The move prevented Union forces from taking Chattanooga which was key to the Confederate line of communication from Richmond to the lower Mississippi valley.[54] The transfer in September 1863 of Longstreet's First Corps from the Army of Northern Virginia was the decisive factor in the Confederate victory at the Battle of Chickamauga, north of Atlanta. These moves demonstrate the South understood the importance of railroads to strategic mobility.[55]

The Union and the Confederacy had different attitudes toward railroads in the combat area. From the first, Southern strategy was to destroy lines likely to be used by the North for invasion of the Confederacy. Bridges and facilities were burned, tracks ripped up and rolling stock that could not be evacuated was destroyed. Because they were advancing, Union forces attempted to capture railroads intact for their own use. Only in rare instances, such as Sherman's campaign through the South, when he did not intend to occupy the territory traversed, were railroads regularly destroyed. In Northern Virginia, the scene of titanic struggles between Lee and several adversaries, armies marched and countermarched across the same ground, continuously attacking each other's rail lines as well as troops. The more exposed lines and bridges were rebuilt a number of times, primarily by the Union Railroad Construction Corps.[56]



Stevedores at City Point, Virginia, 1865.

One of the factors that contributed greatly to the victory of the Union was not only its abundant resources, but its ability to coordinate transportation on both land and water. Steamboats were as important as the railroads, especially in the West. Throughout the war, campaigns were launched to gain control of major rivers, and Naval operations to seize coastal operating bases such as New Orleans were similar to those used to seize or destroy rail facilities.[57] Steamboat troop movements were as dramatic as large rail movements. In February 1862, Grant moved 15,000 men by boat up the Ohio and Tennessee Rivers to capture Fort Henry in northern Tennessee. He then moved part of the force 110 miles by river to take Fort Donelson on the Cumberland. The loss of Donelson smashed the Confederacy's "long Kentucky line" and eventually resulted in their forces falling all the way back to Corinth, Mississippi. In early 1865, the 15,000 men

of Maj. Gen. John M. Schofield's Twenty-third Corps were transferred 1,400 miles from southwest Tennessee via the Tennessee and Ohio Rivers to Cincinnati. From Cincinnati, they went by rail to Washington and then by coastal vessel to the Cape Fear area of North Carolina on the Atlantic coast to attack toward Wilmington. Also in 1865, the Sixteenth Corps with 17,314 men, 3,400 horses and mules, and 435 wagons and ambulances were moved in forty steamboats from Eastport on the Tennessee River, via the Ohio and Mississippi, 1,330 miles to New Orleans in thirteen days. The extensive use of waterways complemented the railroads and ensured they were not overburdened.[58] Several campaigns stand out as excellent examples of transportation as it applied to both the strategic and operation levels of war.

Very early, Confederate leaders recognized the first major stand in defense of the South would be made in Virginia and assigned all the troops in the state to Lee's command. Lee established a force of 12,000 men under General Joseph E. Johnston in the Shenandoah Valley and built up the "Manassas Line" consisting of 24,000 men. The line was commanded by Maj. Gen. P.G.T. Beauregard and supported by a major supply depot in the vicinity of Manassas Junction. The Union had Maj. Gen. Irvin McDowell's army of about 35,000 men in Fairfax, across the Potomac from Washington, and an army of about 18,000 under Maj. Gen. Robert Patterson near Harper's Ferry. The objective of McDowell's 35,000-man Union army was Manassas Junction. Patterson was to keep Johnston's forces pinned down and unable to reinforce Beauregard. A successful attack by McDowell would deny the Confederacy the use of Northern rail lines and terminals; therefore, the capture or retention of a transportation resource was the key objective of each side at Bull Run, in the first major battle of the war.[59] Patterson, cautiously advancing toward Winchester on 16 July, was convinced that Johnston outnumbered him 2 to 1 and withdrew to Harper's Ferry calling for reinforcements. The same day, McDowell's army marched from Fairfax and made initial contact with the Confederates along Bull Run Creek two days later on the 18th. Probes by both sides to establish the enemy's position went on through the 20th. Meanwhile, the Confederates used the Manassas Gap Railroad to carry the bulk of Johnston's troops to the battlefield. They arrived just in time and turned the tide of battle in the South's favor. The disorganized Federal forces fled to Washington, but the equally disorganized Confederates were unable to pursue.

Not all of the Confederate troop movements made by rail were as successful as Johnston's. Some did not arrive until after the battle. Lack of coordination in rail support proved to be typical of many Southern rail

operations.[60] First Bull Run forced many to come to grips with the costs and casualties of the war and enhanced the appreciation of the role that transportation was to play.

After the defeat of the Union Army at Bull Run, Maj. Gen. George B. McClellan replaced McDowell as commander of the Union army in the east. McClellan was a superb organizer and planner but had difficulty with commanding the army in the field. In response to Lincoln's insistence that action be taken to destroy the enemy, McClellan devised a plan to outflank Confederate forces by capitalizing on the North's control of sea and river routes. The Union Army would be transported to the small port of Urbanna on the Rappahannock River, and attack west, cutting Johnston off from Richmond and forcing him to fight on ground of the North's choosing. The plan was a bold one, but McClellan was convinced that the enemy's strength always exceeded his own, which caused him to hesitate and request reinforcements. The delays gave Johnston, now the Confederate commander, time to abandon his supplies in Manassas and withdraw south of the Rappahannock to a more defensible position. McClellan modified his plan and landed his forces at Fort Monroe, intending to drive the 70 miles up the peninsula to Richmond, supported by a secure water line of communication and crossing only two rivers. The plan had merit compared with a 100-mile attack from Washington, crossing several rivers, and supported by a rail line of communication subject to constant cavalry raids. Lincoln was concerned that the plan laid Washington open to attack by Johnston, but approved it contingent on sufficient troops being left in the area to defend Washington.

In early March 1862, Secretary Stanton and Quartermaster General Meigs assembled about 400 ships and barges and over a three week period transported McClellan's army of more than 100,000 men, 300 cannons, 3,600 wagons, 700 ambulances, 25,000 military animals, 3,200 cattle for subsistence with 600,000 rations from Washington and another 2.5 million directly from New York, and mountains of equipment to the Peninsula. Paralyzed by his fear that he was outnumbered, McClellan with 70,000 men, failed to attack a Confederate force of only 13,000 at Yorktown and brought up sappers and heavy guns to begin a siege. During this delay, Johnston's whole force was shifted to delay the Union advance at Yorktown as long as possible. When Johnston inspected the defenses, he stated that "No one but McClellan would have hesitated to attack." On 3 May 1862, Johnston withdrew in good order toward Richmond, fighting a delaying action at Williamsburg which enabled the rest of the army to get away with its artillery and wagons.[62] McClellan followed slowly.

Although the bulk of McClellan's forces were south of the Chickahominy River, he set up his headquarters and depot at White House, Lee's plantation (where Mrs. Lee was still in residence until escorted to Richmond). The site was above the head of navigation of the York River, north of the Chickahominy and on the Richmond-York River Railroad, little damaged during Johnston's withdrawal. Five locomotives and eighty railcars were shipped from Alexandria to establish the railroad as the backbone of the line of communication to Richmond. A huge concentration of steamboats and wagons forwarded support shipments from Fort Monroe to White House and retrograded casualties from there. Support to the field was sent by wagon and rail both north and south of the Chickahominy.[61]

From the outskirts of Richmond, Johnston mounted an attack on 31 May 1862 (the Battle of Fair Oaks) against Union forces north and south of the Chickahominy River, hoping to convince McClellan to call off his offensive. The battle was plagued by poor Confederate staff work and inept execution and Johnston was so seriously wounded that Robert E. Lee was assigned to replace him. Lee immediately attacked, convincing McClellan that he was indeed outnumbered. The Union commander became more cautious and continued to request reinforcements. He found excuses not to attack and on 25 June wired Stanton that "the rebel force is stated at 200,000" though it was less than 90,000.

In the succeeding campaign on the Peninsula, known as The Seven Days' battles, Lee sent for Jackson to move secretly from the Shenandoah Valley and hit McClellan's exposed right in order to defeat the Union Army in detail. Jackson moved on the Virginia Central Railroad from Charlottesville with only a single track and 200 cars and over terrain that was marshy unlike the wider dry roads of the Shenandoah. Jackson arrived late and in the Battle of Mechanicsville on 26 June failed to attack the Union exposed right flank in conjunction with other Confederate attacks. This gave the Union much the best of it in the battle. Despite the heavy Confederate casualties in this and subsequent battles, McClellan was psychologically beaten. Both Fraser's Farm and Malvern Hill were actually Union victories, and his logistical arrangements were well thought out, but McClellan decided to retreat. On 18 June, McClellan began transferring his base of operations and headquarters to Harrison's Landing on the more secure line of communication of the James River. McClellan's army successfully completed its crab-like movement to the James with herculean efforts by field transporters. They did so with the destruction of supplies and equipment, by running full train loads into the river, burning rows of tents with whisky-soaked hay (from sutler stores), blowing up ammunition dumps, and

burning other equipment.[63] McClellan was convinced he could not take Richmond without reinforcements. Lincoln offered him 50,000, but McClellan responded this would not be enough and Lincoln ordered the army recalled. Ably executed by quartermaster transporters, the army was returned to Washington and Richmond was saved, prolonging the war.[64] Despite the dismal failure of McClellan as a general, the Union Army had been superbly supported logistically. It was only the beginning.

Vicksburg, overlooking the Mississippi from a 200-foot bluff near a hairpin turn on the river, was known as the "Gibraltar of the Confederacy" and it was no empty nickname. Earlier attempts to take Vicksburg by attacking from the east had been repulsed and assault of the heights north of Vicksburg would be too costly. The west bank of the river was flooded bayous and swamps, impassable to anything but foot troops. However, after testing a number of alternatives, Grant formulated a plan in close coordination with Admiral Porter. They decided to cross the Mississippi from their position north of Vicksburg and bypass the city on the west bank with foot troops, while Admiral Porter's gunboats and troop and supply transports ran past the Vicksburg batteries to rendezvous with the foot troops on the west bank. Then the troops, ferried across the river, would march east, capture Jackson, the capital of Mississippi, and the key node in line of communication support of Vicksburg. After the capture of Jackson, the army would reverse direction and attack west to take Vicksburg. The plan depended on the Navy bypassing Vicksburg safely, as there would be no going back upstream against a five-knot current past the batteries.

Volunteer troops manned the transports after civilian crews refused to risk the trips. On the dark night of 16 April, the convoy of eight gunboats escorting seven transports moved out and, despite the Confederate's heavy shelling, made it through with the loss of only one transport. Grant immediately ordered more transports with rations to move by the 22d. Seven transports, towing 12 barges with 700,000 rations, ran the batteries, and six got through. Grant planned for ammunition and hard bread to be the only items supplied by the base established at Grand Gulf to be shipped automatically regardless of requisitions. The army struck off toward Jackson and the troops were instructed to live off the land. Starting out with no trains and two days' rations in haversacks, the army collected wagons as well as food and forage. In twenty days, Grant's army marched 200 miles, fought five successful battles, seized Jackson, destroyed railroads in the vicinity, marched on Vicksburg, using the Vicksburg and Jackson Railroad as a LOC, and, after trying twice to fight its way in, invested

Vicksburg under siege. Grant's quartermaster and transporters quickly established a line of communication from the north and a forward depot to keep the Union forces well-supplied as well as outfitted with siege guns and equipment. Vicksburg, the most important transportation-related target of the war, capitulated on 4 July, the same day Lee began his retreat from Gettysburg. The fall of Vicksburg led to the early surrender of Port Hudson, the last Confederate garrison on the river, which allowed unarmed Union merchantmen to sail unmolested from St. Louis to New Orleans. As Lincoln said, "The Father of Waters goes unvexed to the sea." The Confederacy was cut in two.[65]

Atlanta was the transportation hub of the central south as well as the site of factories, depots, and munitions, which supported the armies of the Confederacy. It was also a symbol of resistance and nationality, second only to Richmond, and its capture became a Union political objective overshadowing the military objective to destroy Johnston's western Confederate Army. Johnston's failure to take all the defensive measures expected by the Confederate leadership led to his dismissal and replacement on 17 July by one of his corps commanders, John B. Hood, described by Lee as aggressive, but too reckless. Lee said he was "all lion, none of the fox."[66]

Sherman's campaign to seize Atlanta was a model of logistics planning, with Sherman as the chief logistician, ensuring that everything possible was done to keep open the long, precarious rail line of communication that supported his three armies. In contrast, the march to the sea was marked by almost a total lack of support bases and supply lines, as he was marching toward support bases on the coast and could live off the land. For the Atlanta campaign, Louisville continued to be the primary base (supplied by the major departments), with advance depots at Nashville and Chattanooga expanded into secondary bases, and new advance depots established at Knoxville and Johnsonville, Tennessee. To maintain mobility for the march, Sherman ordered each man to carry food and clothing for five days. Each regiment was limited to one wagon and one ambulance, and officers of each company were permitted one pack animal for baggage. Tents were forbidden. Sherman insisted on moving reserves forward and keeping on hand in the wagon trains' twenty days' food supply as a safety level to cover interruptions to his fragile line of communication. When the rivers were low, supplies from Louisville had to come 185 miles to Nashville, then 150 miles to Chattanooga, from there by single track rail another 150 miles to Atlanta. He calculated a need for 130 carloads a day to support the campaign, but rolling stock limited the throughput to about 90 carloads. He issued an order that all cars arriving at Nashville were to be retained for use forward. Soon, cars

from all over the north appeared on the military railroad in Georgia. Reconstruction of the railroad, south from Chattanooga by the Construction Corps, went forward with the armies and at no time were the trains more than five days behind General Sherman. Strong detachments were stationed on the lines to keep them open, but the secret to maintaining the supply line was rapid repair as no defense force could protect the total route against determined enemy raiders. A contemporary Confederate soldiers' joke was that Sherman carried duplicate tunnels along with trainloads of ties, rails, and bridging timbers. On one occasion, a Northern train got through a stretch of repaired area before the Confederate cavalry leader could return and report the track damaged.[67]

Tactically, Sherman pushed the Confederates back in a series of envelopments that threatened their rail communications with Atlanta, and eventually threatened encirclement of the city. Hood evacuated Atlanta on 1 September after destroying all the supplies he could not carry. The news of Atlanta's fall ensured Lincoln's reelection.[68] In Sherman's own appraisal of the campaign, he took greatest pride that "for 100 days not a man or horse has been without ample food, or a musket or a gun without ammunition." His first and last major concern was getting supplies to the troops. The quartermaster supply and transportation people throughout the entire chain of support performed magnificently, greatly aided by the senior tactical commander's personal interest.[69]

Hood's army withdrew to the south, but immediately initiated operations against the Union line of communication north of Atlanta in an effort to lure Sherman north and out of Atlanta. Sherman followed, but soon realized he was being led on a wild goose chase and turned his attention to further offensive operations into the heart of the Confederacy.[70] He saw his role in marching from Atlanta to Savannah as joining forces with Grant to overwhelm Lee. To accomplish this he had to shift his base to the coast and the best way to nullify the Confederate threat to his line of communication was to abandon it. Before he marched toward the coast with the major part of his command, Sherman left sufficient forces under Thomas to watch Hood and defend Tennessee. Breaks in the railway line were repaired to collect necessary supplies in Atlanta and return excesses to Chattanooga and Nashville. Each soldier received a complete set of clothing and shoes. Wagons were repaired and loaded with rations, forage, ammunition, and other supplies. Before leaving, Sherman's men tore up the tracks of the Atlanta and South Side Railroad to Chattanooga for some 35 miles northwest of Atlanta.[71]

Sherman's force comprised about 62,000 (including civilian attendants), 35,000 horses and mules, 2,500 six-mule wagons, and 600 two-horse ambulances. The wagons carried twenty days of rations, five days of forage, and 200 rounds of ammunition for each man and artillery piece. In addition, 3,400 beef cattle accompanied the march. The Army was organized in four corps and moved out between November 10 and 15. Each man carried forty rounds of ammunition and three days' rations. Baggage was held to a minimum and tents were prohibited. Personal support equipment such as cooking pots were consolidated by mess groups. For resupply and augmentation of wagons, foraging parties of about fifty men per brigade were oriented on the day's march and intended stopping place. They fanned out before daylight five or six miles to the flanks of the column, collected food for men and animals in light wagons, then rejoined the column and turned rations over to the brigade commissaries. Captured cattle and sheep were herded along until needed. Enough horses, mules, and beef cattle were commandeered so that when they reached Savannah they had more than when departing Atlanta. Quartermaster General Meigs had convoys off the coast to completely resupply Sherman's army with everything he anticipated they would need. Sherman captured Fort McAllister, south of Savannah, to reestablish a support base and then turned north to attack. Confederate forces retreated north and Savannah fell on December 20.[72] By his march, Sherman demonstrated that armies need not be tied down to bases and proceeded to march through the Carolinas with a force of similar size and composition, covering 425 miles in 50 days. As in Georgia, the Army lived off the country and destroyed enemy resources and installations as it went. However, Sherman's campaigns were unique and could only succeed in a fertile countryside while keeping on the move. Nevertheless, Sherman and his officers had to pay strict attention to transportation requirements while on the march in order for these campaigns to succeed.[73]

The most outstanding Union logistical feat of the war was the movement and support of the 125,000-man Army of the Potomac from positions north of the Rapidan River to the south bank of the James River, in six weeks of almost steady fighting. Army Quartermaster Rufus Ingalls developed plans, procedures, and innovations to eliminate problems that developed during the Peninsula campaign. For control purposes, each wagon was marked with the numbers and symbols of its corps, division, and brigade, and its cargo (forage, ammunition, and bread). When a wagon was emptied, it went back immediately to the depot to be reloaded with the same cargo. Support during the battle was so effective

that Grant declared there was never a better organized corps than the quartermaster corps of the Army of the Potomac in 1864.[74]

For the siege of Petersburg, which turned into the type of trench warfare that later characterized World War I, the Union established a supply depot at City Point at the confluence of the Appomattox and James Rivers. It grew into the greatest advance base of the war and the largest U.S. logistical base prior to World War II. Though the accomplishments were astounding, they were, by this time, part of a well-managed routine. Commodities such as food, lumber, coal, fodder, and ammunition were segregated and handled at separate wharfs. Stored at City Point were millions of rations of food and fodder. There was also a laundry, a bakery, and a huge hospital. An eleven-mile railroad led directly to the trenches at Petersburg delivering up to 1,400 tons of cargo a day when the Confederates were unable to get flour and bacon from Richmond, 21 miles away.

The transportation system of the U.S. Army that matured during the Civil War was the prototype of that required for a modern war in the Industrial Revolution. It had taken years of thought, hard work, and, in many cases, trial and error, to build a military transportation system that was undoubtedly the finest in the world. Unfortunately, it would be dismantled in fewer years than it took to build.

CHAPTER IV

The Years of Expansion to World War I

"A well equipped and organized transportation service
is a necessary adjunct to every army in the field, and its
absence. . . has resulted in more disasters and
defeats and unsuccessful
marches and campaigns than perhaps any other cause."
Lieutenant Colonel Charles G. Sawtelle,
in a report to the QMG, 1884.

THE FRONTIER

The Mexican War accomplished a major territorial goal of "Manifest Destiny" by extending the United States to the Pacific. Shortly thereafter, the discovery of gold in California and the promise of cheap land lured thousands west. The journey cross-country to the various territories was arduous and fraught with danger. The "roads" described in Captain Marcy's *The Prairie Traveler,* published in 1859, were little more than dusty or muddy tracks, depending on the season. The terrain the traveler had to traverse defied imagination. The Great Plains, known as the "Great American Desert," was a vast tract of featureless land in which the unwary traveler could get disoriented and lost. While not a lifeless wasteland like the Sahara, flowing water was not plentiful and travelers could easily die of thirst if they carried insufficient water. Native grasses supported vast herds of the American bison, called buffalo, and Indian ponies, but could not support grain-fed eastern horses, putting the U.S. Army at a distinct disadvantage. West of the plains were the Rocky Mountains and to the southwest were real deserts.

By the 1850s, the United States government succeeded in pushing all but a few Indian tribes west of the Mississippi River, which would keep the Indians away from the "civilized" parts of the United States. Small Army posts scattered throughout the Trans-Mississippi area were seldom occupied by more than a few companies. The Army garrisons were intended to protect the immigrants,

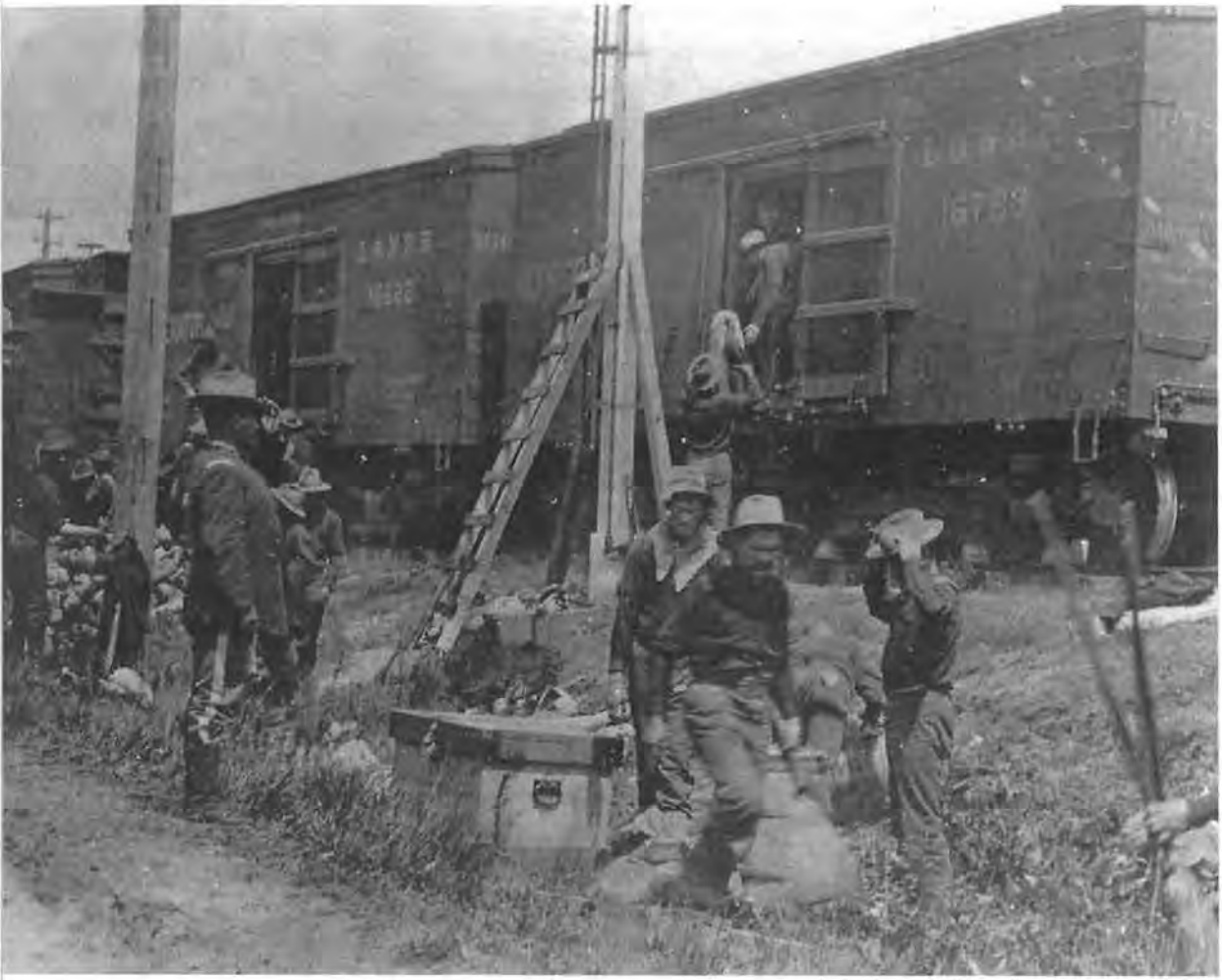
traders, stages, and freight lines that crossed the West with increasing frequency. They accomplished this mission by punishing tribes which raided farms and settlements. The task was made exceptionally difficult because there was never an easily recognizable enemy. The Indian tribes west of the Mississippi were, for the most part, nomadic. Government, as the white man knew it, was nonexistent and chiefs seldom had more than a tenuous control over their tribes. War and raiding were looked upon as manly and profitable, so chiefs who sincerely desired peace could not prevent more aggressive members of the tribe from going raiding. The contemporary solution to the problem was to keep the tribes on reservations and give them annual gifts of food, clothing, and weapons while trying to civilize them and turn them into farmers. It was a policy that might have worked eventually, but misunderstandings, broken promises on both sides, and the inability of the leaders on either side to control their people invariably led to conflict. Adding to the trouble were agents of the Bureau of Indian Affairs who were placed on the reservations to administer policies of the government and provide for the Indians. Many Indian agents were more concerned with lining their own pockets than the welfare of the Indians, who eventually realized what was happening. Another, and far more serious, problem was the large number of white settlers who perceived the Indian as a threat and demanded his extermination. Lines of jurisdiction between the Army, the Bureau of Indian Affairs, and other agencies were often unclear, making a difficult task almost impossible. In the years prior to the Civil War, the Army was overextended, but managed to win several important victories against Indians in the West. The Army also made an effort to differentiate between those members of a tribe who were peaceful and those who were not. This was made more difficult by Indians who raided in good weather and returned to the reservation during winter months to find comfort and anonymity with the rest of the tribe. There were even occasions in which the Army found it necessary to protect Indians, especially women and children, from settlers bent on their extermination.

During the Civil War, the Union was hard-pressed to secure the Trans-Mississippi area from both Indian and Confederate encroachment. Hopes that some of the force used during the war would be sent west when hostilities ended were dashed by the loud cry "Reduce!", the 19th century version of "Cut back." In the Army Act of 1866, the Army was limited to a strength of from six to ten cavalry regiments, nineteen to forty-five infantry regiments, five artillery regiments, and about a thousand Indian scouts. The War Department staff consisted of ten bureaus called departments or corps. Unfortunately, this staff

was not the commanding general's staff. Instead, they reported directly to the Secretary of War and became almost an army within an army, causing friction between "line and staff." The departments were looked upon as the way to get ahead because of the political patronage they enjoyed, and they were not always responsive to needs in the field especially with regard to transportation. Strong commanding generals like Sherman and Sheridan could wield considerable personal influence but could not directly control the departments.

In 1866, the strength of the Army was over 57,000 men, which might have been enough to effectively handle problems on the frontier. Unfortunately, a third of them were stationed in the South for reconstruction duty. From 1867, Congress was less and less willing to fund the Army, so that by 1874, it had fewer than 27,000 officers and men. By 1868, most of the infrastructure built up during the war was already dismantled. Despite the reductions of the Army in size, the costs of supporting the individual soldier continued to climb and was the subject of much investigation and many inspections by high ranking officers. Some believed that the reason for high costs was corruption, and cases of corruption and fraud were found, but the fundamental reason was the cost of transportation. The army was thinly spread in hundreds of small garrisons along hundreds of miles of frontier. The most economical way to organize and support a distribution system was to hire local freight companies to transport troops and supplies. One example of the cost involved is the comparison that Quartermaster General Montgomery Meigs made between the French and U.S. Armies in 1866. In that year it cost $200 per annum to support the average French soldier. The annual cost of a U.S. soldier before the Civil War was nearly $1000 a year, and in 1866, the cost was rising.[1] Except for small garrisons outside of metropolitan France, most French soldiers were stationed in local garrisons which made supply and distribution fairly simple, while nothing on the Western Frontier was simple. Barley purchased in the East at 1 cent per pound cost 10 cents per pound by the time it reached Camp Lyon, Idaho. The most extreme example of transportation costs was in the Military Division of the Pacific, which had to deal with more than its share of remote posts. Forage and other supplies were limited in Arizona, and had to be "shipped by water from San Francisco, via the Gulf of California to the Colorado River, and from there by steamer to Fort Yuma, a distance of 2,210 miles. Including overland transportation of 308 miles from Yuma to Tucson, it cost, by contract, almost 21 cents per pound to send stores from San Francisco to Tucson."[2]

The Quartermaster Department continued to use contract hauling as the most economical method of transportation during and after the Civil War. In



Regular infantry loading boxcars, 1898.

fiscal year 1866, commercial freight wagons carried over "40,750 tons of military stores at a cost of $3,250,000."[3] The following year, the railroads began to carry a larger and larger share of military cargo. In fiscal year 1868, the Union Pacific Railroad carried 18,605 tons of military cargo compared to 22,645 carried by wagons. [4] But the freight wagon and the stagecoach remained viable means of transportation until nearly the 20th century. In 1898, freight wagons still carried 32,647 tons of military cargo and stage coaches 967 passengers.

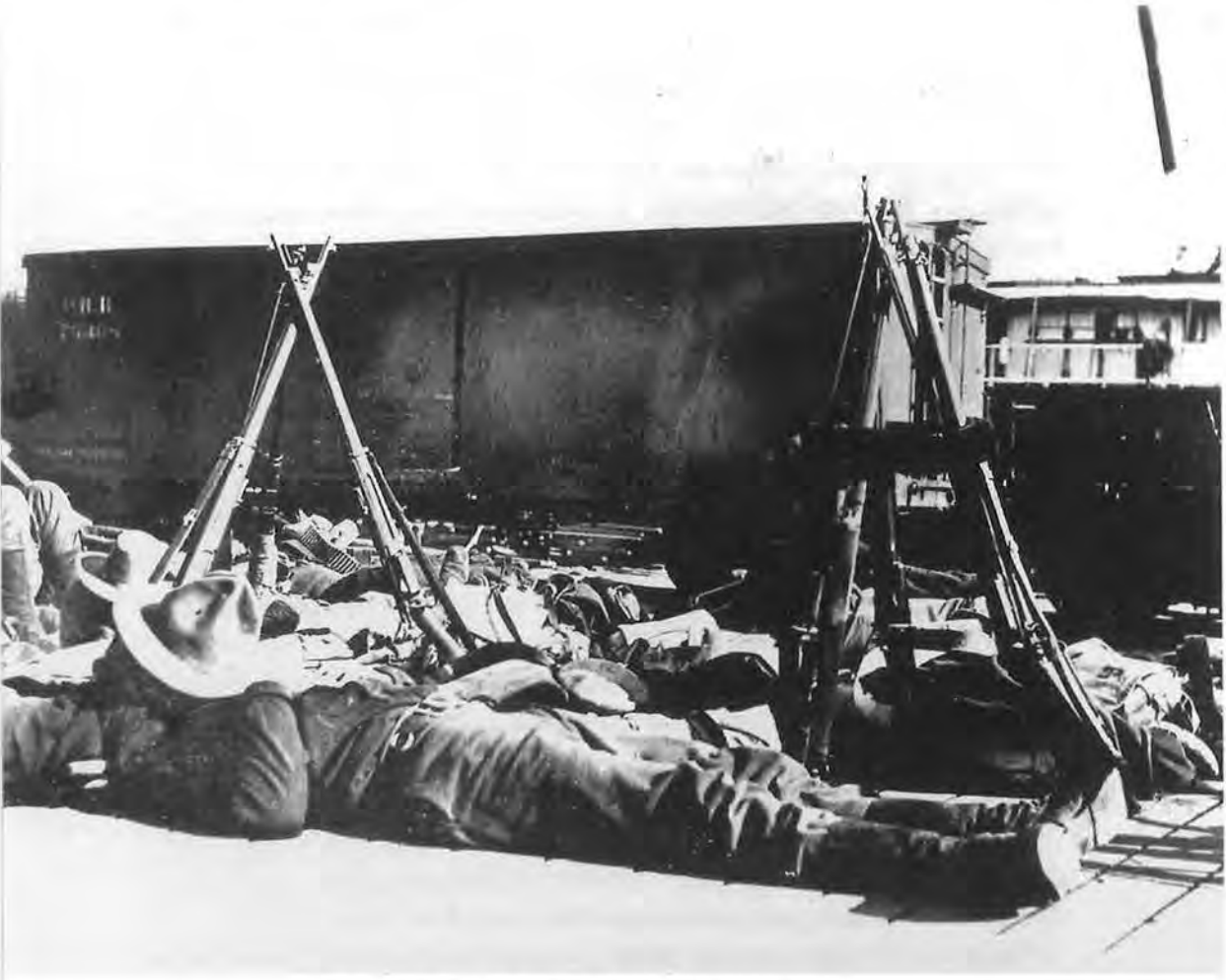
Transportation problems existed not only at the national and military division level, but also at the local level. Freight was contracted to the lowest bidder based on rates "fixed at so much per 100 lbs per 100 miles, the rates being adjusted to the season of the year, that is, lower for the summer than for the

winter months."[5] The fluidity of the military situation, the diversion of supplies by local commanders, and interdiction by hostile Indians all hampered the flow of supplies. In many posts of the West, conditions were little different than Valley Forge. Everything was affected by the lack of transportation from food and clothing, which were always in short supply until the mid-1870s, to timber for building adequate housing and for firewood. The lack of building materials forced many garrisons to build sod or adobe buildings which were unfavorably compared to slave quarters prior to the war.

The conditions which affected national and theater level transportation, also affected tactical transportation. The wagon and the pack mule were the only means of carrying supplies once a unit was away from a riverboat landing or a railhead. Against a fast-moving, elusive enemy, wagons were a hindrance. Mules were nimble and could be used in any terrain, but they had to be employed in great numbers since an individual mule only carried around 200 pounds of cargo. Mules also had to be fed and, like horses, did not fare well on plains grasses. The problem was so serious that, in many campaigns, infantry was able to outdistance the cavalry after three days of marching.

In 1868, Maj. Gen. Phillip Sheridan assumed command of the Military Division of Missouri which controlled operations from the Dakotas to New Mexico. With Sheridan came an overall change in strategy. No longer could pursuit be limited to the Indian war party responsible for a raid. Instead, the entire village was to be pursued in good weather and bad. Villages were to be burned, goods destroyed, and horses captured or killed. As nomads, the plains Indians were particularly vulnerable to this strategy. During the winter, they moved little. Their teepees were their only shelter, and they lived on what game could be found and what food they had stored. Their horses were their only means of transportation both for peaceful pursuits and for war. Destruction of any or all of these resources in good or bad weather made it impossible for a village to survive in any way other than to settle on a reservation. However, pursuit of a mobile enemy by an army supported with horse-drawn wagons was never an easy task. The Red River War of 1874 - 1875 provided a typical example of the tactical constraints imposed by wagon transportation.

In 1872, the Kiowas and Comanches in the Red River area of Texas were in a state of unrest with many grievances. They were required to live on reservations where they received too little food or no food at all. The food they did get was not what they were used to, while white men were slaughtering millions of buffalo for hides and leaving the meat to rot. Along with these issues were the cultural ones which elevated the successful warrior and demanded



Regular infantry waiting for transportation, 1898.

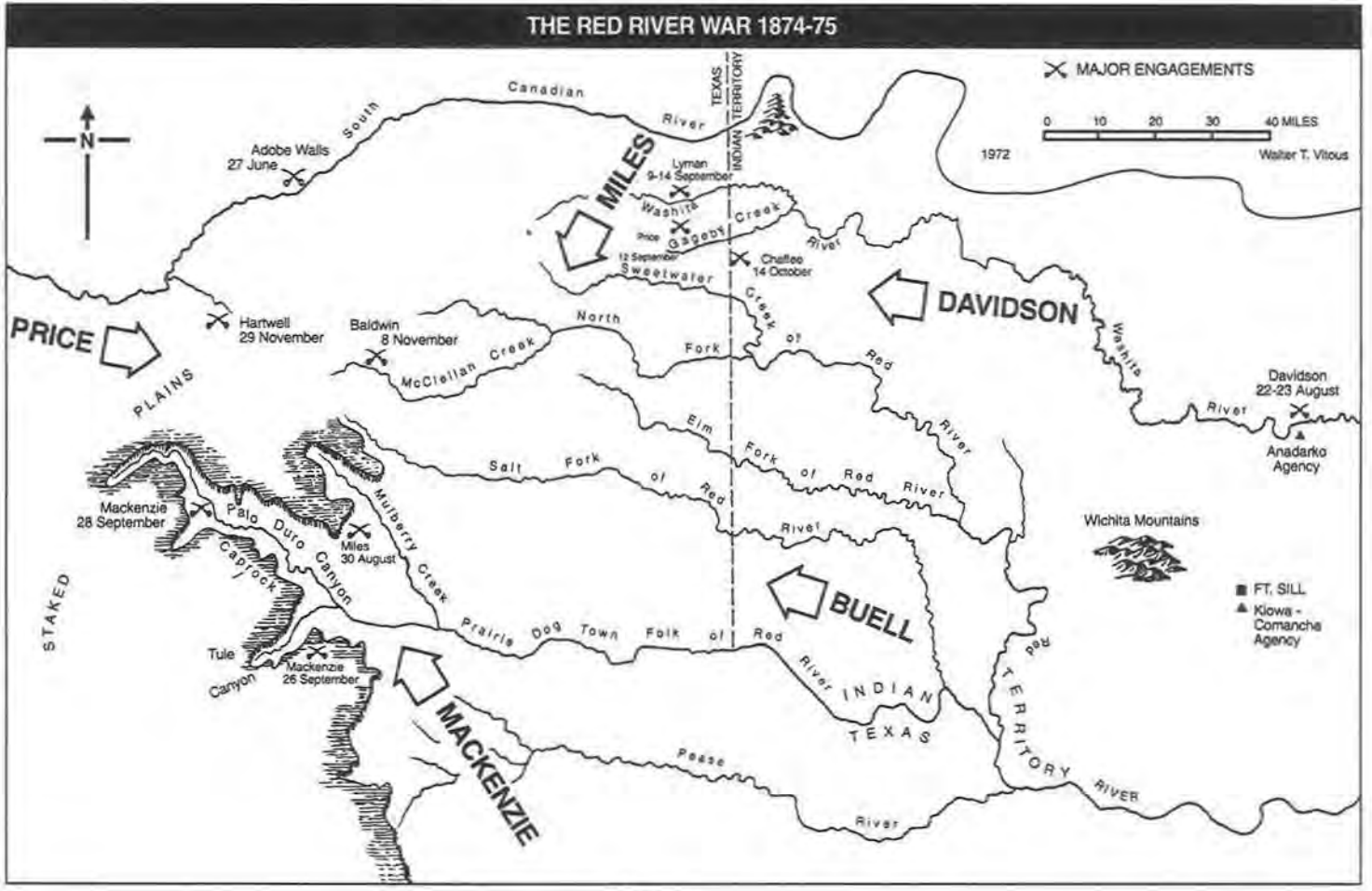
revenge for those killed in previous raids. All of these factors pointed to a major uprising. All that was needed was the right spark.

In early 1873, the government released the warlike Kiowa chiefs Santana and Big Tree from prison as an act of good will. Sherman, who was now Commanding General, was outraged because he felt these chiefs would provide leadership for the Indians, and his pique proved justified. In early 1874, the Kiowas, Comanches, and Cheyenne struck. They raided farms from Texas to Kansas and even attacked the Army and Texas Rangers. After the raids, the Indians returned to their reservations where the Army was not allowed to follow them. In July 1874, new Indian raids occurred and Sherman received permission from Secretary of War Belnap for the Army to pursue the Indians responsible for

the raids onto reservations. He ordered Sheridan to find them and punish them. The area of operations fell under the jurisdictions of General Christopher C. Augur who commanded Texas and part of Indian Territory and General John Pope who commanded Kansas and New Mexico as well as parts of Colorado and Indian Territory. Augur and Pope developed a plan (Map 6) that would relentlessly drive the hostiles into a pocket and force them back onto the reservations.

General Augur's forces consisted of three columns. Colonel Ranald S. MacKenzie with eight troops of the 4th Cavalry moved north from the Mexican border to operate from a base on the Freshwater Fork of the Brazos River. Lt. Col. George P. Buell with the 8th Infantry was assigned to drive from the east in the area bordered by the Salt Fork of the Red River on the north and east and the Prairie Dog Town Fork of the Red River on the south. The third of Augur's columns was to be the 10th Cavalry which was to move directly west from Fort Sill, Oklahoma, under the command of Lt. Col. John W. Davidson. General Pope's forces consisted of two columns. The 5th Infantry and several troops of the 6th Cavalry, commanded by Lt. Col. Nelson A. Miles, commander of the 5th Infantry moved southwest from Fort Dodge, Kansas. Four Troops of the 8th Cavalry under Maj. William R. Price moved east from New Mexico. The campaign began in grueling heat and drought in late August 1874. A few weeks later the drought suddenly ended with torrential downpours.

Although the campaign was a success, transportation, or rather the lack of it, proved to be the weak link. Contract transportation was unreliable for operations in the field, and Army wagons were too few. Miles defeated a band of Indians on 30 August but was unable to pursue them because his sixty wagons could only hold enough supplies for twenty-one days.[6] The equally aggressive Davidson remarked, "Expeditions with our limited transportation find themselves with only enough supplies to carry them back when they reach the present country of the Indians."[7] To emphasize the point, no contract wagons were available in January of 1875. In order to maintain his Sweetwater Cantonment, Pope had to strip his entire department of wagons as well as obtain fifty additional wagons from Sheridan; otherwise he would have had to withdraw the garrison. A similar shortage of transportation seventy years later would result in a similar solution - *The Redball Express.* Other operations suffered from similar transportation shortcomings. Brig. Gen. George Crook, commanding the Department of the Platte, found a partial solution to the problem by using mules instead of wagons, but that meant trains of hundreds of


THE RED RIVER WAR 1874-75
MAJOR ENGAGEMENTS
0 10 20 30 40 MILES
1972
Walter T. Vitous
N
Canadian River
South
TEXAS INDIAN TERRITORY
Adobe Walls 27 June
Lyman 9-14 September
MILES
Washita River
Price 12 September
Gageby Creek
Chalfee 14 October
Sweetwater Creek
DAVIDSON
PRICE
Hartwell 29 November
Baldwin 8 November
McClellan Creek
North Fork of Red River
PLAINS
Davidson 22-23 August
Anadarko Agency
Elm Fork of Red River
Salt Fork of Red River
Mackenzie 28 September
Palo Duro Canyon
Caprock
Miles 30 August
Mulberry Creek
Wichita Mountains
FT. SILL
Kiowa - Comanche Agency
STAKED
Prairie Dog Town Fork of Red River
BUELL
Tule Canyon
Mackenzie 26 September
INDIAN TERRITORY
TEXAS
Red River
MACKENZIE
Pease River

Map 6

mules. However, in the rough terrain of the southwest, mules could go where wagons could not and mule-supported soldiers eventually defeated the Apache.

The situation did not go unnoticed. In 1884, Lt. Col. Charles G. Sawtelle, who became Quartermaster General in 1896, reported to the Quartermaster General, "The history of all wars, modern and ancient, proves that army is the weakest whose transportation facilities are the most inefficient. A well equipped and organized transportation service to every army in the field, and its absence, or even its presence with ignorant and inexperienced officers in charge, has resulted in more disasters and defeats and unsuccessful marches and campaigns than perhaps any other cause."[8] Sawtelle went on to recommend the instruction of officers in transportation and railroad operations at the Artillery School at Fort Monroe and the School of Application at Fort Leavenworth. While he admitted that the small size and decentralized garrisons of the Army precluded the formation of a transportation corps, he warned that in case of war the United States would be found "sadly deficient in this most important requisite to successful military operations."[9] The Spanish-American War would prove him painfully correct.

THE SPANISH-AMERICAN WAR

The Spanish-American War, declared on 25 April 1898, occurred as a result of a genuine belief on the part of the American people that Cuba had to be liberated from a tyrannical and oppressive Spanish regime in Cuba and the desire of the nation to obtain overseas colonies like other imperialist nations of the late 19th century. The direct cause of the war was the destruction of the Battleship *Maine* in Santiago Bay, Cuba, which the media blamed on the Spanish. In light of subsequent events, it seems that the *Maine* was destroyed by an internal explosion caused by coal or defective ammunition, but at the time, it was all that was necessary to whip the country into a war hysteria. Strategically, the war presented the United States with the problem of how to project its power across the ocean, initially to Cuba and later the Philippines. Although the United States had projected power beyond its borders and conducted amphibious operations in the Mexican War and the Civil War, it had shared a common border with its enemy in both cases, and coastal operations were much easier to support than those conducted across open ocean. In 1898, the nation had to assemble the required men and resources and transport both to a port of embarkation and thence to a theater of operations. There they had to be disembarked with their weapons, supplies, and ammunition to carry out combat operations. While in theater, they had to be supplied with enough food and

The pier at Tampa.

ammunition to ensure victory. At the end of the war or campaign, there was the problem of returning the troops and their equipment to the continental United States, then to their home stations.

In 1898, all the expertise gained during the Civil War over thirty-three years before was gone. The organizations that carried out effective combined operations and transported troops, supplies, and equipment across half a continent and along thousands of miles of coastline were no longer in existence. The Regular Army consisted of only 28,183 men with a maximum wartime ceiling of 65,700. The state militias constituted another 114,000 men, many of them of indifferent quality.[9] The Army's largest organization was the regiment of roughly 1,000 men, which was seldom employed "en masse." The Indian enemies the Army faced during the last third of the nineteenth century seldom called for more than a few companies at a time. The War Department was undoubtedly the weakest part of the Army. It was headed by the Secretary of War, Russell A. Alger, whose military subordinate was Maj. Gen. Nelson A. Miles, Commanding General of the Army. The War Department, itself consisted of ten bureaus, each of which responded directly to requests from regimental commanders. There

was no general staff and no mechanism for expansion of support or services in case of war. To make matters worse, Alger and Miles did not get along.

When war was declared, the War Department planned for the expansion of the Regular Army plus a call for 65,000 volunteers. Instead the President called for 125,000 (basically the total militia) in order to get the maximum number of soldiers in the shortest amount of time. The bureau system began to break down immediately. The War Department could have adequately controlled the expansion of the Regular Army, but it was unable to supply enough officers to staff the new corps and divisions which were forming. Nor could it provide staff supervision for the expansion and deployment of an army the size of which the nation had not seen in over thirty years. Neither the nation nor the Army was prepared for war. The result was chaos, which was nowhere more evident than in the area of transportation.

To the small army of 1898, organic transportation was a luxury it could not afford. While never generously supplied with wagons and pack mules, the Army generally had enough of both on hand to support itself in the field even though aggressive commanders chasing elusive Indians felt there were never enough. In 1895, the War Department decided that the Indian troubles were over and the Army would never need wagons again. If it did, the Army could hire them from contractors. Expensive Army wagons and harnesses had been sold for less than ten percent of their actual value.[11] When war came, Col. Crosby P. Miller, the quartermaster officer in charge of procurement, estimated the Army needed approximately 5,000 wagons "based on an allowance of 25 wagons to a regiment of infantry, 45 to the cavalry and 5 to a light battery making up about 275 wagons for a division and about 750 to a corps. The manufacturers of wagons were completely unable to meet such a demand."[12] During a meeting on wagon transportation in his office on 3 April 1898, Secretary of War Alger requested that the Studebaker Company furnish 200 six-mule Army wagons and 1,000 escort wagons within two months. The company head, Clem Studebaker replied that since the Army had sold off all its large wagons and no longer required replacements, the Studebaker Company no longer had the machinery or the materials to produce them and would be unable to produce 200 six-mule wagons in a year. Information supplied by other contractors indicated it would take at least nine months to manufacture enough wagons to Army specifications to meet the Army's needs.[13] Consequently, the Quartermaster Department was required to procure whatever it could. The Army eventually procured 4,620 wagons, more than 3,000 of which were four-mule wagons. However, not all were delivered before the end of the war, and only 114 went overseas, the result of the lack of ocean transport.

Wagons supporting the expedition to Mexico, 1916.

The one bright spot in the war was the efficiency of the railroads in getting the troops to their training camps and eventually to the ports. During the war months, the railways moved 17,000 officers and 435,000 enlisted men at low rates and in reasonable comfort.[14] But the ports were another matter. Transportation coordination and planning during the early stages of the Spanish-American war were minimal. The Port of Tampa was, no doubt, the worst example of a universally bad situation. The port was selected because of its proximity to Cuba, not for its facilities. In 1898, Tampa was little more than a tourist port built to accommodate small steamers bound for the Florida Keys or Cuba. It had a narrow channel along a strip of land that served as a pier. Only two vessels could load or unload at any one time.

Although track was laid along the "pier," loading and unloading had to be done by barefoot stevedores who carried cargo on their backs across fifty feet of soft sand. There was no modern material-handling equipment. Access to the port from the land side was equally poor. It consisted of a single nine-mile track leading to the port area. Once the decision was made to liberate Cuba, troops, equipment, and supplies poured into Tampa. By 18 May, more than 1,000

freight cars jammed the Tampa yards. Trainloads of material were eventually backed up as far as Columbia, South Carolina. The War Department continued the flow of supplies without regard to the capabilities of port storage. As many as fifty cars a day arrived, but only two or three a day could be unloaded. In many cases the cargo arrived without invoices and bills of lading. Officers had to go from car to car, breaking open crates to find out whether they contained weapons, clothing, food, or other stores. In one incident, badly needed uniforms were found in 15 boxcars sidelined 25 miles from Tampa.

General Shafter, the Commanding General at Tampa reported to the War Department on 31 May, 1898 that he would be able to sail in three days. However, when General Miles arrived on 3 June, he could report nothing but the existence of a state of confusion to the Secretary of War. Secretary Alger replied him that 20,000 men "ought to unload any number of cars and assort them,"[15] hardly a constructive remark. Eventually Shafter moved his headquarters to the pier and directed loading operations from the packing case that served as his desk. Getting troops to the ships was supposed to be done by schedule, but it appears to have been left to the enterprise of the individual regimental commanders. Some units commandeered trains; others could not.

The quality of the transportation differed widely. The celebrated "Rough Riders" rode in a coal train. The 6th Infantry traveled in stock cars, ankle deep in manure. The famous black 10th Cavalry Regiment traveled in passenger coaches with ice water in the coolers, but could get nothing to eat because they were separated from their mess, and local restaurants refused to serve them.[16]

At first none of the trains moved because of the congestion on the single track. The 6th Infantry waited in their stock cars 17 hours before they could move. The 10th Cavalry waited almost 24 hours before they got on the transport. Soon it was discovered that there was not enough space for all the units assigned to transports. Several units were assigned to the same ship. When the Rough Riders found out they were assigned the steamer *Yucatan*, they took a boat to the steamer to gain control of it before it docked. Later in the day the 71st New York Volunteers (NYV) arrived to find their assigned ship, also the *Yucatan*, guarded by the Rough Riders. The 71st NYV spent another two days in their train before they embarked on a ship.

Eventually, the transports embarked approximately 16,000 men, nearly 2,300 horses, 38 pieces of artillery, 200 wagons, and 7 ambulances.[17] The deployment was far short of the 25,000 men projected. As the ships were leaving, orders came to call them back, due to fear of two nonexistent Spanish cruisers. Some ships were reloaded with recently arrived medical supplies. On

14 June, the convoy finally steamed out of Tampa Bay. It was twelve days late and had only 60 percent of the projected personnel. The troops spent another twelve days aboard the ships, living in cramped quarters, and eating tasteless food before they landed.

Since the Army had no transports, ships had to be chartered. Regulations required the chartering of only U.S. flag carriers, and the only ones available were small coastal freighters unequipped to carry passengers. In many cases, ships left Tampa with ships' carpenters still on board building bunks and washing facilities. At the landing point, things were no better. On 22 June, Shafter's troops had the good fortune to make an unopposed landing at Daiquiri on the southern coast of Cuba, 15 miles east of their objective, Santiago. After a brief bombardment which failed to hit an unmanned Spanish blockhouse, but succeeded in killing and wounding a few Cuban insurgents, a disorganized disembarkation began. Some captains, not wishing to risk their ships, refused to come close to shore, while one actually pulled farther out to sea, only to be turned back by a naval vessel.

Soldiers boarded long boats and launches and began moving toward shore in heavy surf. Steam-launches supplied by the Navy pulled strings of boats behind them. On the shore was one iron pier and one small wooden wharf. Conditions were so hazardous that two troopers of the 10th Cavalry were crushed when they slipped trying to climb from their lighter to the pier. Several boats were capsized or smashed and several troops injured. Horses and mules were forced to swim ashore, and several horses and 50 mules drowned during the operation. By 1800 hours on 22 June, 6,000 soldiers were ashore and an equal number were landed the following day. On 24 June, a base was established at Siboney, a nearly unsheltered but less treacherous beach closer to Santiago, which became the base of operations for the remainder of the campaign. Engineers built a wharf, but unloading operations were still difficult and not all cargo made it to the shore. The unloading of ships was very slow due to a lack of adequate docks and lighters. The result was a lack of support at the front. For a few days, the lack of supplies halted further advance upon Santiago. General Shafter did not want to launch his final assault on Santiago until sufficient ammunition and supplies were ashore at Siboney. His caution was necessary in the event a hurricane sent the ships out to sea.[18] Tropical canvas uniforms remained in the hold of one of the ships and were not issued until 25 July when the war was over.[19]

Land transportation was sadly deficient. The roads in Cuba were poor and the weather made them nearly impassable. The road between Santiago and Las

Guasimas was in very poor condition. Wagons were unable to traverse the road with its dips, mud holes, and flooded sections with no bridges. The Quartermaster Department did a great deal of work repairing the road, particularly between Siboney and Santiago. They filled depressions, removed boulders, cut through woods, and built bridges. However, those improvements lasted only a short time.

The roads were so bad that a mounted man could not pass a wagon and the roads needed constant repair. Therefore, planning for one-way traffic was crucial. Supplies moving forward and wounded moving rearward had to be scheduled to avoid a jam. Shortages of experienced wagoneers resulted in wagons overturning and causing even more congestion.[20] The bad conditions reduced the load a pack mule could carry by half. Mules that could usually carry 250 pounds could only carry 100 pounds because of the poor state of the roads. Packers were in such short supply that pack trains were laid up for lack of packers. [21] Only the short duration of the campaign seems to have saved the Army from considerable embarrassment.

After the campaign, Col. Theodore Roosevelt wrote to Secretary of War Alger, "The greatest trouble we had was with the lack of transportation". He went on to say that while a regiment was normally authorized twenty-five wagons his regiment was lucky to have two at any time, and sometimes had none. Transportation in Cuba had to be improvised using captured Spanish horses in place of mules. Food, tentage, and clothing had to be left behind to make room for ammunition and medical supplies. "In my opinion, the deficiency in transportation was the worst evil with which we had to contend, serious though some of the others were," Roosevelt declared.[22]

An unopposed landing was made on the island of Puerto Rico at Guanica on 25 July. The landing was much smoother than had been the landings in Cuba. At Guanica, engineers used a pontoon causeway to land more than 1,000 animals and all heavy equipment without incident.[23] Troops under Brig. Gen. Guy V. Henry were ordered to occupy the key city of Yauco, six miles from the landing site and located on the road and railroad that lead to Ponce. General Henry arrived at Yauco on 28 July and marched down the road to Ponce arriving the same day. Transports were brought into the port two miles from Ponce, and Maj. Gen. James H. Wilson debarked with another 3,500 men. Additional troops arrived from Tampa within a week to bring the troop strength in Puerto Rico to 15,000.

The campaign in the Philippines was undertaken in response to Commodore George Dewey's call for reinforcements to hold Manila and control

the Philippines after the U.S. naval victory in the Battle of Manila Bay. The Philippine action went more smoothly than had the campaign in Cuba. The Quartermaster Department purchased two transports and chartered eighteen more to move troops and supplies to Manila.[25] These ships were generally better than those chartered for the Cuban expedition. They were ocean-going vessels which were much larger than the coastal steamers, and could easily be adapted to carry troops but did not guarantee a pleasant voyage. As one soldier remarked, "The troops were not clean in their persons, because no bathing regulations were adopted and the regular 'scrub and wash clothes' was unknown. Lice and other vermin were rampant. The men spit on the deck, threw waste food on deck, and defecated there without regard to the expostulations of the officers of the transport."[26]

On 25 May, an advance party of 2,491 troops left San Francisco aboard three transports. Loading at San Francisco took place in an orderly fashion in contrast to the fiasco at Tampa. This was mainly due to the advance notice of deployment and a clearly defined mission, which allowed the formation of a staff to prepare for embarking soldiers and supplies.[27] The advance party arrived at Manila on 30 June after stopping at Honolulu and Guam. They disembarked at Cavite the following day,[28] sending men and supplies ashore in cascos, which were Philippine lighters towed by captured Spanish tugboats. Each carried about 200 men. To move supplies from the shore to camps ponies and two-wheeled carts drawn by water-buffaloes were used. The Army also hired Chinese "coolies" to move ammunition and assigned four of them to each company.[29]

A second group of 3,586 soldiers departed San Francisco on 15 June and arrived in Manila on 17 July.[30] A third group of 4,847 troops on seven transports under the command of General Arthur MacArthur, father of General Douglas MacArthur, left 25-29 June and arrived at Manila on 25 July. A total of 407 officers and 10,437 men, with 16 light field guns and an assortment of rapid-fire guns including Gatlings, made up the force at Manila. Five additional transports with 4,765 soldiers left San Francisco in late July but did not arrive until the war was over.[31]

There were no major hostile actions with the Spaniards in the Philippines. The Spanish forces preferred to surrender to the Americans rather than face the Philippine insurgents. Manila was occupied at the total cost of 18 Americans killed and 109 wounded.[32] The war ended on 13 August 1898.

In order to clear overcrowded hospitals in Cuba, General Shafter sent eight transports back to the United States with sick and wounded. The transports were not equipped to transport sick and wounded men, had little medicine and few

doctors were available. Some returnees died during the voyage, and news of the poorly equipped and filthy ships soon caught the public's eye. President McKinley ordered an investigation and the attention gained helped General Shafter's request for additional medical support. A new hospital ship, the *Relief*, was sent to assist with 20 surgeons and 700 tons of medical supplies on board.[33]

The first troops to redeploy from Cuba left Santiago on 7 August and arrived at Camp Wikoff, Montauk Point, Long Island on 14 August. Camp Wikoff acted as a reception station for the redeployment. It was chosen for its isolation because the public was afraid soldiers returning from Cuba would bring back yellow fever. Despite the fact that only 35,000 of the more than 200,000 volunteers called to duty actually left the country, Camp Wikoff was totally inadequate for its purpose. There was only one railroad line servicing Montauk from New York City, and it had no facilities for receiving supplies or passengers. Local roads were also unsuitable for the increased traffic.[34]

In midsummer of 1899, six transports were purchased for the Army and converted to troop ships capable of carrying 1,500 to 2,000 officers and men on long voyages. To manage and maintain these ships and any other chartered or purchased by the Army, the Secretary of War created the Army Transport Service within the Quartermaster Department in November 1898.

In September 1898, President McKinley had formed a committee in response to public criticism of the conduct of the war. It was headed by railroad magnate Grenville M. Dodge to investigate allegations of mismanagement of operations by the War Department during the war. After numerous hearings the Dodge Commission reported on 9 February 1899 that, in general, the Quartermaster Department was free of fraudulent actions (in marked contrast to department practices in the Civil War), but that the transportation system was to blame for the poor rate of supply. The Quartermaster Department had procured the proper amount of supplies needed for the war, but was either unable to maintain control over the vast amount of materials once in the distribution system or did not have the transportation assets available to deliver the cargo from Tampa.

As a result of these findings the Dodge Commission recommended a number of changes to the Army and to the Quartermaster Department. In particular, the establishment of the Army Transport Service under the Quartermaster Department. The commission also concluded that a lack of organization was to blame for the railroads' difficulties during the war. As a result, new methods of marking railcars were established for wartime. In addition, legislation was passed specifying that government loads would have priority during war. Provisions were also made for Army Transport Service

officers to meet directly with railroad officials at the War Department as determined by the Secretary of War. The direct communication between the users and the owners would create a better understanding by all, of the complexities and problems encountered during mobilization. These changes to the Quartermaster Corps organization and increases in its strength, in addition to the improved operation of the country's railroad operation, were sorely needed improvements.

The commission's other criticisms of the War Department and Secretary Alger were scathing, but rather than just placing blame, the commission proposed measures to reduce paperwork and stockpile the necessary supplies for war. In addition, it recommended the War Department "develop schools of instruction to train personnel for wartime duty and ensure a supply of competent officers."[35] The findings of the commission helped pave the way for a much improved War Department and service schools. On 21 January 1903, Congress passed the Militia Act which improved procedures for the training the militias of the various states. During this period the Army school system was improved and a long overdue staff system responsible to the commanding general was created. The chaos of the Spanish-American War thus led to several much needed improvements.

The call for change also came from the newly appointed Secretary of War, Elihu Root. Despite, and maybe because of, his lack of familiarity with "the army way of doing things," he was able to reorganize the Army into a more effective organization.[36] Mr. Root felt that an army could be raised quickly when needed, but procuring equipment was a more time-intensive process. Thus he sought to increase the readiness of the Army by increasing the equipment on hand and in particular, transportation assets. He stated, "With 80 million of our people there never will be the slightest difficulty in raising an army of any size which it is possible to put into the field. Our trouble will never be in raising soldiers; our trouble will always be the limit of possibility in transporting, clothing, arming, feeding and caring for our soldiers."[37] Two of Root's reforms had profound, positive, and far reaching effects on the Army. With the support of President Theodore Roosevelt and many younger officers, Root convinced Congress to pass a bill abolishing permanent tenure in the bureaus, replacing it with four-year detail assignments. This reform insured a constant exchange of officers with "line and staff." Root's most impressive reform was the establishment of a General Staff Corps by act of Congress in 1903. It was "charged with the preparation of defense and mobilization plans, with investigation and reporting on all questions affecting the Army's efficiency, and with acting as agents of the Secretary of War and respective commanders in

providing information and co-ordinating action." The General Staff would also be the major influence behind the creation of an independent transportation corps.[38]

In addition to the Dodge Commission Report recommending change, and Mr. Root's desire to change the way the Army operated, the Army's mission was changing. The annexation of Hawaii and the acquisition of Cuba, Puerto Rico, Guam, and the Philippines resulted in a need for a much more extensive supply and transport service. Those distant garrisons created a need to move both soldiers and their dependents overseas. The British system of troop movement was used as a model for the U.S. Army. The Army Transport Service established two home ports, one at San Francisco and the other at New York, to assist with troop movement. In 1898 the Army Transport Service established a regular line of transports that provided weekly service between New York and Cuba-Puerto Rico. A service was also established between San Francisco and Manila. Prior to World War I the Army Transport Service operated this ocean transport service, together with a harbor boat service, and an inter-island service in the Philippines. From the start of the Spanish-American War until World War I, the Army Transport Service increased its number of transports from 3 to 23, other chartered vessels to 125, not counting the 200 small craft used in the Philippines.[39] After the war, routes and services were discontinued as the number of troops overseas declined. At the start of the first World War, the Army Transport Service had 16 operational transports.

In the summer of 1899, there was an uprising in Manila. To put down the insurrection, the United States deployed a total of 125,000 soldiers from San Francisco and New York. A nonexistent transportation network and extreme weather conditions were the major obstacles to providing transportation support to the hundreds of garrisons in the archipelago. For example, in the spring of 1899 it rained 46 inches in one month, making road movement almost impossible.[40] The Philippine Insurrection was the first "brush fire" war in U.S. experience. The second, the Boxer Rebellion in China, occurred shortly thereafter. In order to dispatch troops to China, the Army sent transports from Manila, San Francisco, and New York to the Gulf of Chihli, China, in the fall of 1900. By mid-November, in advance of the freezing of the river that emptied into the gulf, the Army established an advance base ashore with six months' supplies consisting of ammunition, food, winter clothing, lumber, stoves, medical supplies, and fuel. Firsthand reports indicated that U.S. Army soldiers were landing in better condition, with more complete equipment of every class, and larger and better stores of all supplies, than those of any other engaged in suppression of the Boxer Rebellion. The 15,500 soldiers redeployed by May of

The Army's first use of trucks, Mexico, 1916.

1901.[41] These expeditions were another aspect of the new Army mission, projecting power to protect or establish American interests overseas.

In addition to improvements to the railroads and shipping industries, a new invention was making its way into the Army Transport Service. It was the automobile in the form of the truck. In 1900, Quartermaster General Marshall I. Ludington rejected a proposal for use of automobiles for military operations, feeling the roadways in the U.S. were not well-developed enough for the widespread use of automobiles. Even had he been an enthusiastic supporter of motor transport, the funds were not available for experimental cars or trucks. In 1906, Quartermaster General Charles F. Humphrey bought six automobiles, but the Treasury Department ruled that he exceeded his authority of appropriations, and charged them to his personal account - hardly an auspicious beginning.

Humphrey's successor, Major General James B. Alshire, was more successful. In 1907, he was able to purchase twelve vehicles for testing. Initial tests indicated that they were not cost-effective, but attitudes were changing. [42] In 1911, on the recommendation of the Inspector General, the Army bought trucks for experimental purposes. The use of trucks and motorcycles in various tests and maneuvers showed that the motor vehicle had potential, and by 1913, trucks were beginning to replace horses at depots.

In 1913, the United States mobilized in response to unrest in Mexico. Although war was avoided, 23,000 soldiers were initially deployed to the Mexican border, and 11,000 more followed. In 1914, the United States sent 3,200 soldiers to Vera Cruz aboard four transports and one civilian chartered vessel. There, U.S. forces went ashore over the beach and maneuvered nine miles inland to the city's water supply in a show of force. These soldiers were deployed and resupplied from Galveston, Texas.[43]

In the spring of 1916, General Pershing was preparing for an expedition to Mexico in pursuit of Pancho Villa. On 11 March 1916 the Southern Department led the call for establishment of two motor-truck companies. To help support the expedition, the companies were formed each consisting of 27, 1-1/2 ton trucks. By July of 1916, the Army had purchased 588 trucks, 57 tank trucks, 10 machine-shop trucks, 6 wrecking trucks, 75 automobiles, 61 motorcycles, and 8 tractors for repairing roads. The use of these vehicles on the Mexican border was such a success that there were no longer any doubts that the truck would replace animal-drawn transportation. The experience gained from the use of motor transportation would be of tremendous value just a few months later when the United States entered World War I.

By 1917, when the United States joined the Allies in the war against Germany, the desire not to repeat the confusion of Tampa in May and June of 1898 had already borne fruit. While the responsibility for transportation still rested with the Quartermaster General, there was an awareness of the importance of transportation unknown in 1898. The Quartermaster General also had the responsibility for overseas shipments. The Quartermaster General's Transportation Division had two branches. The Land Transportation Branch oversaw shipments by inland carriers. However, most of the movements were actually contracted by the local quartermasters. The Land Transportation Branch did not get involved unless the particular job was too large or too difficult to be handled by local offices. The Water Transportation Branch provided general guidance for water transportation and had nominal control of the Army Transport Service which operated ports of embarkation, transport, and shipments overseas. Although the

organization was far better than the bureaus of the previous era, the efforts were still decentralized and oriented to contracting transportation to common carriers in a peacetime situation rather than to the pending mission of moving personnel, equipment and supplies from military and industrial locations within the continental United States through ports of embarkation to fight a major war overseas. Control was further fragmented by the fact that the operation and repair of railroads in the war zone fell to the Corps of Engineers. The inability of existing organizations to meet transportation needs was evident even in the early days of World War One, and fear of repeating the mistakes of 1898 led to the creation of stronger organizations to handle the wartime requirements.

CHAPTER V

World War I

"It is believed that efficient transportation service for all the operations of the Army can not be expected until all matters of transportation are centralized into one service."

Brigadier General Frank T. Hines

Chief of Transportation, *Annual Report, 1919.*

OVERVIEW

World War I was precipitated by the assassination of Archduke Ferdinand of Austria at the hand of a Serbian nationalist on 28 June 1914. When Austria - Hungary decided to use the incident to seize Serbian territory, Russia supported Serbia, Germany supported Austria-Hungary, and France supported Russia. What began as just another incident in a long history of troubles in the Balkans seriously affected the two alliances which dominated European politics. The Triple Alliance, composed of Germany, Austria-Hungary, and Italy, opposed the Triple Entente of France, Russia, and Great Britain. Saber rattling led to mobilization, and before anyone realized it, the entire continent of Europe was at war. Great Britain, long fearful of Germany's expanding navy, declared war when Germany invaded Belgium. The war, which was supposed to be short and glorious, was greeted with enthusiasm in most countries because it was seen as a means of settling old scores. Even the most sanguine observers failed to predict the course the war would take. Eventually, Italy abandoned the Triple Alliance in 1915 and allied herself with Great Britain, France, Russia, and Rumania, a coalition that became known as The Allies. Turkey and Bulgaria joined Germany and Austria-Hungary to form the Central Powers.

After only a few months, the war on the western front became a stalemate. Trenches ran through Belgium and France from the North Sea to the Swiss border and every part of the front was controlled by artillery and machine guns. Both sides tried to break the deadlock. Enormous artillery barrages, lasting days, followed by huge assaults, resulted in massive casualties. The Germans introduced poison gas, but that too failed to break the deadlock.

Stymied by the impasse of trench warfare, the Allies and the Central Powers tried to break the deadlock by defeating their respective enemies on other fronts. In Turkey, an attempt by the Allies to force the Dardenelles and open a seaborne route to Russia led to disaster and had to be abandoned. Germany achieved spectacular victories against Russia but failed to influence events on the Western Front until the Russians, wracked by revolution, left the war in 1917. In the Balkans, the Germans knocked Rumania out of the war in a mere six weeks but failed to alter the overall situation. In Italy, the Italians suffered a number of defeats, causing the British to send in troops, but the Western Front remained static. Even the spectacular victories of Gen. Edmund H. Allenby and Lawrence of Arabia in the Middle East were merely side shows.

From the German viewpoint, Britain was the most vulnerable of the Allies. As an island nation, she depended on shipping to maintain herself. If that shipping could be severely curtailed or stopped, Britain would have to sue for peace and the alliance with France would crumble. Having identified the problem, the Germans searched for a solution. Neither Germany's partially successful commerce raider program nor the questionable success of her navy at the Battle of Jutland in 1916 was sufficient to wrest control of the sea from the Royal Navy. However, the Germans did have a weapon with the potential of winning the war at sea - the U-boat. In 1917, Germany began unrestricted U-boat warfare around Great Britain. Twice before, the Germans had tried to use the U-boat to destroy British commerce, but curtailed it when the United States protested. Americans saw the U-boat as an "unfair" weapon, which struck without warning, violating their concept of "freedom of the seas." When American citizens were killed on torpedoed ships, anti-German sentiment grew and relations between the United States and Germany worsened. On 2 April 1917 Congress, at the President's request, declared war on Germany.

TRANSPORTATION IN THE UNITED STATES

In spite of a long history of unpreparedness, it is doubtful whether the United States entered any war less prepared than in World War I. Before the war, President Woodrow Wilson was determined to maintain the appearance of strict neutrality and prohibited any sort of military build-up. He even prevented the War Department from developing contingency plans for mobilization in case of involvement in the war in Europe. This may have been an excellent political move, but when war finally came, it meant starting from scratch.

Land transportation required considerable coordination. In 1917, land transportation in the United States meant railroads, since the automobile was in

its infancy. The railroad companies had already been hard at work in coordinating movement and cooperating among carriers long before the war. Contractual agreements on the exchange of rolling stock, centralized rail depots in cities, and the designation of time zones in the continental United States were examples of their efforts. However, entry of the United States into the war brought difficulties the railroad companies could not have imagined. One was the need to coordinate the shipment of men, equipment, and supplies from various parts of the country to a port or large army camp without congestion or excessive idle time for the rolling stock.

Immediately after the declaration of war, the American Railway Association established the Railway War Board composed of railway executives and representatives of the six territorial departments of the Army. It maintained agents at all of the territorial department headquarters, each mobilization camp, and other important military installations. The board was to coordinate military movements, coordinate carriers, and regulate car supply. Unfortunately, the board was unable to deal with the increasing production of war materiel by industry. The unregulated flow of traffic resulted in port congestion and the immobilization of more and more freight cars. Antitrust laws and labor unrest compounded the problem as did the severe winter of 1917.

As a result, the United States government took control of the railroads in December of 1917. In his proclamation establishing government control, President Woodrow Wilson put his finger directly on the problem:

> This is a war of resources no less than of men, perhaps even more than of men, and it is necessary for the complete mobilization of our resources that the transportation systems of the country should be organized and employed under a single authority and a simplified method of coordination which have not proved possible under private management and control.[1]

William McAdoo became the Director General of Railroads and the United States Railroad Administration (USRA) was established. The USRA used every possible means to keep the trains moving and keep rolling stock off sidings. It also used its powers of persuasion to induce shippers to load cars more efficiently to make better use of space. This resulted in an increase of two tons in the average load of a freight car,[2] roughly an increase of ten percent in carrying capacity. Demurrage charges were increased to the unheard of sum of $10 per day for a car detained for 7 days or more.[3] The administration also standardized passenger travel and ticketing arrangements. In all, the USRA succeeded in coordinating rail efforts and reducing traffic congestion throughout the continental United States.

The movement of troops within the United States occurred in five phases. First was the movement of 25,500 troops of the Regular Army, most from camps near the Mexican border to the New York harbor area of Hoboken, New Jersey. This phase was completed in early June 1917. The second phase was the movement of some 343,000 National Guard troops to their training camps. This began in early August and took eleven weeks to complete. Next was the movement of selective service men from their homes to the cantonments. This movement started 4 September 1917 and peaked at 400,000 a month, until a total of 2.8 million had been inducted through the Selective Service System. A fourth phase was the intercamp travel in which half the troop level within the United States moved at least once between October 1917 and January 1918.

The fifth and final phase was the movement of troops to the port of embarkation. Approximately 2.175 million troops were moved between May 1917 and November 1918. Over 80 percent of these men embarked on their transatlantic journey through New York area ports.[4] An example of the magnitude of the final phase was the movement of 18,000 troops of the 8th Division, from Camp Fremont, California, to Camp Mills, Long Island. The division required forty-two trains, each covering the distance of 3,444 miles in an average time of seven days and three hours. The first train was approaching New York as the last was departing California.[5]

Changes were occurring that would have profound effects on the future. In August 1917, Brig. Gen. Francis J. Kernan became the Chief of the Embarkation Service, which was established to control movements of all troops and supplies overseas. In January 1918 an Inland Transportation Division (later the Inland Transportation Service) was created to coordinate military freight shipments in the United States. These agencies were placed under the Purchase, Storage, and Traffic Division of the General Staff. With the establishment of the new agencies, the Water Transportation Branch and the Inland Transportation Branch, both in the Office of the Quartermaster General, were relieved of most of their responsibilities. By June 1918, the General Staff absorbed the majority of the Army's transportation functions and the Quartermaster General's Transportation Division was abolished. In March 1919, the Inland Transportation Service and the Embarkation Service were consolidated into the Transportation Service, an organization independent of the General Staff. The following month the integration of all transportation activities other than motor transportation on posts, in camps, and stations, as well as territorial departments and procurement zones, was effected.

From the beginning, there were incredible problems to overcome. George Washington had advised against the United States becoming involved in "entangling alliances" and, as a result, the nation had not dealt with coalition warfare since the Revolution. So strong was this tradition that the United States entered the war as an "associate" rather than a member of the Allied Powers. The United States was already supplying raw materials and equipment to the Allies, but arrangements had to be made for supplies to continue to reach the Allies already in combat while U.S. troops were being equipped. There were considerable difficulties in gearing up to wartime production. Since the United States was in the war for just over 20 months, most of the finished materiel required to equip the Army was provided by the Allies. In the course of the war the Allies furnished 88 percent of the artillery, 81 percent of the aircraft, 65 percent of the trench mortars and 33 percent of the automatic weapons for the American Expeditionary Force (A.E.F.).[6]

There were also preconceptions that had to be overcome. By law, the militia could not be sent overseas, so it was replaced by the National Army, which absorbed many militia units and placed them under Federal control. The legend of the robust frontiersman rushing to join the colors in time of war also proved to be a myth. There were plenty of volunteers, but over 27 percent of the recruits were rejected for reasons of poor health while another 24 percent were acceptable for "partial military service" for other health reasons. Many of those rejected were from the growing urban population of immigrants who arrived undernourished and were susceptible to tuberculosis and similar diseases. Another shocking statistic was that nearly half the recruits given intelligence tests showed a low level of intelligence.[7] While much of the testing had a cultural bias, it nonetheless revealed serious problems in recruiting for modern war. To operate modern weapons and equipment, soldiers had to be intelligent and have at least a basic education. Since the combat arms had first pick of qualified soldiers, support units never received a sufficient number of acceptable men. There was also a shortage of officers. At the beginning of the war approximately 9,000 officers were on active duty, about two thirds of whom were regulars. Thousands of graduates of land grant colleges with some military training were recruited. Summer training camps for businessmen, established by General Leonard Wood in 1915, supplied 1,100 officers, and some 5,000 noncommissioned officers of the Regular Army were commissioned as company grade officers.[8] Eventually, over two hundred thousand officers would be required, but there was always a shortage. An antidote was to make U.S.

divisions twice as large as the Allied divisions.[9] Here again, there were never enough officers to adequately staff both combat and support units.

In an era in which animal-drawn wagons were a prime mode of transportation, the United States Army did not even have a remount service to oversee the procurement of animals, wagons, and harnesses.[10] There were three permanent remount depots in Virginia, Oklahoma, and Montana, with two auxiliary depots in Texas, but no plan for the purchase of animals, vehicles, or harnesses.[11] Suddenly, there was a demand for approximately 180,000 horses and mules, a problem similar to that which occurred in the Spanish-American War. Prior to the war, horses were supplied by a contractor who was required to deliver so many over a specified period. Quartermaster General Henry G. Sharpe did not favor this practice because contracts would require the purchase of animals even if the war ended quickly. He recommended the purchase of animals on the open market so the government could stop buying horses as soon as hostilities were over. This method was adopted on 8 July 1917 and purchasing officers were supplied with funds to purchase animals at a given price within a given time.

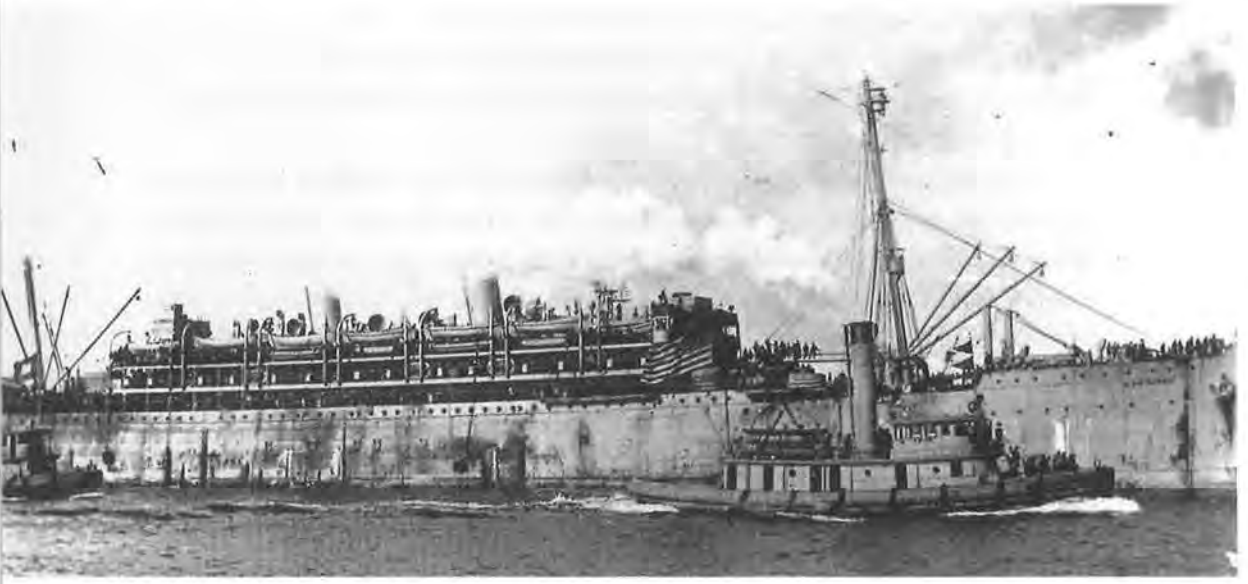
The shortage of animal-drawn vehicles created an inconceivable demand on the wagon industry. In peacetime, wagons were built with air-dried lumber which required years to season. When war was declared, that supply was used immediately, so that kiln-dried lumber was substituted. Since none of the wagon manufacturers had kilns, the government entered into agreements which defrayed half the cost of the kilns. To repay the government, the price of each wagon was lowered by $10 as was the cost of each $185 of spare parts ordered. Between 6 April 1917 and 1 July 1919, the government ordered 190,000 wagons of which 117,000 were delivered. All orders ceased on 11 November 1918, and contracts which could be terminated were canceled as soon as possible.[12] Harnesses posed no problem because the heavy demand for leather meant that huge numbers of hides were already stockpiled by the tanning industry. To prevent price gouging, prices were fixed in a meeting between the Council of National Defense and the tanners. The government also took an option on 750,000 hides on hand at the various tanners. Despite the immediate need for animals, vehicles, and harnesses, it took until September 1917 before the Remount Branch of the Transportation Division was in full operation. The supply of animals overseas proved to be the weakest area of U.S. military transportation in World War I. Although plenty of animals were available, there was insufficient shipping to send them overseas, and the Remount Service provided only a fraction of the animals required by the A.E.F.

PORT OPERATIONS

The War Department was determined not to repeat the mistakes of the Spanish-American War that had so adversely affected port operations. This commitment bore fruit with increased attention paid to water traffic by the Quartermaster General. The Army Transport Service formed in 1898 was responsible for the Army's ports of embarkation and a fleet of army transports. It also had the responsibility for overseas shipments.

Other organizations designed to control and support transportation operations evolved rapidly and became increasingly more powerful. In July 1917, two primary ports of embarkation were established at New York (Hoboken) and Newport News, Virginia. Each was commanded by a general officer and the Army Transport Service superintendents at the ports were placed under them. In addition, the authority of the Water Transportation Branch in the Office of the Quartermaster General regarding ship operations was subordinated to that of the commanding generals of the ports.[13] It was a good start, but there was still no coordination between shippers and the ports. As a result, troops and equipment poured in, causing delays and confusion. There were far more troops and equipment than at Tampa in 1898, but total chaos was avoided. The ports were modern and well staffed, and there was an existing transportation establishment dedicated to getting troops and equipment overseas and ready to solve problems as they arose. The first step in coordinating the flow of traffic to the ports was for shipping officers in the supply bureaus to obtain transportation releases from port commanders before they shipped. The Embarkation Service was given the responsibility of regulating the Army's ports and providing the "releases" for shipment to the ports in November. Unfortunately, this control failed because there was no mechanism to hold shipments at points of origin.

In November 1917, the Secretary of War established the War Board of the Port of New York. This board functioned under the guidance of an experienced shipping businessman who served as the port's civilian executive officer. He was vested with authority to make regulations, establish priorities, and do whatever necessary to make the port function smoothly and assure the prompt dispatch of War Department cargo. This worked for a short time, but the increase in military requirements demanded the use of other ports where problems of congestion arose. In February 1918, the Secretary of War, in conjunction with the United States Shipping Board, established the Shipping Control Committee, which consisted of three civilians, one of them British. It was responsible for the allocation of shipping, exchange of ships between allied nations, and the utilization of ports. The Shipping Control Committee worked in



U.S.S. Huron, formerly the *Friedrich Der Grosse*
a German liner converted to a troopship.

close cooperation with the Embarkation Service and the Army Transport Service superintendents at the ports.

The initial elements of the 1st Division with 16,000 tons of cargo left New York and Hoboken on 14 June 1917. By the end of July, most of the division were in training camps in France, but the last elements did not arrive in France until December. Soon after the first division left, a second division was ordered to prepare for departure. It was at this time that Major General Henry G. Sharpe, the Quartermaster General, recommended that a second port of embarkation be opened at Newport News, Virginia.[14] The Secretary of War approved his plan. Soldiers were to billet in staging areas on the outskirts of the city and embark through New York, along with all general supplies being handled by the port. All animals, forage, and heavy ordnance would be handled at Newport News.[15] Secondary ports of embarkation were established at Baltimore, Philadelphia,and Boston; and at Montreal, Halifax, and St. Johns in Canada.[16] In the New York harbor complex the Embarkation Service operated with 2,500 service men. Piers used for the upload included twelve at Hoboken, eight in Brooklyn, and thirteen in Manhattan.[17] The record for troop embarkation was set on 31 August 1918 when over 51,000 troops boarded vessels at the New York harbor. This was most passengers to sail from any port in a single day up to that time.[18] Of all soldiers making the transatlantic journey, 88 percent embarked through New York. A total of 1.656 million soldiers had gone through the New York Port by

the end of the war, and another 142,000 through subports attached to the New York organization. Over 288,000 troops embarked through Newport News.[19] In addition to a record number of soldiers, a record was set for supply shipments of 809,774 tons in November 1918.[20]

The limiting factor on an effective American effort throughout most of the war was the availability of ocean shipping. In December 1917, approximately 1.920 million tons in troop transport and 1.589 million tons in cargo shipping were needed. The Army barely had a quarter of what was required and it took 97,400 gross tons to move a single American division.[21] In April 1917, the Army Transport Service had sixteen vessels; twelve in the Pacific, and four in the Panama Canal Zone. The Quartermaster planned to maintain these ships as a nucleus of Army shipping and buy and refit civilian ships in a time of crisis. A register of suitable civilian ships was kept on record. All that was needed were the orders and financial support to expand the fleet of transports from its nucleus.[23] To assist in transport of troops and equipment, the Army seized 20 German ships that had been interned in American ports. These vessels had a total of 300,000 tons of stowage space for troops and cargo. Altogether, the converted German ships carried 500,000 men to fight against their former owners.[24]

Each agency competed for space aboard ships, just as they competed for other modes of transportation. To prevent a crisis, the Shipping Board took control over all American flag ships in August 1917.[25] During the first seven months of the war, 5 million tons of supplies were needed overseas, but less than 500,000 tons were shipped from the United States due to the shortage of vessels. The remainder of the supplies were purchased locally in Europe. Shipments were less than 16,000 short tons in June, July, and August of 1917. July of 1918 saw 750,000 short tons shipped, with a record of 829,000 short tons in November 1919. A total of 5.13 million short tons were shipped during the war with another 2.320 million tons shipped between 11 November 1918 and 30 April 1919.[26] From the beginning of the war until December 1918, only 8 of 18 million tons of needed supplies arrived from the United States.[27]

Once war was declared, the first convoy of ships left relatively quickly, despite the congestion and lack of coordination. Congestion at the ports and a lack of assets were not the only problems faced by the sealift effort. The German submarine offensive inflicted heavy losses on ocean shipping. In April 1917, 870,000 tons of Allied shipping were lost.[28] By the end of the war U-boats had sunk 5,234 cargo ships for a total of 12,185,832 gross registered tons (GRT).[29] In response to the U-boat threat, the Allies inaugurated the convoy system in

June 1917. It was so effective that losses decreased immediately, eventually dropping 90 percent. To replace the losses of ships at sea and to increase the number of ships transporting cargo, the United States initiated a huge ship construction program. The largest part of the program was carried out at Hog Island, near Philadelphia, where 30,000 men worked fifty shipways at a time. The steel ships were constructed according to standard design and mass production techniques. By November 1918 they were laying six keels a week. However, not a single ship was delivered in time to carry cargo to the war zone because hostilities ended so quickly. Approximately 650,000 tons, or about 10 percent of the American operated merchant fleet did get into service by the end of the war. Planned ship construction for 1919 would have resulted in the construction of 2,249 passenger, cargo, refrigerator, and tanker ships, with an aggregate tonnage of 8.50 million tons, equal to one-quarter of the total merchant tonnage of all the Allies and the United States in 1914.[30]

LOGISTICS IN FRANCE

The problems encountered by the American Expeditionary Force were unlike any of those faced by any army up to that point in history. The strategic, tactical, and logistical situation was intimidating and it was fortunate that Gen. John J. "Blackjack" Pershing was appointed to command the A.E.F. Pershing's mission was to create an American Army out of whole cloth while resisting Allied pressure to use American soldiers as piecemeal replacements for their own armies. He also rejected the Allies' insistence on training American troops only for trench warfare and insisted they be trained for open warfare as well. This decision was a good one and the ability to fight in the open contributed greatly to the Allied victory. Pershing was acutely aware of the U.S. logistical situation and took a personal interest in logistical operations. During an inspection of the port of Bordeaux, he discovered that stevedores under Maj. John O'Neill had set a record for unloading troops and baggage. Pershing asked how it was accomplished and O'Neill explained that he "took off his shirt" (removed his rank) and worked like a stevedore himself until he understood the job. He then pointed to other officers he was training in the same fashion. Pershing was impressed and made O'Neill the stevedore instructor of the A.E.F.[30]

When Pershing arrived in Europe, the U.S. Army had, in the United States, fewer than 600 artillery pieces (many of them not suited for war) with enough ammunition for only nine hours of normal combat.[32] Logistical and transportation doctrine taught at the Army Staff College at Fort Leavenworth

was based on the German experience in the Austro-Prussian War of 1866 and Franco-Prussian War of 1870. During those wars, the Germans developed the principle of continuous replenishment in which the "impetus of supply was from the rear, through a system of depots that stretched out behind an advancing army like the extensions of a telescope, with continuous shuttling from the rearward depot to the next forward."[33]

The 1914 edition of the U.S. Field Service Regulations did not envision a major war outside the continental United States. During wartime, the regulations divided the country into two areas: the zone of the interior (ZI), and the theater of operations. The ZI was the area in which combat operations were not being conducted, and it fell under the control of the War Department. The theater of operations, under the control of the commander of the Field Forces, was the area in which combat operations were taking place. The theater of operations was further divided into the forward zone (known as the zone of the advance) and the rear zone (known as the zone of the lines of communication). In the forward zone there might be several armies, each with its own commander. In the rear zone, there might be several lines of communication, (LOC), each with a base section, an intermediate section, and one or more advance sections, but only one commanding general and staff. Each section had representatives of the various supply services and an assistant chief of staff who acted for the commanding general. Like the German system upon which it was based, the base section was to receive all supplies from the zone of the interior. The base section shipped the supplies to the intermediate section which would transship them to the advanced section for distribution to units at the front. In the language of the day, "The function of the LOC is to relieve the combatant field forces from every consideration except that of defeating the enemy."[35] The German system broke down in the massive offensive of 1914 because a wagon based transportation system could not keep up with the rapidly advancing armies.[36] Once the war of maneuver stagnated in the trenches, the logistical situation for all sides became the proverbial logistician's dream, because it was merely a matter of keeping up deliveries to static positions.

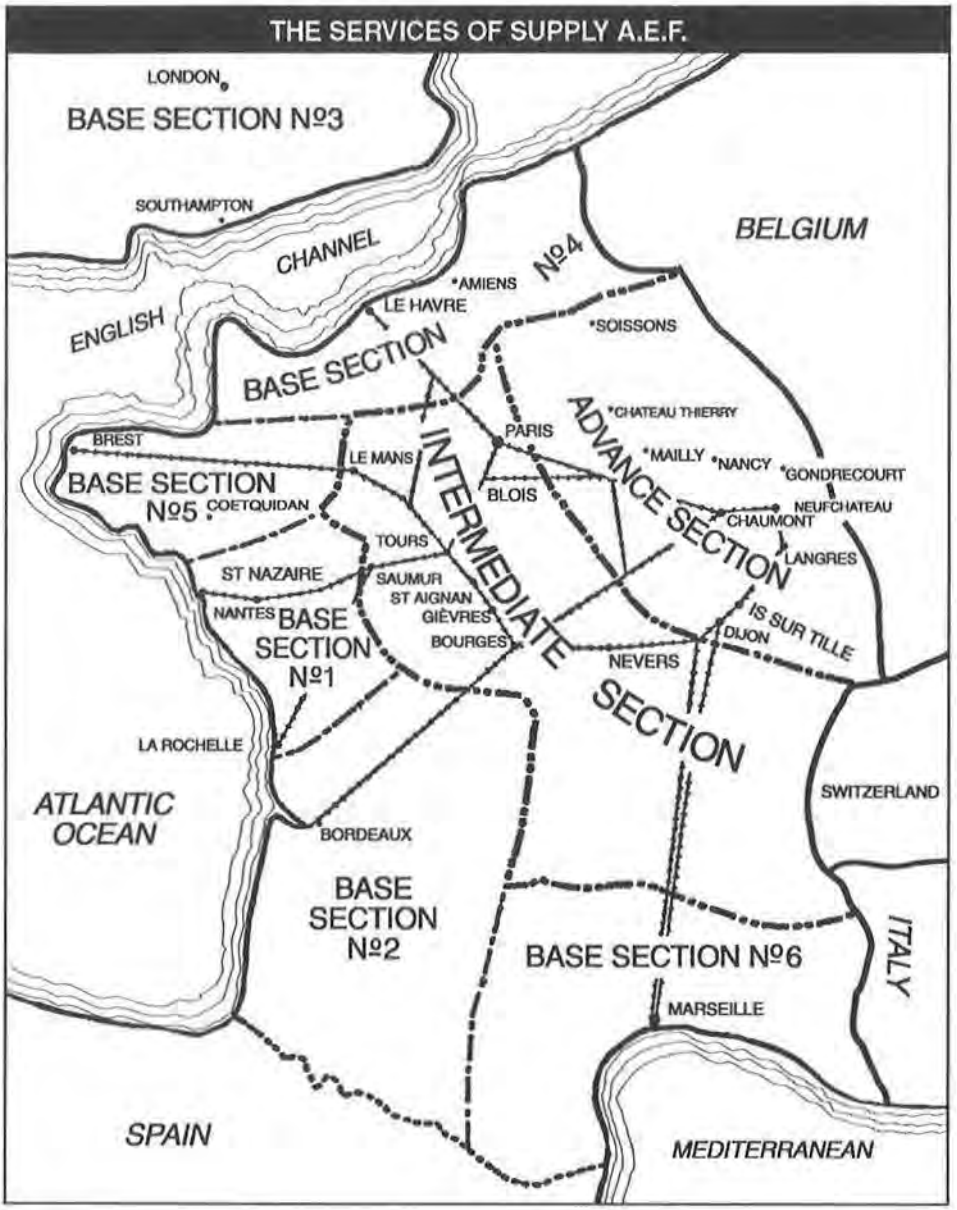
The Western Front, deadlocked for three years, appeared to offer U.S. forces the opportunity to take advantage of Allied wartime experience and quickly establish a routine. Unfortunately, nothing was further from the truth. As late arrivals in the war, U.S. forces had to accommodate themselves to the existing system as well as to certain Allied prerogatives. British support came through the Channel ports of Le Havre, Cherbourg, and Boulogne, so the United States could not use those ports or cross British lines of communication. The

French demanded that their army would remain between the enemy and Paris and that the Americans were not to be allowed to cross their LOC. The Americans were moved south and assigned the port of Sainte-Nazaire on the west coast of France. The training base for the 1st Division was at Gondrecourt, hundreds of miles away.

When Pershing arrived, he knew the system outlined in the Field Service Regulations had to be modified. The A.E.F. in France had to perform many of the tasks assigned to the zone of the interior, and one man could not possibly command such a large LOC in a foreign country. Only one advance section was established with its headquarters at Neufchateau, and each section was to have its own commander instead of an assistant chief of staff (see Map 7). Behind the advance section was one intermediate section with headquarters at the town of Nevers, and behind it were five base sections. The goal for storage of supplies was 90 days, but the goal proved to be unrealistic and was subsequently lowered to a level of 45 days.

As the war progressed and more American soldiers arrived in France, serious weaknesses appeared in the existing organization. In February 1918, General Pershing asked Col. Johnson Hagood to head a board of officers to study those deficiencies and make recommendations to correct them. The recommendations of the Hagood Board resulted in the establishment of the Services of Supply (SOS), which assumed the duties of the zone of LOC. All the chiefs of the administrative and technical services were to exercise their functions under the direction of the commanding general, SOS. Pershing's decision was not universally accepted by the War Department, and efforts were made to create an overseas zone of the interior in France by sending War Department personnel to run it. After a brief correspondence, Secretary of War Newton D. Baker agreed with Pershing and the SOS was allowed to continue under Pershing's control. The policy of the theater commander controlling his own base section was certainly a positive development, which was to have even greater significance in World War II. In addition to the existing branches, the SOS also included a Service of Utilities, which contained the Transportation Department, the Motor Transportation Service, and a Division of Light Railways and Roads.

The man selected to command the SOS was General James E. Harbord, Pershing's former chief of staff and a successful division commander. Harbord's chief of staff was Col. Hagood. Harbord, unlike his predecessor, Maj. Gen. Francis J. Kernan, was constantly on the move, traveling by rail at night so he could keep in touch with his headquarters. Throughout the war Harbord was



Map 7

faced with two problems that would never be solved. One was the lack of sufficient support personnel. Although estimates called for approximately 330,000 service troops for an army of just over 1.3 million men, that strength level was never reached. Another problem was the low morale of the troops due

to lack of recognition for accomplishing a difficult mission. General Harbord referred to them as "the forgotten men" of the war.

TRANSPORTATION IN THE A.E.F.

The first convoy from the United States arrived at Sainte-Nazaire on 26 June 1917 to begin the build-up of the gigantic supply structure known as the LOC. This was the organization that would be responsible for storage and distribution of the A.E.F. equipment and supplies. Ships were unloading an average of 212,585 cargo tons a month at the port, 63.6 percent of which consisted of Quartermaster supplies.[37] Troops were initially debarked at Sainte-Nazaire, but later in the war, Brest became the principal port for the landing of troops, with Le Havre the secondary port. Many American soldiers going to France on British transports landed at Liverpool, Glasgow, or other ports in the United Kingdom. After a few days in rest camps, they moved across the Channel to Le Havre, Cherbourg, Calais, or another of the other Channel ports.[38] There was a shortage of men and equipment to discharge the ships once they arrived in France. Early in 1918, the wharfs at Sainte-Nazaire had reached a state of confusion similar to that being experienced in U.S. ports. During this time, General Pershing spoke to a battalion of stevedores about the importance of their work and promised them a chance to go to the front to fight. Their frank response was that they would rather go home than any nearer to the fighting.[39] To raise morale, an incentive program was instituted called "The Race to Berlin." The stevedore company that had the best improvement on their production rate would be the first to go home after the war. The competition produced spectacular results and the standings were published in the *Stars and Stripes*. The discharge of cargo increased by 20 percent. The detention time for eighty-four vessels in July was fourteen days. In November 1918, it dropped to eleven days for 138 vessels. By November 1918, 5.96 million tons of cargo were shipped though the ports of embarkation. It grew to 9.577 million tons by the end of May 1919.[40] Ships were unloaded quickly and supplies were sent to an interior depot to be sorted. This change helped decrease the turnaround time of the ships, which were in extremely short supply. A shortage of railcars prevented equipment from being downloaded from the ships directly to rail which contributed to port congestion.[41]

Railroads were a particularly thorny command problem in the A.E.F. Pershing asked the War Department to send him the best railroad man it could find along with several competent assistants. The War Department responded by sending Mr. William W. Atterbury, the operating vice president of the

Getting a convoy moving.

Pennsylvania Railroad. Atterbury's charter was that he was to have a free hand in matters dealing with the railroads and be answerable only to Pershing, who wired the War Department to say the charter was unacceptable. To make matters worse, Atterbury arrived unannounced at Pershing's headquarters in Paris. It was to the credit of both men that they resolved their differences and made the situation work. Atterbury was appointed the Director General of Transportation and was made a brigadier general in 1918. Initially he had considerable autonomy, but his authority was adjusted to equate to other chiefs of services as the weaknesses of excessive autonomy became evident later in the war.

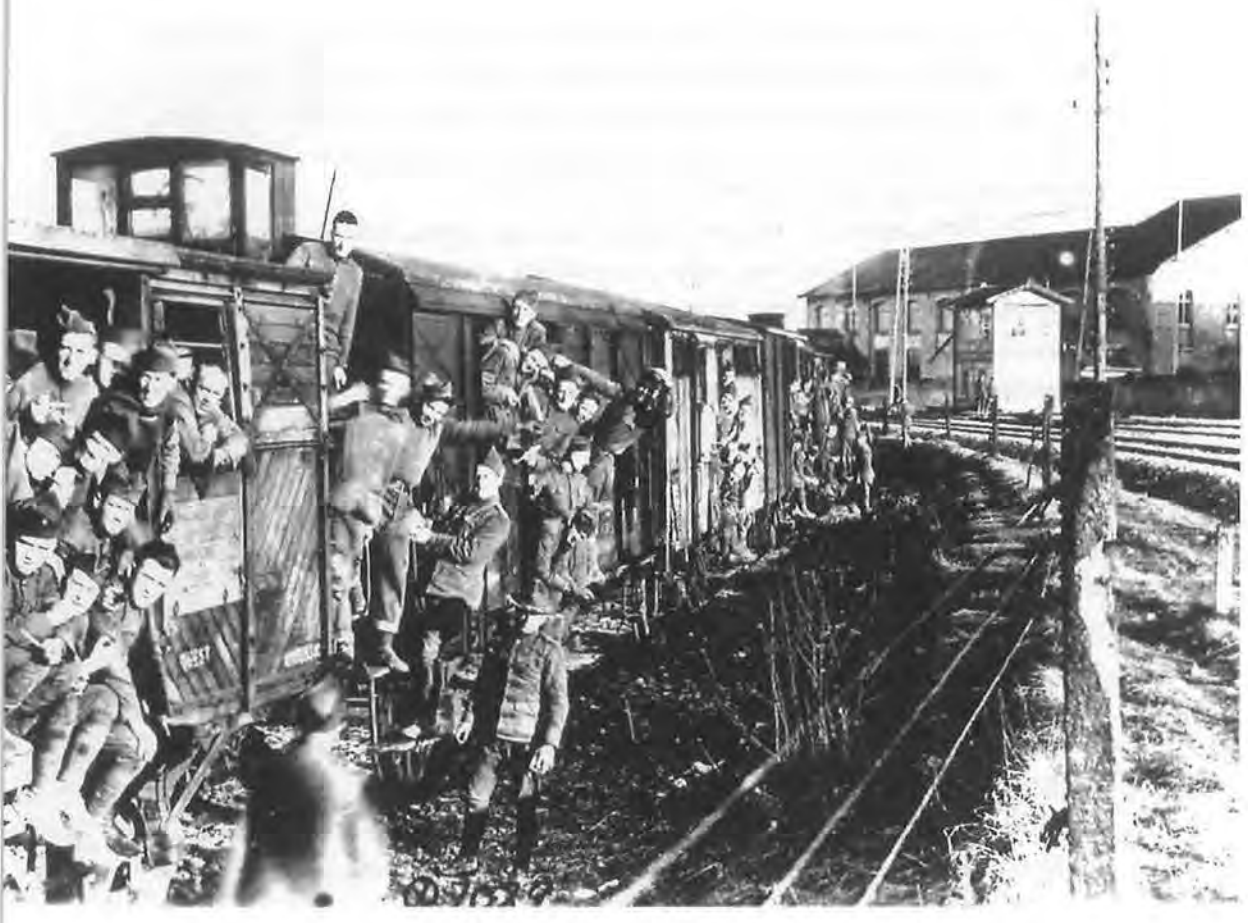
Another personality who influenced rail and other modes of transportation was Lt. Col. Charles G. Dawes of the 17th Engineers. Dawes, a boyhood friend of Pershing, was an influential banker in Chicago and a former comptroller of the currency. Using his engineering experience, he obtained a commission in

order to fight with the A.E.F. When Pershing found Dawes was in France, he sent for him and made him his purchasing agent. One of Dawes' first coups was to obtain 160 locomotives that the Belgians had evacuated to keep them from falling into the hands of the advancing Germans. The locomotives, in need of minor repairs, were soon in operation with the A.E.F.

As 1917 passed, it became evident that the supply bottleneck was the onward movement from the ports, a problem that had serious long-term implications. A contributing factor was the way the French operated their railroads, three aspects of which were particularly irritating to American transportation personnel. Because the French Railways were run by the government, not by the army, there was no attempt to track cargo or consider priorities. The second problem was the procedure of using standard trains for the movement of units. If the train was not full, it was dispatched with empty cars because the French felt it was more economical to send empty cars than to wait to fill them. The third matter was that each "Chef de Gare" or station master was a law unto himself and had the authority to sidetrack shipments or keep empty cars at his station. These irritations would be partially solved when American trains and crews began to operate.[42]

The A.E.F. determined that it required 4,000 to 5,011 locomotives and 98,000-127,033 cars.[43] The European cars were smaller than those in the United States and it took 2,017 cars with eighty-five locomotives to move an American division in France.[44] The United States was in the process of manufacturing cars and locomotives for the A.E.F., but it would take time before they could be delivered. Railroad rolling stock was obtained in Europe whenever possible. To alleviate a short-term need, the United States leased six French railway tank cars for the movement of petroleum. While 2,950 tank cars were ordered from the United States, none arrived by April 1918, and an additional 50 were leased from the British. By the end of the war only 549 tank cars had arrived.[45] The French and British also made up shortages in locomotives.[46]

The depot at Nevers was designated Depot #1 for the intermediate section on 13 August 1917. Nevers was chosen because it was a division point on the French railway system and because it was centrally located in reference to the front, affording maximum flexibility to the A.E.F.[47] Once the direction of the war was certain, the main intermediate depot was established at Gievres early in 1918. Intermediate depots were also established at Montierchaume and Issoudun. The last link was at Neufchateau on 14 December 1917. In July and August of 1918, Nevers received more than 6,000 carloads of supplies each



Forty men and eight horses. U.S. troops on their way to the trenches, 1918.

month and distributed an average of 200 cars daily. Gievres handled as many as 667 cars in one day, loading 410 and unloading 257.[48]

The Remount Service in the A.E.F. was officially established in September 1917. It numbered 493 officers and 14,596 enlisted men. Its mission was to purchase animals, manage remount depots, and care, condition, train, and maintain animals.[49] Pershing stated:

> "One of the biggest, if not the biggest, problem in the A.E.F. was providing horses and mules. Of the 243,360 animals received by the Army during the war, only 67,725 were sent from the United States. The supply of animals in the United States was ample but shipping was not."[50]

The shortage of shipping for animals meant the A.E.F. never had a steady supply from any single source. At first, animals were shipped from the United

States, until the French began supplying them in July 1917. Animals were once again shipped from the United States between November 1917 and April 1918 with animals shipped intermittently across the Atlantic thereafter.

The A.E.F. was so short of animals that Marshal Ferdinand Foch ordered 13,000 animals be turned over to the U.S. Army to enable it to immediately begin the Argonne offensive in the fall of 1918. Of the 243,360 animals received, 135,914 came from French, 21,259 from British, and 18,462 from Spanish sources.[51]

In World War I the use of motor transportation assumed great significance, but it supplemented horses and wagons for local transportation rather than substituting for railroads or for long hauls. Truck convoys did carry supplies from the ports to forward areas, but usually in connection with the delivery of the vehicles themselves to forward units. The A.E.F. never had more than half of the vehicles authorized by tables of organization.[52] The motor vehicle shortage was evident from the start of the war when the French used busses and 600 taxis to take troops to the front lines in the First Battle of the Marne.

The first four American truck companies to arrive in France in June 1917 were units used earlier in the Pershing Punitive Expedition in Mexico.[53] One of the initial problems with motorized vehicles was repairing them. At one time the Army was using 294 different types and makes of vehicles, making resupply almost impossible.[54] In August 1918, there was an effort to standardize military vehicles. As production started, more contracts were let until orders called for almost 43,000 3-ton cargo standard trucks. About 10,000 were produced before the armistice, and 8,000 were shipped overseas.[55] With the arrival of the motor vehicle, fuel became a necessary item of supply. Over 48.5 million gallons of gasoline were delivered between January and December 1918. Deliveries also included approximately 5 million gallons of aviation fuel, 1.5 million gallons of kerosene, 4 million gallons of lubricating oil, and 2.5 million pounds of grease.[56]

In addition to its roads and railways, the French had a 7,000-mile system of inland waterways, which was used extensively by the French and British.[57] When the A.E.F. arrived in France, the SOS realized the potential of the waterway system, but once again there was no equipment. What the A.E.F. used had to be provided by the Allies. By the time of the armistice, the British and French furnished the A.E.F., with 13 tugs and 307 barges. Monthly totals of supplies and equipment moved peaked at 47,000 tons in October. Most of the river traffic was on the Seine from Le Havre and Rouen to below Paris, though some barge traffic went to Dijon, Gimouville Saint-Satur, and Montargis. When the armistice was signed, the A.E.F. was planning to triple the volume of

Loading horses in boxcars in France, 1918.

supplies transported on the inland waterways to 150,000 tons a month or 5 percent of the A.E.F. tonnage.[58]

Transportation was the most serious logistical problem on the battlefield as well as in the LOC. Horses, mules, and vehicles were always in short supply. The roads upon which they traveled were universally bad. Even in good weather they were likely to give way under heavy traffic. Most combat operations took place in terrain that had been shelled incessantly for years and was impassable to wheeled vehicles of any sort. Any tactical movement meant that engineer road details had to be ready to repair existing roads or create tracks through a moon-like landscape. In November 1918, some 28,000 men were at work on the roads in the A.E.F. area, and five engineer battalions were operating quarries to provide crushed stone. As in Mexico, trucks were more capable of negotiating

Wagons moving supplies forward, 1917.

difficult terrain than animal-drawn vehicles, which made the shortage of trucks even more critical.

Because animal and motor traffic encountered so many difficulties, a narrow gauge railroad was an effective alternative means of transportation. Narrow gauge was about two feet (60 cm) wide and was invaluable in serving the forward areas when offensive operations started. One of the factors that made it so effective was the ability to set it up quickly. It took a detail of 60 men approximately ten hours to build a quarter mile of plank road, while it took 135 men only five hours to lay three miles of narrow gauge track. The Germans also used this gauge, and during offensives, the A.E.F. hooked up to existing German-built lines and used them where possible. Approximately half of the 1,400 kilometers of narrow gauge track in use by the A.E.F. at the time of the armistice was German-built. One hundred sixty steam-and gasoline-powered locomotives were in use on these lines by the end of the war.[59]

Men and supplies move forward during the Argonne offensive, in a closing phase of World War I, September 28, 1918.

FIRST ARMY

On 11 August 1918, American forces began moving forward by rail, truck, and motor busses that earlier had been pressed into service from the streets of Paris and London. Three divisions came from the British front, four from the Vesle River front (Aisne-Marne sector), two from the Vosges, in the extreme east, and three from training areas in the vicinity of Chaumont. Four divisions were already in the area of Saint-Mihiel.

On 12 September 1918, First Army, with nine American and four French divisions in line, and three American divisions in reserve, attacked on both sides of the point of the Saint-Mihiel salient. Heavy rains made supply by wagons or trucks impossible, but the offensive proceeded, thanks to the narrow gauge railroads. Thirteen days after the Saint-Mihiel attack, General Pershing launched an even bigger attack at Meuse-Argonne. It comprised fifteen

divisions which included 600,000 troops, 2,700 guns, and one million tons of supplies. To provide secrecy, the movement did not begin until after the Saint-Mihiel offensive and was conducted at night in conjunction with regular French movements. Once the offensive began, it took twelve to fourteen trainloads of artillery ammunition daily to support the operation. Eventually, 3,500 trucks, 93,000 animals, and over 215 miles of light railways were employed to support the operation. It took three to five trainloads of building material per day to build roads and six to seven trainloads a day to build railroads which carried much more traffic.[60]

Just prior to the Armistice, A.E.F . animal assets consisted of 45,000 saddle horses, 115,000 draft animals, and 2,500 pack animals. Motor vehicle assets were 30,000 trucks, 7,800 motor cars, and 13,700 motorcycles. Railroad assets resources included the operation and maintenance of 6,000 miles of standard gauge track and 1,400 miles of narrow gauge track. There were 1,380 locomotives and 14,000 cars for the standard gauge track and 450 locomotives and 3,300 cars for narrow gauge railroads.[61] The day after the Armistice, the Transportation Service, which included the Embarkation Service and the Inland Traffic Service, became an independent branch, the Transportation Corps, under the command of Brig. Gen. Frank T. Hines. The Motor Transportation Corps, which was organized to standardize procurement and maintenance of Army motor vehicles, was placed under the control of the Quartermaster Corps.

DEMOBILIZATION

As in other wars, the transportation mission did not end with hostilities. There was still an occupation force of 240,000 men to support in the Rhineland as well as a massive demobilization effort to support. The cry to "bring the boys home by Christmas" was more than just a slogan. The troopships available had a lift capacity of a little over 100,000 men a month. In peacetime conditions, without the need for a convoy system, the rate could be increased but it would still take over a year to return everyone in the A.E.F. to the United States. The obvious solution was to convert cargo ships to troop carriers and charter foreign passenger vessels. Averaging forty-four days per ship, fifty-eight cargo vessels were converted to troop ships and thirty-three passenger ships were chartered. In addition, the Navy installed troop-carrying facilities in fourteen battleships and ten cruisers for a carrying capacity of 28,600 men. To round out the effort, ten large ships which had lain idle in German ports were taken over and quickly repaired. In the end a total of 174 vessels with a single-lift capacity of 419,000 troops were in service. In June 1919, they achieved a record of 368,000 troops

The truck finally comes into its own.

embarked from France, 60,000 more than ever embarked from the United States in a single month.[62]

The most significant transportation lesson learned from the war was the need for a Transportation Corps. In his 1919 report to the Secretary of War, Brig. Gen. Frank T. Hines, who was the Chief of Transportation, emphasized the advantages of centralized control of transportation assets and recommended the establishment of a transportation corps "with complete jurisdiction over all matters of transportation for all branches in the War Department."[63] Despite this recommendation, the Chief of Staff submitted to the Secretary of War a somewhat more limited recommendation for the establishment of a Transportation Corps to control military transportation and a Motor Transport Corps to standardize the procurement of motor vehicles. This was an indication

that the Army finally recognized the need for an organization that could effectively control its transportation assets and that the motor vehicle was a necessary item of equipment in the army of the 20th century. Unfortunately, such progress would to have to wait for another war. Bills were submitted to Congress regarding the establishment of a Transportation Corps and a Motor Transport Corps, but the hearings on these bills revealed no consensus in the War Department concerning transportation and none of the bills left committee.

The National Defense Act of 1920 placed the responsibility for all War Department transportation except military railways, under a "Transportation Service. . . organized and operated as a separate service of the Quartermaster Corps. . . charged with the transportation of the Army by land and water, including transportation of troops and supplies by mechanical or animal means, and with the furnishing of means of transportation of all classes and kinds required by the Army."[64] The divisions within the new Transportation Service dealt respectively with "animal transport, motor transport, rail transport, water transport and *war planning*" (authors' italics). If this was a defeat for a separate transportation corps, it was also an acknowledgment that in order for wartime transportation to be effective, there had to be centralized control and advanced planning for conflict.

Another major lesson was that in order to project power beyond the shores of the continental United States, sufficient shipping had to be immediately available to move troops and heavy equipment. The lesson was ignored. Ironically, the U.S. Army had learned to manage the large demand for animals during a major war, but it had become an unnecessary skill. Animal power would never again be a major consideration for the U.S. Army.

After 1920, the Army drew rapidly down in size, and war planning became less important than routine operations. The Transportation Service ultimately became a Transportation Division in the Office of the Quartermaster General. As the war receded into the past, the Transportation Division concerned itself with routine matters of military transportation more than with war planning until the late 1930s when Europe was once again plunged into a world war.

CHAPTER VI

World War II Operations in the United States

"There must be great care taken to send us munitions and victuals withersoever the enemy goeth".
Francis Drake, 29 July 1588.

STRATEGIC OVERVIEW

In the 1930s, the population of the United States was reluctant to face the threat of expansionism in Europe and Asia, and military preparedness was not a high priority. In mid-1939, the Regular Army numbered 174,000 men, and the Congress rejected the expenditure of even modest sums to prepare for war. The Japanese invasion of China in 1931 and Hitler's attack on Poland in 1939 shocked the nation into recognizing the need for preparedness, but appropriations were slow in coming. President Franklin Roosevelt fully recognized the dangers of the international situation and issued the Proclamation of Limited Emergency in September 1939. This proclamation authorized a Regular Army of 227,000 and a National Guard of 235,000. The fall of France in June 1940 triggered a congressional appropriation of $4 billion and passage of the Selective Service Act, which provided for an Army of 1.4 million, but with appropriations only to August 1941. The House of Representatives renewed the act shortly before Pearl Harbor, by a margin of only one vote.

In June 1941, the German attack on the Soviet Union intensified the crisis. The Secretary of War began to compute quantitative requirements for the thousands of items to support the massive Army needed to defeat Germany, Italy, and Japan. This began the Victory Program, which finally gave realistic consideration to the productive resources of the country. It was also the requirement base for the war precipitated by Pearl Harbor.

World War II was the first time U.S. troops were deployed throughout the world. The strategy followed by the United States and its Allies was driven by their capability to project and support forces worldwide. For most of the war,

support of Allied military forces and civilian populations held a high priority for shipping resources, since they were the forces "holding the line" until U.S. industrial and military might could be brought to bear. In fact, the prewar support of our Allies accelerated U.S. mobilization. The output of factories already geared up to support Allied requirements for equipment, and maritime control measures were used to mobilize war production and expedite overseas deliveries.

Throughout the war, the availability of shipping directly affected the United Nations' capacity to strike decisive strategic blows against the enemy. Until the time of the German collapse, ocean transport was the primary factor limiting the Allies military effort. The availability of shipping was a key factor in the strategy formulated by Roosevelt and Prime Minister Winston Churchill. It led to the buildup in the British Isles (code name BOLERO) of the forces to invade mainland Europe (code name OVERLORD). There was also an urgent need to check the expansion of Japanese aggression in the Pacific and hinder the consolidation of Japanese gains. Therefore, the United States, with limited resources, assumed the strategic defensive in the Pacific in order to prepare the bases from which to launch the Pacific counteroffensive following the defeat of Germany.[1] Since Roosevelt and Churchill agreed that forces available in 1942-1943 were insufficient to mount an invasion of Europe, the strategy was to counter the Axis threat to North Africa (code name TORCH) and other areas outside the European continent. There was also the need to draw German forces away from Russia as quickly as possible.

HEADQUARTERS ORGANIZATION

One of the results of the Army National Defense Act of 1920 was to put Army Transportation back to where it was before World War I. The Transportation Service was designated as a "separate service" under control of the Quartermaster General (QMG) and management of military railroads reverted to the Corps of Engineers. The only breakthrough was the assignment of motor transportation to the QMG. Quartermaster General transportation functions were managed by five staff divisions dealing respectively with animal, motor, rail, and water transport, and war plans.[2] The expertise of the World War I Transportation Service dissipated as rapidly as Civil War expertise had in the 1870s. The country was optimistic that peace would prevail. That optimism led to such drastic curtailment of Army resources that by 1937, the Transportation Service had shrunk to one division. The division had three branches: the Commercial Traffic Branch, which controlled and coordinated all War

Department traffic by commercial carriers in the zone of the interior (ZI) and overseas; the Water Transportation Branch, which procured, assigned, and managed operations of Army transports and harbor boats, and supervised ports of embarkation; and the Motor Transport Branch, which was responsible for development, design, procurement, maintenance, storage, and issue of wheeled motor vehicles. There were also offices responsible for training, administration, and war plans.

The organization that eventually managed transportation during WWII evolved from the expansion of the Transportation Service in the frenetic atmosphere of 1939-1941. The Motor Transport Branch became a division in the office of the Quartermaster General (OQMG) to cope with the tremendous increase in motor vehicles. A Marine Design, Construction, and Procurement Branch was separated from the Water Transport Branch to deal with the increasing number of Army transports and harbor craft This was a prophetic decision in light of the massive increases in ship, harbor craft, and amphibious craft requirements soon to be generated. A Traffic Control Branch, another foresighted measure, was established to coordinate and expedite land and water movements and plan for future control measures. Other branches were established to deal with research and administration, and all branches were expanded to meet enlarged responsibilities to support an Army which had increased in size to 1,686,000 by December 1941. In January 1941, the Quartermaster General appointed a Transportation Advisory Group. This group of leading executives from all transportation modes and the warehousing industry advised on potential problems facing the Army and on the organization for transportation management.[3] The Quartermaster General's recognition of the urgent need to increase transportation management capabilities, and the vigorous actions he took to get experienced transportation officials to fill new positions contributed immensely to future transportation successes.

The QMG was not the only Army agency with an interest in transportation. The Transportation Section of the War Department Supply Division (G-4) exercised General Staff supervision over Army-wide transportation functions and war plans. In December 1940, its only members were Maj. Frank S. Ross, a civilian highway expert, and a secretary. Ross was an experienced Infantry officer, commissioned in World War I, with transportation knowledge gained from working summers on railroads while he attended the Texas School of Mines. The expansion of the transportation section was similar to that of OQMG and reflected a growing desire of the General Staff to increase supervision of all logistics functions throughout the Army. In March 1941, Lt. Col. Charles P.

Gross, a decorated Engineer officer, was appointed chief of the section, with Ross as his deputy. By October 1941, the section was upgraded to a branch, and coordinated lend-lease movements and long-range planning as well as transportation operations.[4]

While the War Department transportation organization was expanding, the Federal government increased control over the coordination of transportation operations. The government also established controls over resources used to manufacture transportation equipment and to expand the government and private transportation infrastructure. It was in this confusing and complex period that the Transportation Corps was conceived, born, and spent its formative years. There were intense jurisdictional battles within the Army and throughout the Government as well-meaning, but inexperienced executives attempted to accomplish what they perceived as their *missions* or protected what they considered to be their *turf*. Army jurisdictional decisions on the roles of the Quartermaster General, and the Transportation Branch of G-4, and other Army elements were of prime importance to the future Transportation Corps. The chiefs of Engineers, Ordnance, Signal Corps, and the Army Air Forces frequently attempted to obtain autonomy in managing traffic and use of transportation resources. The QMG and G-4 usually joined forces in combatting such aggression, and the logic of centralized control generally brought favorable decisions from the Chief of Staff or War Department. Compromises were reached through negotiation in many instances.

The logic of centralized control of transportation did not always prevail. In a series of War Department orders prior to and early in the war, authority was delegated to the Army Air Forces to administer priorities and space for air movement of Army personnel and freight and to operate aerial ports of embarkation. The Army Air Forces were also authorized to route freight shipments in the zone of the interior, subject to obtaining releases from the Chief of Transportation for surface shipments overseas. Even though that delegation caused duplication of resources and unnecessary coordination problems, all requests to establish centralized control were deferred until "the end of hostilities," when they became a moot point with the establishment of an autonomous Air Force.[5]

The increase of government agencies with management authority over transportation generated the need for an agency to ensure Army requirements were recognized in competition with claimants, such as lend-lease, industrial expansion, and other military services. The War Department usually designated the Transportation Branch, G-4, to represent the Army, but the Quartermaster General also maintained liaison because of his responsibilities for field

operations. Close coordination was essential with long-established organizations such as the Interstate Commerce Commission and wartime agencies such as the Office of Defense Transportation.[6] The chief, Transportation Branch, G-4, also centralized dealings with the Navy on transportation matters as much as possible, focusing initially on controlling Army movements on Navy ships.

Requirements to coordinate and direct transportation plans and operations for the Army cried out for centralized management. Col. Theodore H. Dillon, Chief of the Transportation Division, OQMG put it in a nutshell on 4 February 1942 when he said, "The real weakness of our transportation setup is that the entire job, inland, terminal, and overseas, is not the direct responsibility of one operating organization."[7] It was clear the General Staff should be relieved of direct supervision of the administration and logistics support functions.

Under the president's wartime powers, a Services of Supply (SOS), later renamed Army Service Forces (ASF), was established on 9 March 1942 to relieve the General Staff of direct supervision of the technical and administrative services, the nine corps areas in the zone of the interior, and ports and depots. The transportation organization absorbed most transportation functions previously performed by the G-4, the QMG and those that had been assumed by the War Department undersecretary's transportation staff. Placing the transportation function at the technical service level rather than the General Staff as in 1918 was a bold step that would pay handsome dividends.

As soon as Lt. Gen. Brehon B. Somervell, former War Department G-4, was appointed to command the SOS, he created a Transportation Division that was quickly redesignated the Transportation Service. Certain air movement functions were delegated to the Army Air Forces as described above, but SOS was responsible for the reassigned G-4 and OQMG transportation functions, which included the nontactical movement of Army personnel and materiel by rail, highway, and water. The Services of Supply determined requirements for locomotives and rolling stock for utility railways. It operated ocean going vessels owned or chartered by the Army and arranged for additional shipping. Services of Supply acquired and distributed harbor craft and operated the ports of embarkation (POEs) and their staging areas. It established regulating stations and holding and reconsignment points to prevent port congestion in both U.S. and overseas ports. In all, some 60,000 military and civilian personnel were assigned to transportation operations. Military railways remained the responsibility of the Corps of Engineers, and motor transport remained the responsibility of the QMG. The Transportation Service had no direct responsibilities for transportation operations within overseas theaters. The

organization in Chart 1[8] incorporated the personnel who had been operating in G-4, OQMG and field activities, so there was little reorganizational delay in the continuing expansion of the transportation mission.

Two aspects of the establishment of the Transportation Service were remarkable by any standard. The first was the universal recognition that one agency was required to control all the military ground and water transportation. Secondly, it was all done so rapidly while the War Department was expanding, jurisdictions were changing on a daily basis and resources were constrained. General Gross, in a memo to General Somervell dated 11 July 1942, reported that since Pearl Harbor, 390,000 troops and 1,900,000 short tons of cargo had been shipped overseas, compared with 122,400 troops and 287,000 tons in a similar six-month period in 1917. Ten ports of embarkation and subports were operational and serving seven overseas theaters, compared with three serving one theater in 1917. Furthermore, a complete system of traffic control was being operated by the Transportation Service including field agencies that effectively forestalled the port congestion which had been such a serious problem in World War I. He also pointed out the need for further centralization of movement control and the fact that adequate provisions had not been made for procuring and training Transportation Corps personnel to meet future needs.[9] The requirement for training was demonstrated by the fact that many transportation officers appointed by installation commanders instead of the Chief of Transportation were not qualified.

Limitations on Transportation Service authority triggered extensive evaluation by the War Department and Services of Supply staffs of the need for further changes, many of which were proposed by General Gross' office. Recommendations submitted for approval by the Chief of Staff culminated in the creation of the Transportation Corps (TC) on 31 July 1942. The Chief of Transportation assumed all responsibilities and resources assigned to the short-lived Transportation Service. Recommendations to establish a Transportation Corps replacement training center and a TC officer candidate school were not immediately approved and had to wait until their establishment by the Army Service Forces.[10] Further, the Corps could not be designated as a permanent component of the Army without congressional action, which was not sought by the War Department. The "temporary" status of the Corps complicated personnel and organizational actions in its formation and expansion. For example, officers and warrant officers of other Army branches who were not transferred when the Transportation Service was redesignated had to be "detailed" to duty with the Corps, rather than assigned. General Gross moved quickly to

ORGANIZATION OF THE OFFICE OF THE CHIEF OF TRANSPORTATION: 30 JUNE 1942

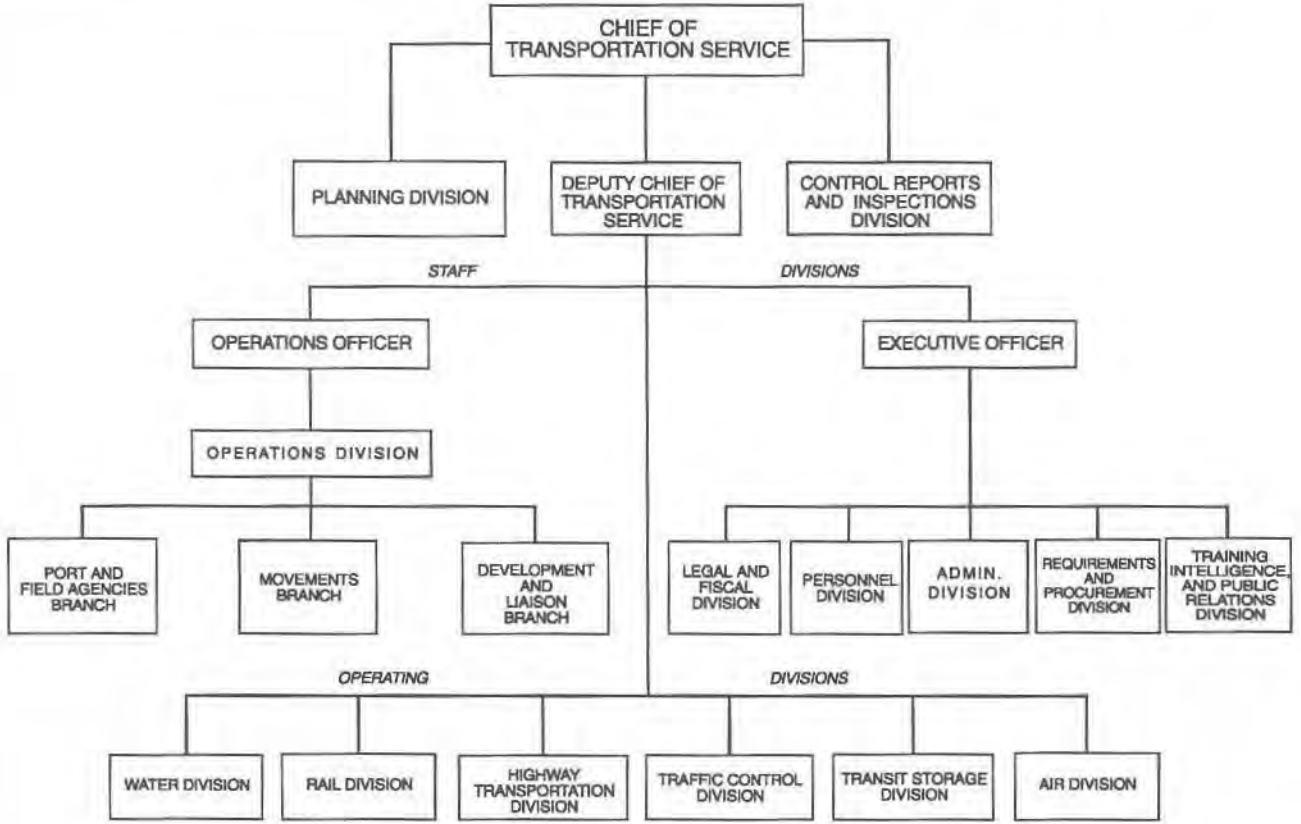


Chart 1

solidify assigned responsibilities and ensure the Corps exercised them effectively. He initiated actions to integrate all aspects of surface transportation management under the TC, particularly military railroad and motor transport operations.

Army Regulation 100-50, 1 September 1942, and War Department General Order 60, 5 November 1942, assigned the Chief of Transportation responsibility for all activities (with minor exceptions) connected with military railroads in both the zone of interior and in theaters of operation. Responsibility for construction remained with the Corps of Engineers. The Chief of Transportation accountability included total "life cycle management" of equipment, organizations, and military and civilian personnel. Details of the realignment were worked out between the two corps.[11]

In the motor transport decision during the same period, the Chief of Transportation was given no responsibilities for vehicle equipment or troop units for theaters of operation. The design and procurement of motor vehicles was transferred from the Quartermaster General to the Ordnance Corps on 1 August 1942, and the organization and training of motor transport troop units was left with the QMG. Throughout the war, truck units retained their quartermaster designation, although in some theaters a parenthetical (TC) was included. It was not until July 1946 that they were officially redesignated "Transportation."[12]

The Chief of Transportation remained deeply interested in motor vehicle troops and equipment because the chiefs of transportation in the theaters used them in their highway transport services. He exercised considerable influence through persuasion and logic rather than authority. In addition, he directed studies which led to acquisition and deployment of line-haul carriers with larger capacities than tactical vehicles. The studies also validated the feasibility of double loading tactical vehicles and hauling trailers for runs on good highways. Finally, the Office of the Chief of Transportation provided highway tonnage capacity analyses for worldwide logistics plans and vehicle port clearance. In June 1942, the Chief of Transportation was ordered to establish and control a pool of motor buses to offset shortages of commercial transportation in the vicinity of war industries and Army installations. In 1945, the Chief of Transportation was made responsible for administrative vehicles used by Army Service Forces installations. Also, highway movement of Army-interest passengers and cargo continued to be mainly by commercial carrier, managed by the Office of the Chief of Transportation.[13]

The organization of transportation headquarters evolved as functions were assigned and withdrawn and as senior leaders identified better ways to use assets to meet the Army's changing priorities. Comparison of the organization in

mid-June 1945 shown in Chart 2 with the organization in 1942 shows that the structure of the office increased markedly with directorate-level offices and the supply function added, but the same fundamental functions remained. In 1945, the office was staffed with 407 military and 1,573 civilians in the Washington, D.C. area and an additional 164 military and 969 civilian spaces outside Washington.[14]

FIELD ORGANIZATIONS IN THE UNITED STATES

The organization of Transportation Corps field installations reflected the Chief of Transportation's policy to decentralize authority, but the essential integration of transportation functions remained under his control. Ports of embarkation and transportation zone offices were the principal field agencies in the ZI to execute operations. Training responsibilities were assigned to ports and zone offices and to installations devoted only to training. Procurement offices and supply depots acquired, stored, and distributed material managed by the corps. Many functions in the ZI were largely dependent on performance by private industry. Throughout the war, Transportation Corps executives had to maintain close coordination with industry and federal oversight agencies. (See listing at Endnote 6). The Chief of Transportation was responsible for developing plans for operations in the United States and advising on courses of action to cope with any wartime impacts on transportation that might adversely affect support of the Army. It is to the credit of General Gross, his subordinates, the transportation industry, and the labor unions that the voluntary teamwork in World War II was so effective.

PORTS OF EMBARKATION

Ports of embarkation were established at all major U.S. civilian ports and a few specialized subports. The commander exercised jurisdiction over assigned operating facilities and received, supplied, and provided command and control for troops embarking or debarking. Ports of embarkation received, stored, and transported supplies, and ensured that ships assigned to the port were properly fitted out and maintained. They supervised the operation and maintenance of military traffic through and between the port and the supported theater(s). The latter responsibility required establishment of two suborganizations in addition to the functional transportation elements. An Overseas Supply Division (OSD) was established to receive, edit, extract, and forward to supply sources requisitions from designated overseas commands, for which the port had

ORGANIZATION OF THE OFFICE OF THE CHIEF OF TRANSPORTATION: 1 JULY 1945

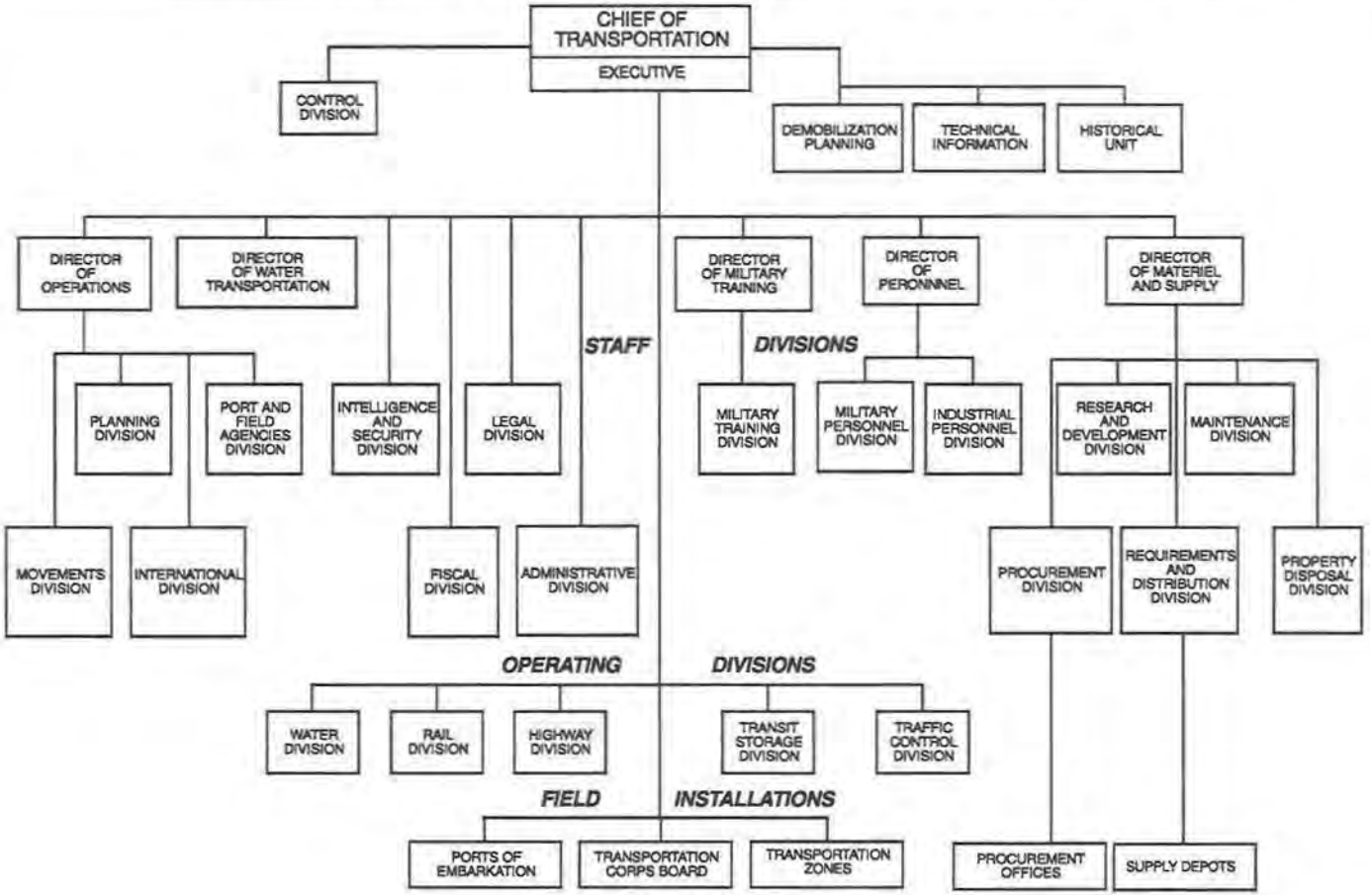
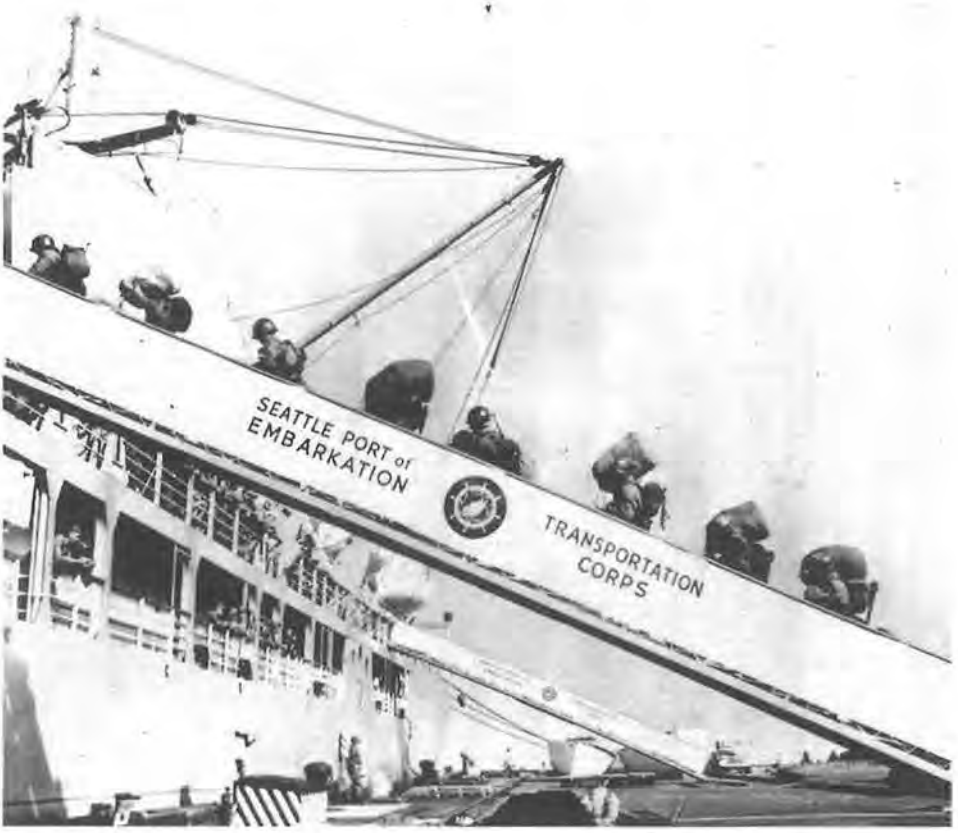


Chart 2



Troops embarking on a transport at Seattle Port of Embarkation.

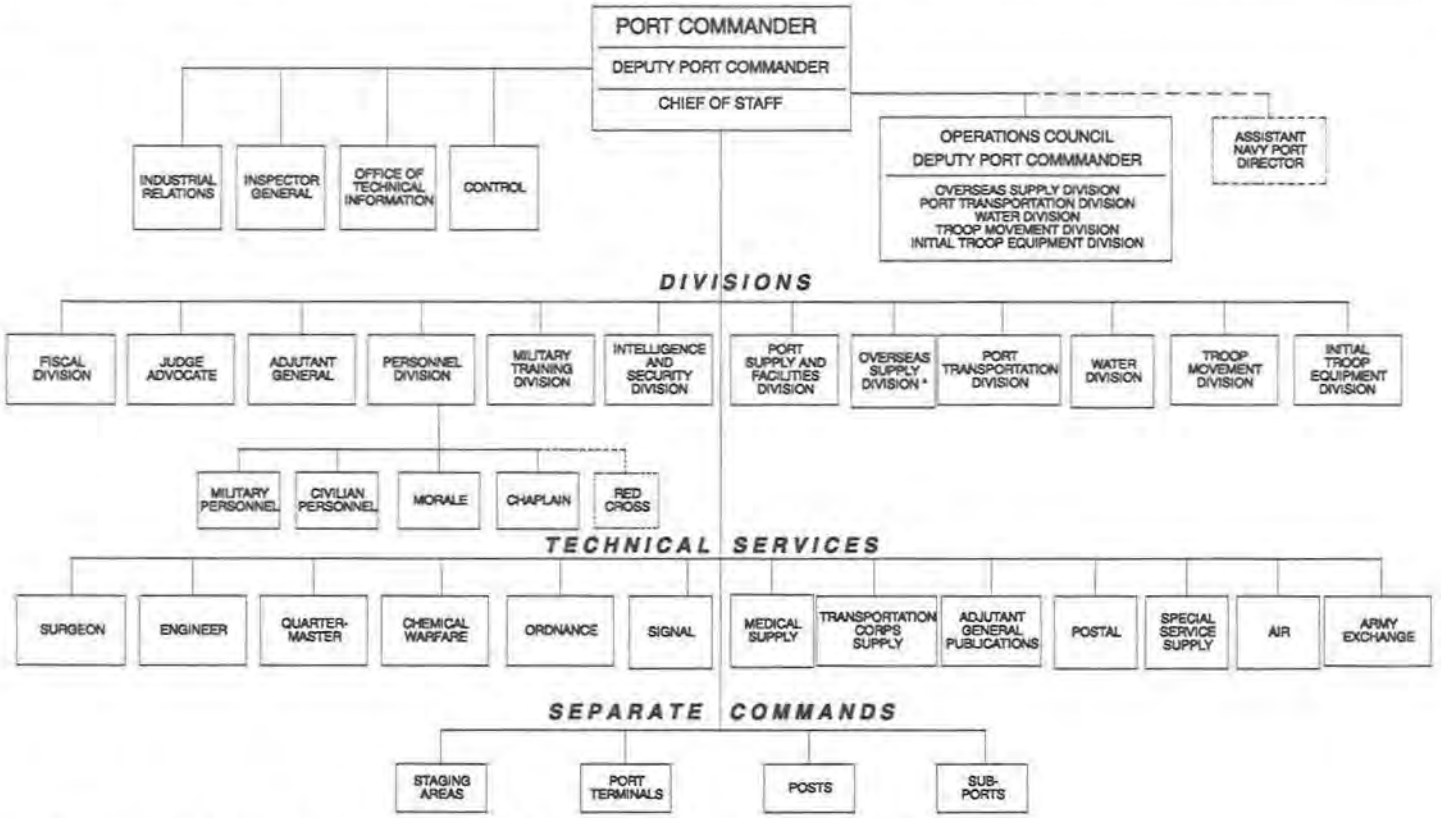
primary responsibility. This function was assigned after Pearl Harbor. They also scheduled the movement of shipments to the port and overseas and kept the overseas commanders informed of supply status. Each theater had a major port for supply support. Europe had New York, Pacific had San Francisco, and the Caribbean area had New Orleans. A number of studies and recommendations were made by Army Service Forces and other technical services to reassign the function, on the grounds that supply was not a transportation responsibility. However, an independent study by the ASF chief of staff found the system worked well and recommended only minor changes. These changes were approved by General Somervell in April 1943.[15] The second supply-oriented element was the Initial Troop Equipment Division, which controlled the flow of unit related materiel through the port. The division was responsible for both equipment accompanying units embarking at the POE and equipment consigned to specific units overseas.

As with all wartime organizations, port of embarkation missions changed during the course of the war. As the Army learned more about the transportation function, responsibilities were realigned. Each port was organized to fit the geographical and operational requirements of its specific mission. The "standard" POE organization (Chart 3), approved by the Chief of Transportation, ASF, on 1 July 1945, reflects organizations used throughout the war.[16] Each War Department technical service with a supply responsibility established representatives at the ports to provide immediate technical advice on supply matters and to manage other functions of their service supporting port operations. The Chief of Transportation valued these contingents highly and directed that dealings with service representatives be made directly through port commanders rather than through Office of the Chief of Transportation in order to simplify coordination and expedite operations. Ports also had extensive training functions. In addition to training individuals and units in transportation tasks, they were responsible for the continuing training of troops staged for embarkation. Further, ports had to train directly commissioned civilians to perform transportation duties at the port. As of 31 December 1944, ports were staffed with 62,646 military and 77,986 civilian personnel. New York and San Francisco were the largest POEs. The total traffic through all ports by August 1945 was about 7,300,000 passengers and 127 million measurement tons of cargo.[17]

TRANSPORTATION ZONE OFFICES

In the United States, the Chief of Transportation directed, supervised, and coordinated all transportation by common carrier for the War Department. Predecessors of the Transportation Corps established a number of organizations to provide necessary control and coordination. These included operating division liasion offices at transportation gateways and war production centers. They established consolidating stations, regulating stations, and holding and reconsignment points, as well as various activities concerned with procurement of Transportation Corps equipment and supplies. This abundance of agencies, each reporting to different headquarters elements proved almost impossible to manage. After several attempts to bring order to the system, General Gross established nine transportation zone offices (TZO), each collocated with a headquarters of the nine Army Service Forces commands. The Chief of Transportation delegated full authority for specified functions previously performed by his operating divisions. Each zone office supervised and coordinated the transportation activities within its zone. The prime responsibilities were to provide in-transit visibility, to control traffic according to

TYPICAL ORGANIZATION FOR PORTS OF EMBARKATION, APPROVED BY THE CHIEF OF TRANSPORTATION, ARMY SERVICE FORCES: 1 JULY 1945



* The Overseas Supply Division exercises supervision over the Technical Services in connection with overseas supply matters.

Chart 3

the Chief of Transportation programs to ensure movements of military traffic did not cause congestion or delay operations at ports of embarkation and overseas ports and to operate the procurement offices and depots that were responsible for transportation supply and industrial relations with manufacturing plants in the zone area. While zone offices were organized to meet mission needs, a typical organization (Chart 4) was approved by the Chief of Transportation, ASF, in November 1943. Control by the transportation zone office was exercised through Branch Zone Offices and District Transportation Offices, as well as the above operating activities.[18]

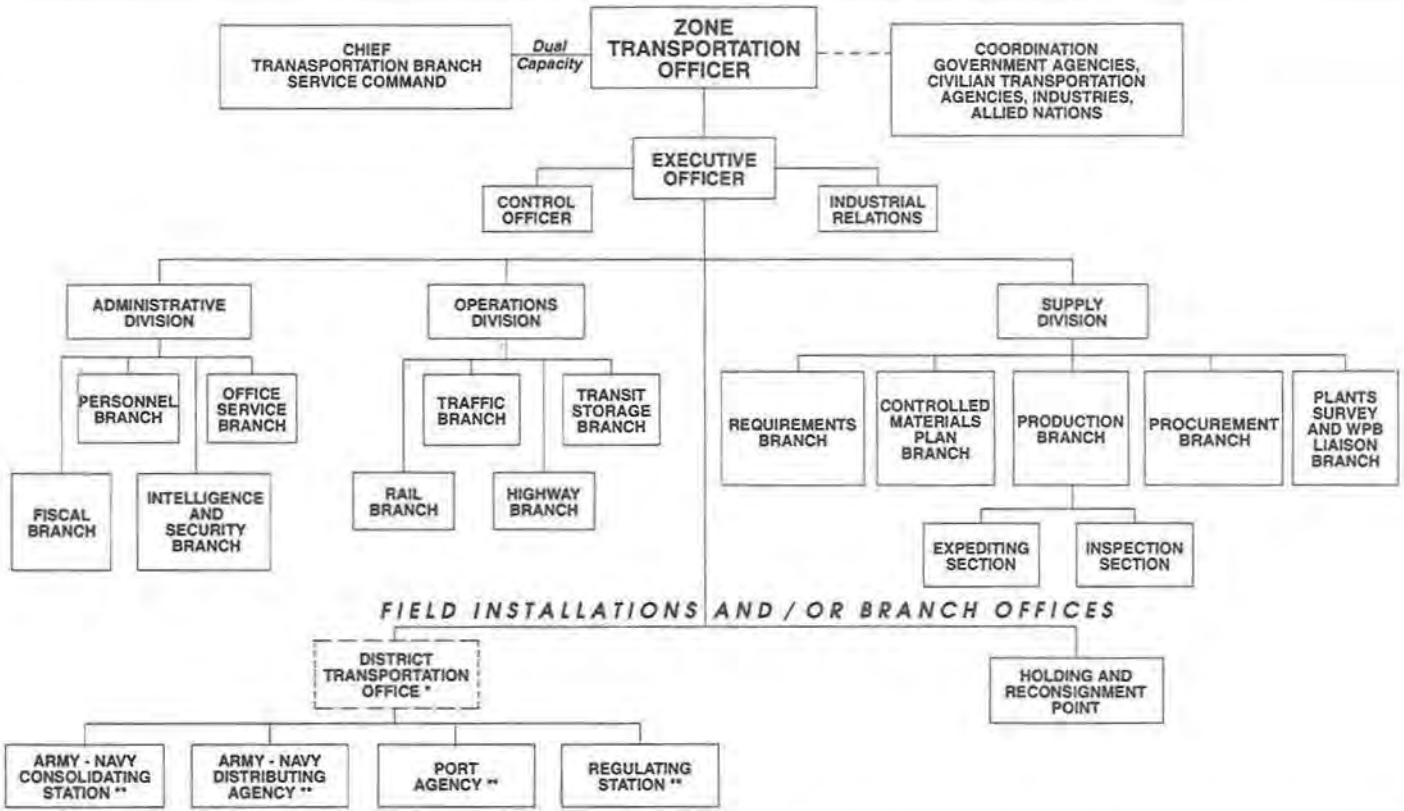
Eventually the TZO assumed a dual function. It executed Chief of Transportation responsibilities and served as the Transportation Office of the service command headquarters in which it was located. Toward the end of the war, the TZO also established air freight regulating offices at some aerial ports of embarkation to supervise the processing of Army shipments. The zone offices were especially valuable in assisting and training post transportation staffs to perform their duties according to Chief of Transportation policies and procedures. The Supply Division was deleted from the zone organization in 1945. At the close of hostilities, the nine zone offices supervised 67 subordinate organizations with an approximate strength of 1,204 military, 8,421 civilians, and about 5,000 contract employees.[19]

TRAINING AND DOCTRINE ORGANIZATIONS

In addition to the ports and zone offices, the Chief of Transportation established other field activities for training and procurement. General Gross recognized that well-trained personnel operating with sound doctrine were the key to improving and maintaining efficient transportation operations and placed strong emphasis on both these objectives. Due to the requirements for immediate transportation support in all theaters, training and doctrine evolved slowly. Nevertheless, the Transportation Corps demonstrated steady improvement in the quality and professionalism of operations throughout the war.

Although sound doctrine was the foundation of a good training program, the Transportation Corps began its existence with neither. Transportation responsibilities grew exponentially as the war progressed and the mission could not wait for personnel to be trained in schools or training centers. As a result, many early transporters were trained on the job. Some training activities were assigned to Army Service Forces organizations, but the Chief of Transportation continued to be responsible for doctrine, quotas, and inspections for the quality of the training and output.

TYPICAL ORGANIZATION FOR ZONE TRANSPORTATION OFFICES, APPROVED BY THE CHIEF OF TRANSPORTATION, ARMY SERVICE FORCES: NOVEMBER 1943



* District office may or may not intervene between agencies shown below and zone headquarters. ** When directly under zone offices these installations become branch offices.

Chart 4

Troops training at Camp Claiborne on track repair.

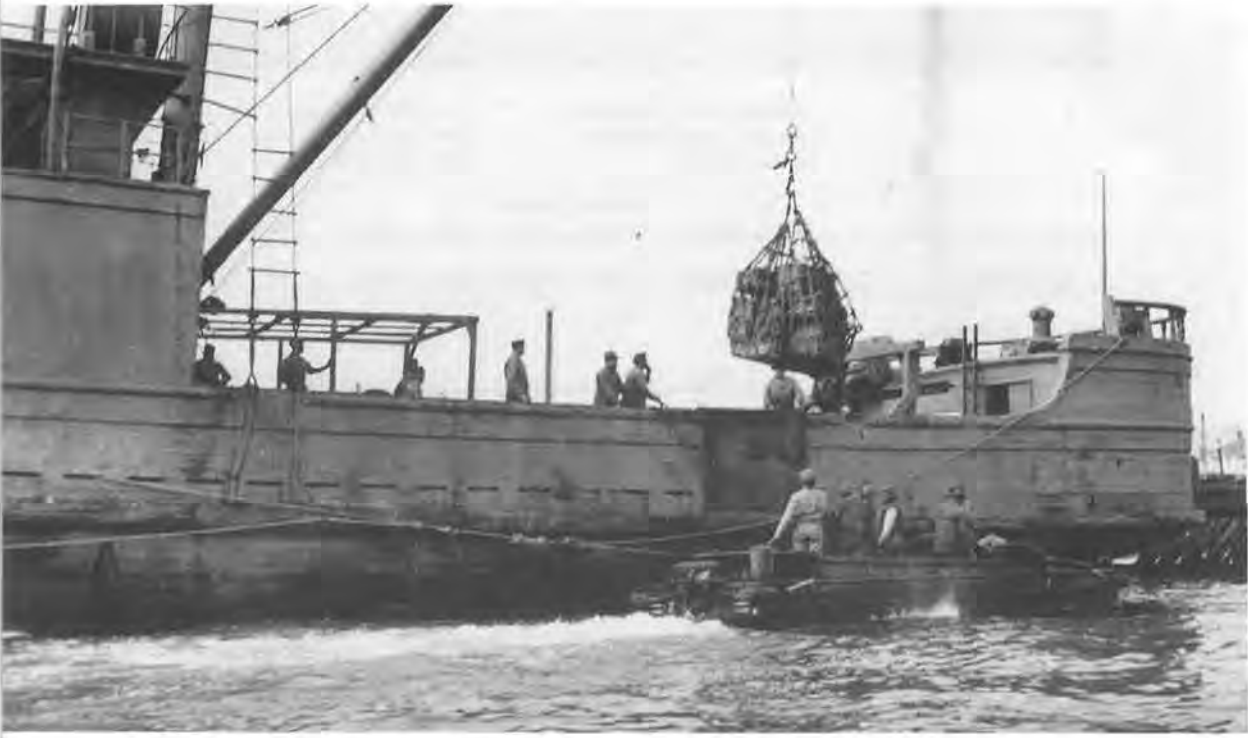
In contrast to today's Army-wide centralized personnel and force structure system, General Gross felt it was his responsibility to furnish the Army in general, and the theaters in particular, with the required number of competent officers and well-trained and equipped units. Army force structure listings and tables of organization did not identify all the types of units needed to cope with the global and intensive levels of transportation support. Therefore, planners identified new functions required to support global operations and conceived, developed, organized, trained, equipped, and deployed units to meet the needs.[20]

The first TC unit training center was established in July 1942 at Indian Town Gap Military Reservation in Pennsylvania to supplement the training of port battalions at the New York Port of Embarkation. The New Orleans Transportation Corps unit training center was established in January 1943 and had major training responsibilities throughout the war. The center, later designated

as Camp Plauché, eventually included courses originally established at other Transportation Corps installations and academic institutions. Eventually the center took over officer courses first conducted at San Francisco and New York ports and the Transportation Corps Officer Candidate School, which started at Mississippi State College in 1942. Marine cadet training was conducted at St. Petersburg, Florida. The Chief of Transportation established small boat and amphibian truck training at Charleston in the spring of 1943, but it was later transferred to Camp Gordon Johnston, Florida, and operated by the Army Service Forces.

In 1939, the Military Railway Service (MRS) was comprised of reserve units, each manned by employees of the commercial railroad that sponsored them. Because of the long period of inactivity, the units' esprit was low and training was limited. Carl R. Gray, executive vice president of the Chicago, St. Paul, Minneapolis, and Omaha Railroad, and a reserve colonel was called to duty as manager of the Military Railway Service, headquartered at Fort Snelling, Minnesota. Colonel (later Maj. Gen.) Gray, together with Col. (later Brig. Gen.) Charles D. Young, an executive of an eastern rail line called to duty in the Office of the Chief of Engineers, took steps to build up reserve units, rejuvenate sponsorship, and prepare for future expansion. In June 1941, the 711th Railway Operating Battalion (ROB) was activated at Fort Belvoir, Virginia, and moved in August to Camp Claiborne, Louisiana, to build and operate a training railroad.

When the war started, the Military Railroad Service Headquarters (HQ) and the 711th Battalion were the only rail troops on active duty. The Military Railway Service supervised the activation and training of railway troops, the affiliated reserve units, which initially comprised five railway grand divisions, twenty railway operating battalions, and three railway shop battalions. Other units were activated as requirements dictated. Management of rail training was transferred to the New Orleans Port of Embarkation when the Military Railway Service headquarters moved to North Africa in the winter of 1943. Basic military training was given at Camp Plauché. Most individual, technical, and unit training was conducted on the rights of way and shops of commercial railroads, which sponsored affiliated rail units in peacetime. Some training was conducted on the Claiborne and Polk Military Railway, a 50-mile stretch of track built by the 711th Railway Operating Battalion specifically for training and known by graduates as "The Worst Railroad on Earth." Rail training was also conducted at Camp Shelby, Mississippi, and Fort Warren, Wyoming. A list of units sponsored by American railroads is at Appendix D.[22] The cooperation of American railroads in training individuals and units, as well as furnishing



Troops training at San Francisco Port of Embarkation
loading and unloading the DUKW.

hundreds of experienced employees for direct appointments, was a notable success and contribution to the war effort. Some 45,000 officers and men were assigned to rail operations by June 1945.

In early 1944, the Chief of Transportation proposed the establishment of a single Transportation Corps unit training center, but the recommendation was not approved. A more concrete proposal in May 1945 recommended that Fort Eustis, Virginia, be designated as the site for the center. In January 1946, it was approved as a Class IV activity under the Chief of Transportation, and the Transportation Training Center and Transportation School have functioned at Fort Eustis ever since that time. The installation was redesignated as The Transportation Center and Fort Eustis in 1950.[23]

The number of transportation units activated during the war was a remarkable achievement. It is particularly noteworthy since the corps was not established until July 1942 and was substantially behind other branches which began organizing and equipping units prior to and in the early stages of the war. The broad scope of unit functions and the sheer magnitude of the task accomplished is demonstrated by the listing in Chart 5 of Transportation Corps troop units activated during the war.[24]

TRANSPORTATION CORPS TROOP UNITS ACTIVATED DURING WORLD WAR II[a]

	Activated and/or Trained by Chief of Transportation in Zone of Interior[b]				Activated overseas or Transferred to Transportation Corps While Overseas or En Route[c]			
	Units	Officers	Warrant Officers	Enlisted Men	Units	Officers	Warrant Officers	Enlisted Men
ALL TYPES	**765**	**7,685**	**768**	**170,974**	**217**	**2,625**	**192**	**39,785**
Major and Mobile Port, Headquarters and Headquarters Company	18	1,391	49	7,035	6	453	17	2,606
Medium Port, Headquarters and Headquarters Company	2	152	0	460	5	380	0	1,145
Port Company	420	1,814	0	94,718	70	338	0	15,333
Stevedoring Company			0		1	4		115
Port Battalion, Headquarters and Headquarters Detachment	73	237	150	986	19	78	38	322
Staging Area Company	4	24	0	756	4	24	0	755
Staging Area Battalion	1	26	0	457				
Amphibian Truck Company	51	316	0	9,028	19	118	0	3,367
Amphibian Truck Detachment					1	1	0	51
Amphibian Truck Battalion, Headquarters and Headquarters Detachment	3	12	0	39	12	66	6	223
Harbor Craft Company	46	1,057	496	11,085	11	125	107	2,707
Harbor Craft Platoon					1	10	4	85
Harbor Craft Crew (Class A)	5	25	5	63	1	5	1	13
Port Marine Maintenance Company	9	54	0	1,836	4	24	0	816
Army Marine Ship Repair Company	8	40	0	882	2	10	0	214
Boat Maintenance Platoon	1	1	0	42				
Traffic Regulation Group	15	851	0	4,558	15	342	0	2,325
Traffic Regulation Battalion					4	212	0	888
Regulating Station, Headquarters and Headquarters Company	4	168	4	570	1	42	1	141
Headquarters and Headquarters Company, Highway Transport Service					1	28	1	101
Base Depot Company	10	50	0	1,550	9	45	0	1,246
Floating Spare Parts Depot	2	10	0	110				

Chart 5

TRANSPORTATION CORPS TROOP UNITS ACTIVATED DURING WORLD WAR II[a]

	Activated and/or Trained by Chief of Transportation in Zone of Interior[b]				Activated overseas or Transferred to Transportation Corps While Overseas or En Route[c]			
	Units	Officers	Warrant Officers	Enlisted Men	Units	Officers	Warrant Officers	Enlisted Men
ALL TYPES	**765**	**7,685**	**768**	**170,974**	**217**	**2,625**	**192**	**39,785**
Warehouse Platoon					3	9	0	186
Transportation Corps Service Company					1	7	0	178
Transportation Corps Service (Headquarters only)					4	8	0	52
Transportation Corps Service Battalion, Headquarters and Headquarters Detachment	7	28	0	91	3	12	0	38
Transportation Corps Service Group, Headquarters and Headquarters Detachment					7	28	0	119
Transportation Corps Service Group, Headquarters and Headquarters Company					1	16	0	170
Military Railway Service, Headquarters and Headquarters Company	2	56	2	361	1	32	6	165
Railway Grand Division, Headquarters and Headquarters Company	12	311	0	810				
Railway Operating Battalion	32	769	41	26,691	6	152	10	4,977
Railway Operating Detachment					1	13	0	391
Railway Transportation Company					1	5	0	325
Railway Operating Company					2	11	0	325
Railway Shop Battalion	11	263	21	7,254	1	27	1	406
Hospital Train Maintenance Platoon	5	5	0	135				
Hospital Train Maintenance Section	5	0	0	54				
Railway Workshop Mobile	8	8	0	204				
Railway Track Maintenance Platoon	11	17	0	1,199				

[a] Includes prewar emergency period.

[b] Includes some units activated by the Quartermaster General and the Chief of Engineers and transferred to the Transportation Corps before completion of training.

[c] Includes some units activated by the Quartermaster General and the Chief of Engineers in the zone of interior and transferred to the Transportation Corps while en route to or after arrival in oversea commands.

Chart 5. Continued

The columns showing overseas activations and transfers en route reflect the Chief of Transportation's late start and War Department troop basis limitations. For example, the Chief of Transportation could not activate all units requested by the Pacific theater, so the theater adjusted priorities and activated transportation units overseas from available personnel to meet mission requirements.

SUPPLY AND PROCUREMENT ORGANIZATIONS

In the Office of the Chief of Transportation, the director of materiel and supply was responsible for the management of research and development, procurement, and supply functions. The Transportation Corps was made responsible for procurement after existing technical services had contracted their equipment needs with major manufacturers. The Corps was required to contract with smaller U.S. firms that had limited facilities and experience. To cope with the dispersion of sources, supply and procurement divisions were established in each of the the transportation zones to interface with local suppliers and administer contracts.

Depots which stored and issued Transportation Corps supplies and equipment were physically located at four holding and reconsignment point facilities at Marietta, Pennsylvania; Voorheesville, New York; Montgomery, Alabama; and Lathrop, California. A number of subdepots were established and operated by the holding and reconsignment point commander under control of the zone commander and technical/staff supervision of the zone supply division as directed and approved by the Office of the Chief of Transportation. Procurement and supply gradually became better organized with standardized procedures. Early in 1945, procurement operations were consolidated in field offices in New York, Chicago, New Orleans, and San Francisco, which operated directly under the director of supply. The scope and success of the major item procurement program for Army and lend-lease claimants is demonstrated by the quantities listed in Chart 6. [25]

The late start and limited supply experience of the Transportation Corps created problems in both the procurement and distribution of spare parts. In consultation with Brig. Gen. Frank A. Heilman, Chief of Supply, Army Service Forces stock control and maintenance divisions were established in late 1943 when the problems became evident. This helped control and improve the spare parts supply and gradually the situation improved; however, the Chief of Transportation was obliged to report in late January 1944, "the present status of

QUANTITIES OF MAJOR ITEMS OF TRANSPORTATION EQUIPMENT CONSTRUCTED AND ACCEPTED IN THE ZONE OF INTERIOR

RAILWAY EQUIPMENT

ALL TYPES: 1942 - 1945 [a]	*Number of Units*
TOTAL	**106,698**
Railway Cars (Passenger and Freight)	95,290
Locomotives	7,570
Locomotive Cranes	260
Maintenance-of-Way Cars	3,251
Specialized Industrial Cars	327

MARINE EQUIPMENT

ALL TYPES: JULY 1940 - DECEMBER 1945[b]	*Number of Units*
TOTAL	**13,962**
Total Self-Propelled	7,849
Barges and Lighters	442
Freight and Passenger Vessels	468
Launches	1,358
Rescue and Salvage Vessels	813
Tugs and Towboats	2,123
Miscellaneous Boats	258
Marine Tractors and Other Propulsion Units	2,387
Total Nonpropelled	6,113
Barges	5,839
Floating Cranes	274

MATERIALS-HANDLING EQUIPMENT

ALL TYPES: 1942-1945[c]	*Number of Units*
TOTAL	**1,908**
Gantry Portal Cranes	501
Stiff-Leg Derricks	685
Miscellaneous	722

[a] Data for acceptances of railway equipment not available for 1940 and 1941. Acceptances in 1942 include those effected by Chief of Engineers up to 16 November, when railway procurement was transferred to the Chief of Transportation.

[b] Marine equipment figures include acceptances by other Army agencies—chiefly the Quartermaster Corps, and the Transportation Service up to 31 July 1942, when the Transportation Corps was established.

[c] Data for acceptances of materials-handling equipment not available for 1940 and 1941.

Chart 6

the repair parts problem is acute." Transportation procurement did not fully catch up with the need until the production of end items passed its peak.[26]

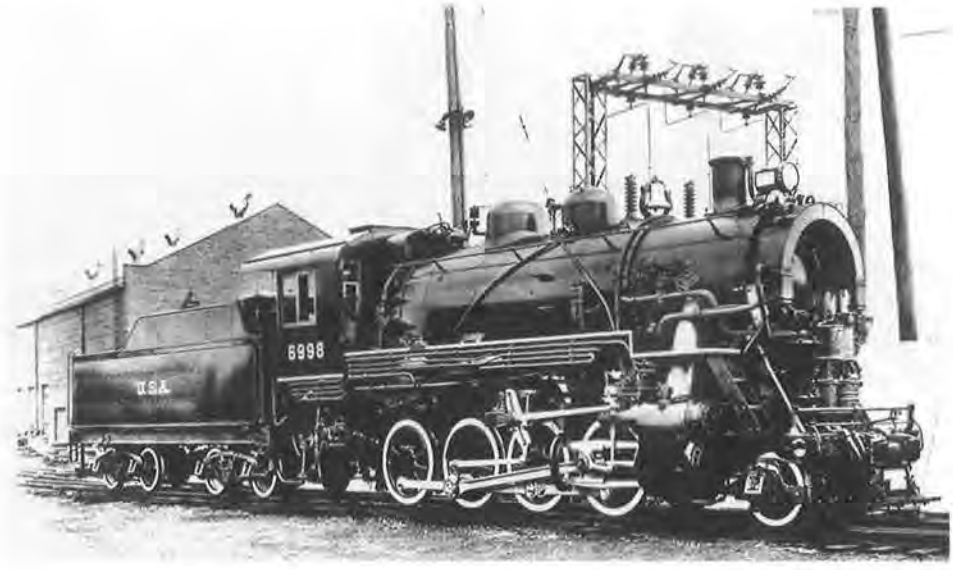
Until January 1945, transportation research and development was conducted in several operating and technical divisions of the Office of the Chief of Transportation as well as the ports. In that month, the Transportation Corps Board was established at Fort Monroe, Virginia. It was designed to deal with a wide range of projects and develop improved designs and specifications for TC equipment and supplies. The board also had responsibility to improve training programs and devise more effective transportation operating procedures.[27]

TRANSPORTATION OPERATIONS IN THE UNITED STATES

The Chief of Transportation operated military transportation facilities and arranged for commercial transportation to move Army personnel and material within the United States and to overseas destinations, in close coordination with Army Service Forces regional service commands. When General Gross became the Chief of Transportation, his objectives were to have the Corps control as many transportation functions as possible and maintain unbroken control of troop and supply movements from the point of origin to their arrival at the overseas ports of debarkation.

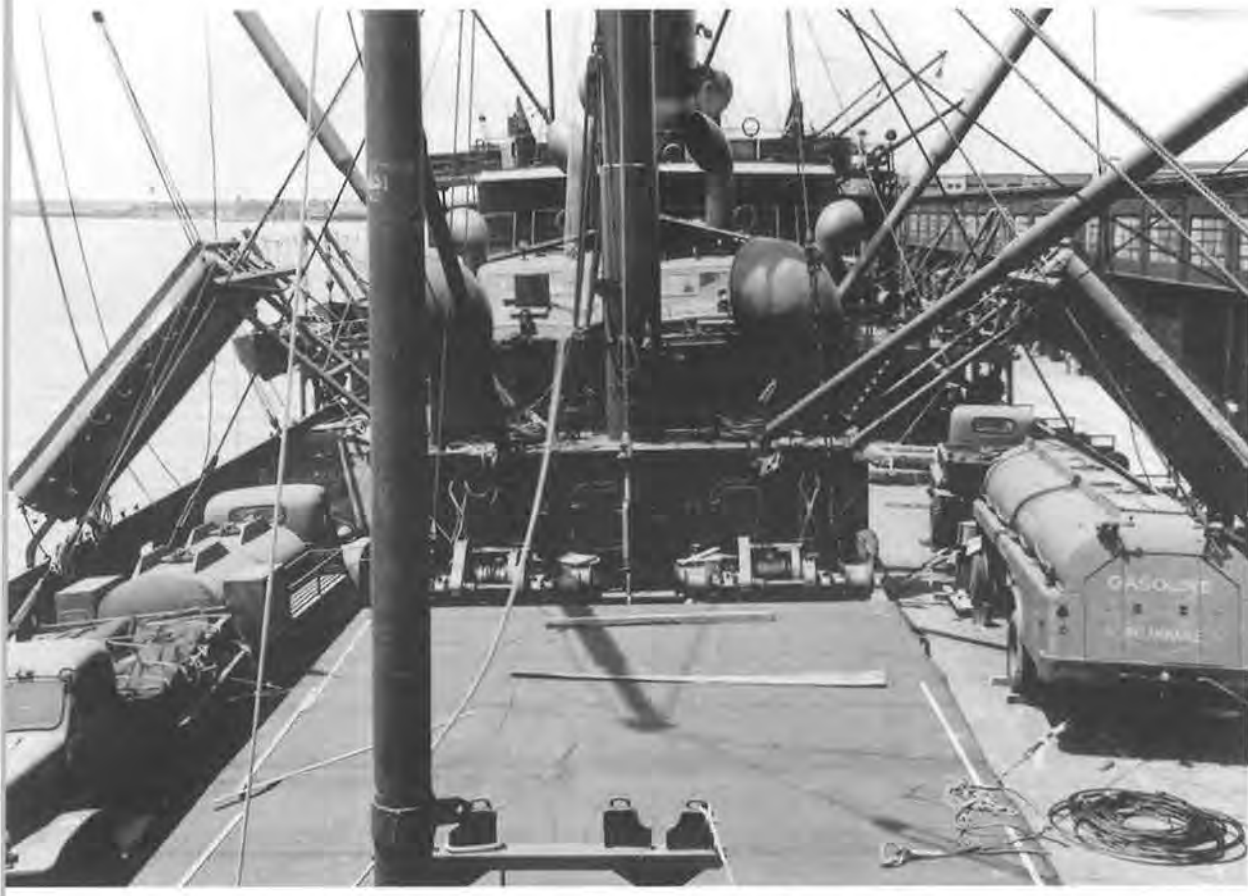
The most pervasive consideration in planning and executing transportation operations was the shortage of ocean shipping needed to project Army power overseas. Constraints on overseas movements directly affected planning, scheduling, and control of movements to the ports. Also, they indirectly affected routing of traffic, and the allocation, production, and use of resources for all modes of transportation within the United States. Shipping limitations stemmed from shortfalls brought on by the need to support lend-lease programs and to deploy to off-shore bases, by losses to enemy U-boats, and by the inherent complexity of shipbuilding industrial mobilization. The demand for ships to transport troops and freight overseas began as soon as the war started and increased until the end of hostilities. Shortages persisted throughout the war.

Prior to World War II, the United States controlled 45 percent of the world's oceangoing vessels of 1,000 gross tons or more.[28] The bulk of the remainder was owned by nations friendly to the Allies. It was soon evident that the resources available were far from sufficient. In September 1941, the Quartermaster General and G-4 took strong actions to increase the Army's sealift capacity. The Army Transport Service operated sixteen troop carriers and fifteen freighters, with a peacetime lift capacity of 18,000 troops and 177,000 measurement tons of cargo. The Army was also using a large amount of



First locomotive purchased by the U.S. Army since WWI

commercial space obtained from the Maritime Administration. At that time, the Naval Transportation Service had a lift capacity of 35,000 troops and 273,000 tons of cargo. While Army planners were guardedly optimistic about the shipping situation at the time, their optimism was ill-founded as more and more claimants came forth to swell U.S. support to the potential allies. The attack on Pearl Harbor and the invasion of the Philippines required revision of all prior estimates. The establishment of the War Shipping Administration (WSA) by the president and the proliferation of other control measures and agencies generated a massive effort in the Office of the Chief of Transportation to ensure future support of Army force deployments. As the war intensified, planning was frustrated by the extensive losses of shipping from Axis submarine operations, estimated at 34,000,000 deadweight tons, from 1939 through August 1945. This was about equal to all U.S. and British tonnage existing in 1939. Losses greatly exceeded new construction until October 1943 when offensive naval operations decreased submarine successes and the massive U.S. shipbuilding program hit its stride.[29] Notwithstanding those accomplishments, in February 1945, after the United States had accomplished the greatest shipbuilding effort in history, Prime Minister Winston Churchill said in a speech in the House of Commons: "The reason why shipping is so tight at present is because the peak period of the war in Europe has been prolonged for a good many months beyond what was hoped last autumn, and meanwhile the peak period against Japan has been brought forward by American victories in the Pacific."[30]



Deck loaded Liberty ship, Charleston Port of Embarkation.

Ocean shipping estimates were further complicated by priority requirements for landing craft and equipment needed for the amphibious operations needed to retake continental Europe and the islands in the Pacific. Amphibious equipment used much the same type of production resources as oceangoing shipping, but doctrine and planning data were sparse. The Army and Navy conducted exercises and extensive research on equipment to come up with credible estimates of oceangoing special lift, small boat, and amphibious equipment needs.

The Directorates of Operations and of Water Transportation were the key staff agencies in Office of the Chief of Transportation dealing with federal and Allied maritime planners. They negotiated with the controlling agencies, presenting strong justification to support Army needs. They developed programs in conjunction with the Navy and Army technical services to improve utilization of shipping and interfaced actively with agencies that allocated lift resources to

military claimants. As a result of these efforts, by August 1945, the Transportation Corps operated 186 oceangoing vessels, which were either owned or chartered. They included 51 troop and cargo ships, 26 hospital ships, 55 inter-island vessels, 17 floating warehouses, 12 repair ships, 7 spare parts depots, 2 cable vessels, 1 news transmission ship, and 15 training ships. On 1 January 1945, at the peak of the war against Germany, those vessels constituted only one-seventh of the total of 17,330,000 deadweight tons of shipping allocated by the War Shipping Administration to the Army to move troops and cargo to and from overseas destinations.[31] This was 48 percent of all tonnage available to the War Shipping Administration, greater than the total U.S. merchant fleet in September 1939. As the war shifted to the Pacific, Army allocations decreased in favor of those to the Navy.

Army Transport Service vessel operations were managed by the U.S. and overseas port commanders to which the ships were assigned. They functioned under the Office of the Chief of Transportation policies and procedures developed primarily by the Water Division of the Office of the Chief of Transportation and were operated by civilian crews. A transport commander, a military officer, was responsible for the passengers and a Navy or Army gun crew or "armed guard" to man the armament. The transport commander's small staff included Navy and/or Army Signal Corps radio operators and Navy radar operators for the sets installed late in the war, together with a civilian transportation agent, a surgeon, and a chaplain. Troop ship administration was a complex and demanding task that tended to generate friction from jurisdictional problems, particularly on civilian-operated vessels. Similar problems arose as large numbers of Army troops began traveling on Navy transports, Navy-operated commercial ships, and British ships such as the ocean liner transports *Queen Mary* and *Queen Elizabeth*. However, port commanders and the Office of the Chief of Transportation worked with their counterparts, developed jurisdictional agreements and joint implementing directives, and instituted measures such as putting American complements on British transports and removing Army transport commanders from Navy vessels. As time went on, civilian and military personnel became accustomed to working together and teamwork replaced friction. Throughout the war, the Office of the Chief of Transportation gave priority effort to improving food service, and broadening voyage morale activities and physical training. Those programs improved conditions, but troop transport travel was seldom a pleasure cruise.[32]

During the war, the Transportation Corps developed small boats and other floating equipment which were used for a variety of purposes. The category

"small boats" included all craft, powered or not, under 1,000 gross tons and 200 feet long. These included coastal freighters, harbor craft and barges, but did not include amphibious landing craft, for which responsibility was assigned to the Navy in 1943. The development of requirements and tables of organization and allowances coupled with actual design, procurement, and distribution of the vessels themselves constituted an effort as great as that of supplying oceangoing shipping. At the start of the war, the Army had 386 craft. By December 1945, the Office of the Chief of Transportation had acquired almost 14,000 of the general types shown in Chart 6, and additional craft were procured in overseas theaters.

Crews operating small boats were sometimes provided by the owning agency. The Army Air Forces manned its own crash boats, and the Coast Artillery manned its mine planters. In overseas commands, boat crews were provided by theater commanders who used civilian, military, or Coast Guard crews requisitioned from the United States, or hired local civilians in theater. As in all prior wars, expedient use was made of indigenous crews to ease the impact on U.S. manpower. The Chief of Transportation provided crews for boats operated at Transportation Corps facilities in the United States, military crews for forward area operations as requested by theater commanders; crews to deliver craft to ports of embarkation or to overseas destinations when deployed under their own power; and trained personnel to operate boats at ports in the theaters. About 13,000 officers and soldiers were trained to man harbor craft companies, an additional 3,000 were activated in companies overseas, and about 20,000 civilians were employed on small boats worldwide by the end of the war. The personnel management of civilian small boat employees was a difficult task complicated by heavy turnover in personnel, draft deferments, and war bonuses. Strong consideration was given to fully militarizing small boat operations, but the idea was dropped. Many civilian employees who were experienced crewmen could not qualify for military service because of age or physical limitations. Like the effort to provide oceangoing shipping, the small boat program was a success and contributed markedly to U.S. and theater transportation operations.[33]

ARMY PASSENGER TRAFFIC MANAGEMENT

In the United States, both military and civilian passenger traffic boomed during the war. The Army training program was expensive in terms of transportation. The newly inducted civilian traveled from home to induction station, on to a reception center, and then to the replacement training center. After basic training, the soldier might travel to one or more specialist training centers before going to his unit or on to a port. Entire units were transported across

Troops in staging area at Camp Patrick Henry before moving to Hampton Roads Port of Embarkation.

the continent to participate in desert training. The average number of moves for a draftee, prior to going overseas, was three in World War I and five in World War II, although some soldiers made six to seven before leaving the United States.

Civilian business travel flourished and the improving economy fostered personal travel. The rationing of fuel and tires and the elimination of passenger car production curtailed the use of private transportation. The withdrawal of intercoastal shipping to meet transoceanic requirements and the submarine threat shifted travel to land carriers. Wartime priorities over labor and materials precluded public carriers from allocating resources to other than military-related missions, so the increase in civilian travel was met by more intensive use of existing resources. The public responded well to constraints, and the Office of Defense Transportation generally avoided official restrictions on nonessential traffic throughout the war.

Strict controls were established and enforced by the Chief of Transportation over movements. His office worked closely with the commercial carriers, particularly the Association of American Railroads whose member railroads controlled 97.5 percent of the total railroad mileage and carried about 98 percent of Army group movements (40 or more). The rail portion of intercity

passenger miles grew from less than a tenth of the total in 1940-1941 to more than a third in the 1943-1945 period. Combined private auto and bus passenger miles declined from 90 percent in 1940, to about 70 percent in 1945, while bus traffic held generally stable at slightly under 10 percent.[34]

The Traffic Control Division and Transportation Zone Offices managed the routing and approval of group troop movements, while smaller movements were routed by origin station transportation officers.[35] The working arrangements with the railroads were incorporated primarily in the Joint Military Passenger Agreement, negotiated annually between rail territorial passenger associations and the armed forces. Specific movement and routing arrangements with the rail carriers included allocation of cars appropriate for the move, such as day coaches, sleepers, commercial dining or converted baggage-kitchen cars, and hospital cars. The Army developed and procured special military cars, such as troop sleepers and kitchen cars, to supplement commercial equipment in the United States, as well as deploying them overseas. Commercial bus carriers were not as well-organized as the railroads, and they focused on local operations. However, the Traffic Control Division worked with the National Association of Bus Operators in Washington, D.C. and the National Bus Traffic Association and National Bus Military Bureau in Chicago to negotiate with the bus operators. The Transportation Zone Offices negotiated with regional carriers. The collaboration of the common carriers and the Army was an outstanding example of teamwork between private industry and government in a national emergency.

The Chief of Transportation and the carriers took a number of measures to improve the use of passenger travel resources. For example, the Chief of Transportation obtained authority to change departure/arrival times of trains, to correlate the use of resources available from nearby troop movements, and to restrict the period that equipment could be ordered in advance and staged at posts. The Chief of Transportation also obtained relief from state restrictions on train length and established a strict inspection program to ensure Army users properly cared for equipment and carrier service met equipment and schedule specifications. The Chief of Transportation developed and implemented detailed troop movement procedures and established Army Reservation Bureaus for furlough travel of Army personnel. The bureaus were later used by all services. Over four million reservations were obtained for Army personnel in 1945. The Office of the Chief of Transportation coordinated closely with the Surgeon General and Army Service Forces on the movement of patients in both hospital cars and standard equipment and by 1945 received authority to control all movements involving fifteen patients and attendants.

The movement of Negro troops in the segregated environment of World War II created problems for transporters in those states whose laws required segregation. Army policy stated there would be no discrimination in services rendered between whites and blacks (even though units were segregated), and the Chief of Transportation endeavored to enforce this policy to the extent of his ability. On special trains and buses under Army control, the policy was implemented; however, on public carriers in segregated states, employee efforts to enforce segregation created many unpleasant situations for Negro service personnel. Every effort was made to minimize the unpleasantness by working with local authorities and carriers to provide equal treatment, use Army-controlled equipment to forestall segregation, and correct abuses identified through investigations. These measures only partially met the problem as the Army had no means to offset segregation laws.[36]

Administrative troop movements through ports were based on releases by the Office of the Chief of Transportation, which issued them as soon as requests were received from the major control headquarters—Army Ground Forces (AGF), Army Air Forces (AAF), or Army Service Forces (ASF). The Traffic Control Division and Transportation Zone Office controlled all movements by issuing routing instructions and allocating rail equipment, including that required for concurrent shipment of accompanying supplies and equipment. Much of the equipment came from depots or directly from the manufacturers and was matched with units by the port of embarkation. The bulk of troops were moved to staging areas, such as Camp Stoneman for San Francisco and Camp Kilmer for New York, on schedules authorized by the port, which was the only agency with complete overview of the myriad factors affecting movements. At the staging area, units and individuals were processed to validate physical, medical, and equipment status. Deficiencies were corrected and troops trained as needed to correct shortages in the skills mandatory for movement overseas. Training was also conducted in abandon-ship procedures. Individual replacements were organized in casual companies, prepared for movement, then moved to the ship embarkation area on precise schedules per detailed procedures. To avoid congestion at the ports, processing teams were sent to the locations of units moving directly from home station to shipside. Procedures were so effective that the loading of huge transports, such as the British Queens, which carried as many as 15,000 troops, was accomplished in as little as five hours. From December 1941 through December 1945, Army ports embarked over 7.6 million passengers.[37]

ARMY FREIGHT TRAFFIC MANAGEMENT

Army-sponsored freight traffic in the United States was managed in much the same manner as passenger traffic. Controls were imposed on freight single carload movements, equivalent to the movement of forty troops. The Traffic Control and Rail Divisions of Office of the Chief of Transportation coordinated Army interests with the railroads through the Association of American Railroads Car Service Division. Member roads delegated authority to the division for such matters as transfer of freight equipment from a railroad or territory to another and embargoing shipments to critical points. The Army also coordinated freight movements and use of resources closely with the Interstate Commerce Commission and Office of Defense Transportation. The amount of freight moved to overseas destinations during the war was colossal. Shipments on government bills of lading by common and contract carriers, which included nearly all movements, totaled more than 340 million short tons. During 1944, more than 105 million tons were moved, compared to 11.2 million tons in 1919, the peak year of World War I. At an average of 30 tons per car, reached in 1944-1945, about 3.5 million cars were loaded, moved, accounted for, unloaded, and in some instances held in reconsignment areas, diverted, or otherwise given special handling.[38] The nature of Army cargo further complicated movements. Engineer, armor, aircraft, and transportation rail and marine equipment included bulky, hard to handle, and outsized items requiring special routing to avoid bridges and small tunnels.

About half of Army freight originated at commercial industrial plants, a quarter from Army depots, and about a tenth from Army-owned industrial plants, with the rest from miscellaneous commercial and military installations. For freight originating at commercial activities, control measures such as car utilization and documentation were difficult to enforce, further complicating management of the program.[39] However, the principal Chief of Transportation management control, releases and routing orders for carload shipments, applied to all shippers of Army cargo. That authority was not only sustained throughout the war against general and frequent criticism of the process, but was broadened. As the Chief of Transportation strengthened his zones and other field agencies with more and better trained officers, it became evident to Army leadership that closer control of movements was essential. Additional movement authority was delegated to field transportation officers to route selected in-country shipments of five carloads or less. Control of the flow of traffic to the ports of embarkation and depots and prevention of congestion remained one of the highest priorities of transportation managers for the entire war.

Lend-lease shipments did not go through military ports, but their volume had a significant impact on U.S. traffic movements. Scheduling their arrival at overseas ports also required close control. The War Department and the Lend-Lease Administration agreed in July 1941 that the Transportation Corps would control movement of lend-lease shipments to all ports using transit storage facilities at holding and reconsignment points.

Numerous innovations were instituted to better manage the transportation function and improve productivity. One of the most notable was the consolidated car service, initiated in July 1942. Consolidating stations were established at selected locations to combine less than carload (LCL) shipments to one destination or other transfer point into carload lots. While LCL shipments constituted only a small portion of tonnage moved, they amounted to 40 percent of the number of shipments. Prior efforts to have post transportation officers consolidate shipments produced spotty results. Carrier LCL service and freight forwarder rates were high and did not provide the in-transit visibility of shipments that was available for carload movements. The consolidation service was an unprecedented success and was extended to the Navy in February 1943 and later to the Marine Corps and Coast Guard. The service worked out satisfactorily for the railroads but generated opposition from commercial freight forwarders. However, the great savings in railcars and rate savings overwhelmingly supported initiation and expansion of the military program. Freight forwarders and the Railway Express continued to be used extensively. Truck lines also benefited from the service since they provided faster service in moving LCL shipments over shorter distances to consolidating stations. They also distributed cargo to consignees more quickly, so the Office of the Chief of Transportation encouraged their use. The program expedited deliveries, reduced misshipments, used car capacities more effectively, and reduced LCL shipment damage. Approximately 2.4 million tons of cargo were consolidated from July 1942 through December 1945.[40]

Other major programs were established to mobilize and conserve freight cars. Regulations were issued by the Chief of Transportation to reduce light loading of cars and expedite the release and dispatch of loaded cars. The new regulations also reduced hoarding of cars and using them for storage. They required consignees to unload cars promptly, clean and remove dunnage immediately to speed reuse, avoid crosshauling and backhauling, and improve loading and unloading techniques. The Army was the nation's largest user of rail transportation, and it gave conservation of assets a high priority by preventing careless and wasteful practices. The Office of the Chief of Transportation

directed that planning information be distributed in the field to encourage conservation at every level. For example, shippers notified consignees by wire of large movements such as twenty-five carloads to obtain receiving clearance. Car situation reports were required from all installations and analyzed for performance. Competition among installations was created by publishing reports and encouraging least satisfactory activities to improve performance. Car and equipment loading rules were established to promote uniformity and conservation of materials, and the Chief of Transportation participated closely with the carriers and their 600 "car efficiency committees," which policed local civil and military performance throughout the country.

The Transportation Corps innovation of holding and reconsignment points and consolidating stations under Transportation Zone Offices, along with central management of carload movements, were major factors in facilitating the flow of traffic and preventing congestion at ports and depots. The measures taken to train Transportation Corps officers and soldiers and to establish Army procedures to supplement and implement those of other agencies enhanced productivity. The professionalism of the Army transportation function increased as the war continued.

PORT OPERATIONS

Numerous management actions were required by U.S. transportation officers to move units and cargo overseas through a port of embarkation. Each action had to be coordinated with the point of origin and all intermediate points; with the Overseas Supply Divisions at the ports if the shipment was requested by the theater or had to accompany a deploying unit; and with the Water and Port Transportation Divisions of the POE. The Office of the Chief of Transportation directors of operations and water transportation coordinated all operations that expedited and maximized POE throughput and utilization.

The acquisition and retention of Army port facilities in the United States was as severe a challenge as obtaining ocean shipping allocations. Ports were well-developed and could adequately handle wartime traffic when properly managed. However, many alternative nonterminal uses such as storage and repair were constantly being proposed, and the Chief of Transportation had to guard against them. General Gross personally negotiated with the Navy, the WSA, and the Office of Defense Transportation throughout the war to obtain and keep the terminal facilities needed to meet Army tactical and strategic plans. Much was accomplished to improve port utilization through cooperative efforts and realignment of workload among Army ports. In a report to the War Department in November 1945, the Chief of Transportation pointed out that

Repair of hospital train kitchen car at Charleston port.

maintenance of separate establishments by the Army and Navy at the large ports was wasteful and that joint operations would have improved resource utilization and eliminated much of the onerous and costly coordination that wartime operations generated.[41]

The majority of troop and cargo movements overseas, through the ports, were administrative in the context that ships were to be off-loaded at an established port rather than in an assault on a hostile shore. Most amphibious assault forces were mounted from the theaters; however, a few were embarked in the ZI. The first large one was Maj. Gen. George S. Patton, Jr.'s Western Task Force for the invasion of North Africa, which loaded out of the Hampton Roads Virginia port in October 1942. The Army had little experience in combat loading for assault landings and other aspects of amphibious warfare. Time for planning had been short. Consequently, there was considerable confusion at the port, but lessons were learned quickly and applied to subsequent operations.

Maj. Gen. Troy Middleton's force for the Sicily landing embarked more smoothly from Hampton Roads in June 1943, as did the forces to assault Attu and Kiska that were loaded on the west coast in April and July 1943.[42]

Stevedoring at the ports of embarkation was performed mainly by Army civilians and contractors. Initially, labor was sufficient to meet the workload, but the attraction of other industries with higher wages and better working conditions gradually created shortages of longshore labor. In 1943, the office of the Chief of Transportation staff and POE commanders foresaw shortages developing. The Chief of Transportation included in the 1944 troop basis sixty port companies to supplement contract stevedores in U.S. ports in addition to those programmed for the theaters. By 30 April 1945, forty-two companies were activated and assigned to ports on the Atlantic, Gulf, and Pacific coasts. Also, some 11,000 Italian prisoner of war service units were organized into sixty-five units to perform tasks other than shiploading in selected areas of POE.[43]

By working closely with labor unions and local industry, supplementing civilian resources, negotiating more favorable rates, and improving the productivity of loading operations, the Transportation Corps was able to meet outloading requirements, while reducing operating costs. For example, the all-port average cost of handling general cargo dropped from $1.73 per measurement ton in November 1943 to $1.42 in June 1945. Explosives handling costs dropped from $6.45 per long ton to $4.52 in the same period.[44]

Ammunition movement always received priority attention throughout the transportation community. The shipment of ammunition and explosives to the theaters was a matter of personal concern to General Gross, not only for the period of hostilities, but also for retrograde operations after the war. The size and explosive power of shells and bombs exceeded those of World War I and proper handling required intense coordination and cooperation among the principal interested agencies that included the Chief of Transportation, Chief of Ordnance, the Navy, Bureau of Safety of the ICC, Bureau of Explosives of the Association of American Railroads, the Coast Guard, and the WSA. During World War I, most explosives were loaded to ships at anchor to minimize the impact of explosions and for other safety reasons. In 1940, shipments were loaded both from piers at terminals and to ships at anchor. Early in the war, it became evident that the volume of ammunition expected would require extensive increases in pier facilities away from population centers. Loading directly from inland carriers to vessels was the preferred method to avoid double handling. Prevailing practice required ports to load small quantities of ammunition on several ships to limit the impact of accidents, which required more ports. In

addition, backup facilities for each port would be needed to hold shipments away from the ports, since these were most vulnerable to sabotage, fire, and accident. The Quartermaster General and Chief of Ordnance jointly developed a construction program, which was approved on 19 December 1941 and promptly initiated by the Corps of Engineers. The decision was made to keep ammunition facilities under the jurisdiction of the approprate port of embarkation, except for those directly adjacent to and part of an ordnance installation. Some facilities were leased. The outshipment of ammunition was an immensely large and complicated program moving more than 11 million tons through Army ports. About 9 million short tons were moved through Atlantic and Gulf ports and 2.5 million through Pacific ports.[45] Despite the volume of dangerous cargo handled, no major disasters occurred at any port operated by the Army. There were fires on piers that were quickly extinguished, as well as explosions of ammunition moving by rail in the United States. These incidents and the Port Chicago, California, Naval Ammunition Depot disaster in July 1944 kept the Transportation Corps constantly alert to the hazards of transporting ammunition.

The role of the port of embarkation in providing continuing support to overseas theaters was managed primarily by the Overseas Supply Division. After the initial period of automatic resupply and establishment of an organized supply system, the Overseas Supply Divisions at each port assumed responsibility for the resupply of a designated theater.[46] Requisitions were "edited" by Army technical service representatives based on data maintained on stocks reported on hand and consumption experience. Requests were sent to the appropriate supply source or in emergencies filled from stocks on hand in the port or held in supporting holding and reconsignment points. Many items were "controlled" and had to be released by the responsible technical service headquarters. Shipments were scheduled for movement if the availability date was known; or if not, when availability was determined, Overseas Supply Divisions called them forward in coordination with planned sailings. Shipments arriving in the port were received and processed by the Transportation Division and loaded by the terminal operators of the Water Division. The Overseas Supply Divisions kept the theater informed of the status of each request, and its scheduled arrival in-theater.[47] The accomplishments of the Overseas Supply Divisions contributed greatly to the quality of logistics support to the theaters and were a feather in the cap for the Corps.

The Transportation Corps was active in programs to improve the protection of shipments. At the outset of the war, Army packaging specifications were woefully inadequate to protect supplies from the rigors of wartime transportation

and handling. They also failed to protect items stored in poor quality shelters or in the open, a condition which prevailed, particularly following assault landings. Strong complaints concerning packaging followed the landing in North Africa in 1943. Ports of embarkation were excellent laboratories for testing the effectiveness of item and shipment packing. In February 1942, the Office of the Quartermaster General loaned experts to General Gross to set up a unit that eventually became the Packing Section of the Water Division. This organization studied and recommended improved specifications and procedures. In June 1942, on Gross' recommendation, Army Service Forces established similar activities, which later became the Army Packaging Board. The various packaging activities, coordinating closely with the theaters on their requirements, produced major improvements. New packaging regulations prescribed the use of sturdier and waterproofed materials, established specifications for initial packing by manufacturers and depots, increased inspection of palletizing, and repacking/recoopering requirements for holding and reconsignment points and ports of embarkation. Feedback programs were established so that discrepancies reported by theaters and transportation activities, were directed to shipment originators for corrective action.[48]

The Chief of Transportation also conducted in-depth studies on special ship stowage requirements for bulky cargo, such as tanks, vehicles, and rail equipment, that were generally moved in the holds or on the decks of regular cargo ships. The overseas movement of aircraft which could not be ferried was a special challenge. Even disassembled, they were still bulky and fragile and created problems in the theaters that had to set up assembly lines. This delayed the availability of aircraft and required more specialists in the theater. Successful solutions to shipping assembled aircraft included retrofitting thirty-six Liberty ships with larger hatches, shipping aircraft on naval escort carriers, and equipping more than 600 U.S. and British tankers with false decks, above the main deck, that provided an unbroken area to stow aircraft and other light commodities. Even though the Liberty conversions provided for the most damage-free movement, over 20,000 aircraft were deployed on tanker decks from March 1943 to the end of the war.[49]

The peacetime system for marking shipments was wholly inadequate for the volume and scope of destinations for World War II addressees. As with any military problem, there were many interests to serve, such as shippers, transporters, security experts, and most importantly, the overseas command recipients. In late 1942 and early 1943, the European theater complained that the existing system was unsatisfactory in North Africa and that a more definitive

marking system was needed to meet the crowded depot conditions for the buildup in the United Kingdom. The Chief of Transportation initially disagreed with the theater proposal as burdensome and time-consuming, but eventually concurred with a five-part code, published in WD TM 38-414, that provided a four-letter POD or area destination; a single letter priority, by the half month, to be shipped from the ZI; an abbreviated source (QM, Ord), with Roman numeral class of supply; a consignee combination identifying separately packed parts of an item to be assembled; letters/numbers identifying origin depot and number of shipments from a multiline requisition. The single-line requisition was not developed until after the war. An address might read BOBO-A-ORDII-GT3-ACO2RA3. In addition, each service color coded each package with a band or corner triangle for identification in initial sorting. The Overseas Supply Divisions included the code markings on extract requisitions sent from ports to sources of supply. The Chief of Transportation continued to be active in revising marking instructions as a member of the War Department Code Marking Policy Committee and had the chief responsibility for policing the program.[50]

A major improvement associated with shipment identification came with the introduction by the Army Service Forces of the standardized War Department Shipping Document and Vendor Shipping Document. They were tested in the spring of 1943 and quickly made universal. Again, the Chief of Transportation was responsible for policing the program. He sent teams of officers to Europe to collect opinions, train people in proper use of the documents, and disseminate corrective actions required by the preparers in the United States. Shipment documentation and marking were of such importance that General Gross established a unit, frequently assisted by ad hoc support, devoted entirely to improving the program and monitoring its execution at Transportation Corps installations.

During the latter part of the war, U.S. ports of embarkation repeatedly outloaded in a single month more than 400 cargo vessels with over four million measurement tons of cargo and 60 to 80 troop transports, with days in port declining substantially over the period.[51] Operation of ports in the United States was a Transportation Corps success story, matching those of traffic management, acquisition of shipping, training and doctrine, and Transportation Corps supply.

CHAPTER VII

World War II
U.S. Worldwide Commitments

"In order to make assured conquests it is necessary always to proceed within the rules: to advance, to establish yourself solidly, to advance and establish yourself again, and always prepare to have within reach of your army your resources and your requirements."

Frederick the Great: Instructions for His Generals, 1747.

INTRODUCTION

The decisive land battles of World War II were fought in Europe and on the islands of the Pacific. But during and even before direct involvement in the war, the United States took important actions in areas distant from the central conflict in Europe and the Pacific. Many actions were defensive and designed to avert victories by Axis forces from becoming decisive before the Allies could mobilize their forces for a counteroffensive. Those that occurred before Pearl Harbor were initiated to assist the valiant efforts of Great Britain and the Soviet Union, who were already at war with the Axis. All of these actions required considerable transportation resources in the way of personnel and equipment. While they are less known than the main combat theaters, they too made a significant contribution to victory. Principal deployments were in the Western Hemisphere, the Persian Corridor (PC), the China, Burma, India (CBI) area, and the North African/Mediterranean Theaters (NATOUSA/MTOUSA).

During the rearmament and mobilization of the early 1940s, the President deployed military forces to defend American interests in areas of the Western Hemisphere that were essential to support future deployment of U.S. forces. Plans were drawn to organize, equip, and deploy forces to meet emergencies, and as early as 1939, actions were started to strengthen U.S. bases in the Caribbean, Pacific, and Alaska.

In September 1940, the President agreed with Great Britain to exchange fifty overage U.S. destroyers for the right to lease Commonwealth naval and air

bases in the Atlantic, Caribbean, and Canada. In early and mid-1941, the United States also reached agreements with the governments concerned to establish air, sea, and land bases on Greenland and Iceland. By the time America entered the war, Army transporters were already supporting the 66,000 troops of the Caribbean Defense Command (CDC) established in 1941 with the key mission to protect the Panama Canal. The CDC also coordinated base operations throughout the Caribbean area including Puerto Rico, Trinidad, British Guiana, and Cuba.

Opening new bases and reinforcing established stations caused a major increase in the transportation workload. These tasks soon paled in comparison with the more formidable challenges of prosecuting the war in the large theaters. Solutions to the early transportation problems ensured the security of the hemisphere while providing priceless experience for the future. Quartermaster General transporters took immediate action with the War Shipping Administration to increase the Army Transport Service fleet which was barely adequate to support existing off-shore bases. They coordinated extensively with the Chief of Engineers and War Department G-4 to arrange delivery of construction materials, equipment, and supplies. Concurrently, they initiated arrangements for transportation resources to support new bases, troop levels, and missions.[1]

NORTH ATLANTIC BASES

The strategic location of Newfoundland dictated the early development of U.S. air and naval bases there. In January 1941, the first contingent of 1,000 U.S. troops arrived in St. John's, which became the principal Army port. Leased port facilities were insufficient for planned discharge. Port clearance was done by the government-owned Newfoundland Railway, a narrow gauge road with obsolete equipment, and by truck over unimproved local roads. Unionized longshoremen restricted work over ten hours a day while heavy snowstorms from January to April hampered operations. Negotiations were conducted through government channels to improve local labor productivity and develop an extensive base construction program for permanent docks, an offshore petroleum, oils, and lubricants (POL) discharge facility, and pipeline to Harmon Army Airfield. Proposals also included additional railway equipment, the rehabilitation of the rail right-of-way, and the improvement of highways. The physical improvements and increased productivity reduced port congestion, and shipments of construction materials declined as facilities were completed. Newfoundland

remained an important naval activity and air base supported by St. John's Army Port for the remainder of the war.[2]

Army landing fields and weather stations were established in Northeast Canada to support aircraft ferry routes to supplement the direct route across the Atlantic from Gander, Newfoundland, to Scotland, a 2,100-mile flight, too long for most aircraft. In September 1941, the first increment of the program emplaced three temporary weather stations in Labrador and on Baffin Island (Codename Crystal I, II and III) at potential landing fields that could not be constructed before onset of winter. The Army Transport Service (ATS) vessel *Sicilien* carried the cargo of arctic housing, communications equipment, supplies, food, and fuel to Halifax, Nova Scotia, where it was transferred to Army-chartered trawlers and other small vessels that could navigate the narrow channels and cope with tides up to 42 feet in the objective area. Eskimos acted as pilots and helped as laborers while vessel crews stevedored for extra pay to assist the engineers who erected the stations. The mission was completed in late November 1941 under extremely hazardous and daunting conditions.[3]

The second increment (Codename Crimson) operated at the port of Churchill on the Hudson Bay. Originally developed to export wheat during the ice-free season from July to mid-October, Churchill was connected to Canadian main lines by a 510-mile single-track rail line running north through Manitoba. The 12th Port, commanded by Lt.Col. (later Col.) Curtis A. Noble, and the 389th Port Battalion operated the transfer point and port from mid-July to November 1942. Their mission was to tranship construction materials from the railhead to vessels delivering them to landing fields and weather sites. Off-loading was by lighter, and deliveries were hampered by hazardous tides and bad weather. It was an expensive and complex operation, superseded the next year by shipments direct from the Boston port of embarkation (POE) to construction sites. The increasing practice of shipping assembled short-range aircraft as deckloads and better weather data eventually eliminated the need for the "stepping-stones" in north-east Canada.[4]

ALASKA AND WESTERN CANADA

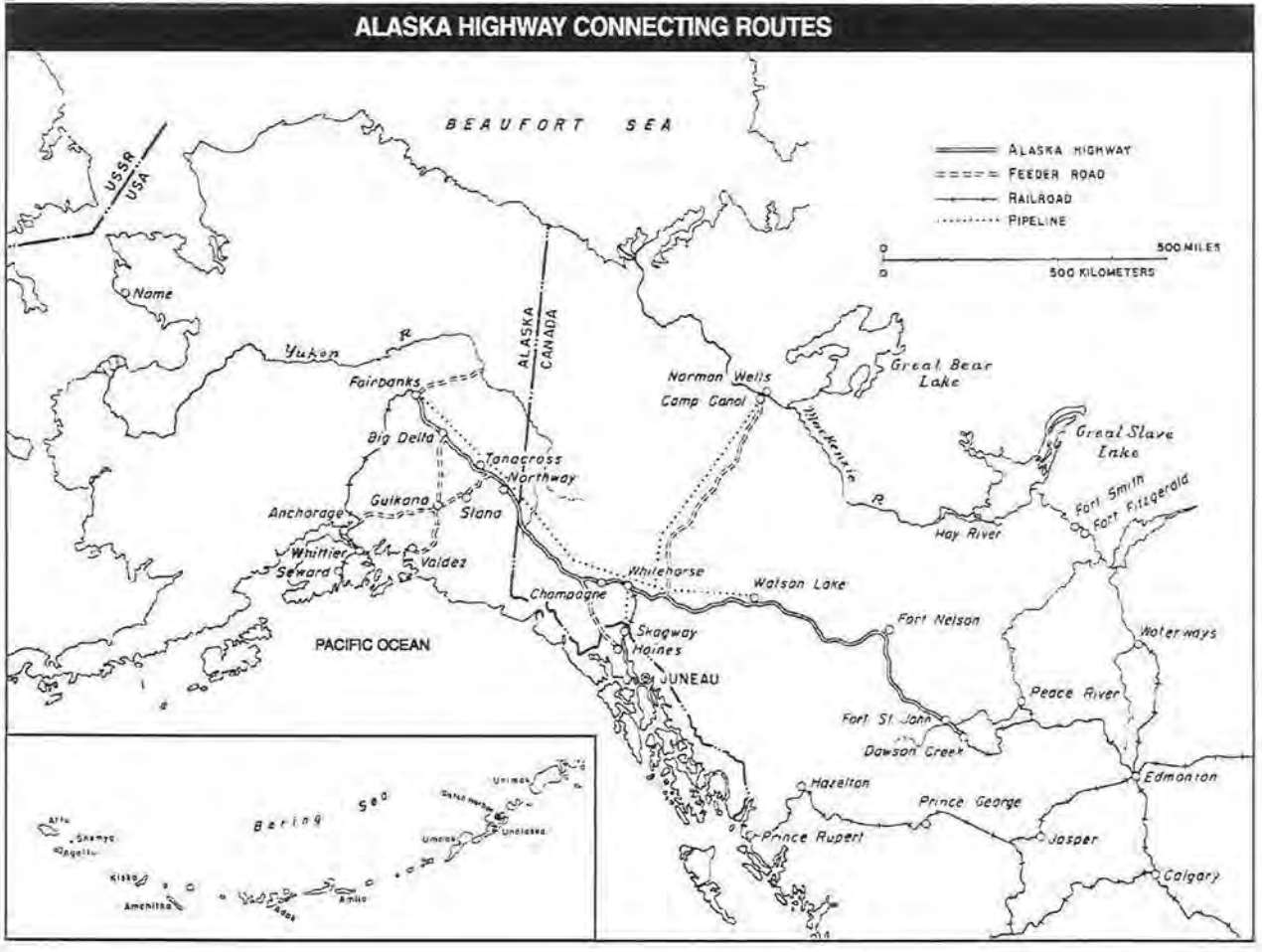
In the prewar period, Alaska had operational Army and Navy bases with a limited transportation infrastructure and minimal staffing at posts and ports. Beginning in mid-1940 there was a gradual Army buildup, and the Alaska Defense Command (ADC) was formed under the command of Col. (later Lt. Gen.) Simon B. Buckner, Jr. Strategic planners relied on the strength of the Pacific Fleet to defend Alaska. They anticipated that enemy attacks would be

limited to the Aleutian Islands, and planning focused on expansion of defensively oriented naval bases and a series of air bases in Alaska and across Canada to the United States. These bases were nearing completion by the time of the Pearl Harbor attack, which changed the strategy to protecting sea lanes. As shown in Map 8, this required more and different bases, a substantial force buildup, and a land route from the United States for use if sea resupply was interrupted.[5] As expected, the Japanese attacked Dutch Harbor, but only as a diversion for their attack on Midway. United States success at Midway caused the Japanese to withdraw to Kiska and Attu in the western Aleutians. Those bases lacked strength to seriously threaten Alaska or the sea lanes, but at the Casablanca Conference, the decision was to drive them from that lodgement. After a period of heavy bombing and the establishment of U.S. forward bases on Adak (later to become the most active wartime port in Alaska) and Amchitka Islands, Attu and Kiska were invaded and reclaimed during May-July 1943.

Considering the limitations imposed by the climate and the fact that other theaters had a higher priority, the theater in Alaska grew rapidly. By the fall of 1943, there were twenty-eight ports, forty main posts, and over seventy other locations where troops were stationed. Transportation support grew with the theater. About a hundred Army and commercial vessels were on the run from the zone of interior (ZI) to Alaska. Transportation management was provided by the Superintendents, Army Transport Service. Initially, many of the transportation units were improvised or provisional and manned by available troops. Extensive use was made of combat arms soldiers to discharge cargo from vessels and aircraft, particularly in the Aleutian campaigns. As the war progressed, organized Quartermaster and Transportation Corps units were deployed to Alaska to operate ports and waterways, railroads, and motor vehicles.

In an area as primitive as Alaska in 1942, water transportation was vitally important. Not only did the Transportation Corps expand existing ports and develop new ones to handle the oceangoing shipping, it also exploited river transportation in revolutionary ways. Bases along the Yukon River in Alaska and the Mackenzie River in Canada were only accessible by boat. Tugboats were cut into sections and hauled by rail to the navigable head of the Mackenzie. There, they were welded together and used on the river until the end of the navigable season. At that time, they were once again disassembled and stored until next season.

Two Railway Operating Battalions (ROBs) assisted in running civilian-operated railroads. The 714th Railway Operating Battalion deployed to Anchorage to assist in running the Alaska Railroad, and the 770th Railway


ALASKA HIGHWAY CONNECTING ROUTES
BEAUFORT SEA
USSR
USA
ALASKA
CANADA
ALASKA HIGHWAY
FEEDER ROAD
RAILROAD
PIPELINE
500 MILES
500 KILOMETERS
Nome
Yukon R
Fairbanks
Big Delta
Tanacross
Northway
Gulkana
Slana
Anchorage
Whittier
Seward
Valdez
PACIFIC OCEAN
Chamagne
Whitehorse
Skagway
Haines
JUNEAU
Norman Wells
Camp Canol
Mackenzie R
Great Bear Lake
Great Slave Lake
Fort Smith
Fort Fitzgerald
Hay River
Watson Lake
Fort Nelson
Waterways
Peace River
Fort St John
Dawson Creek
Hazelton
Prince George
Prince Rupert
Jasper
Edmonton
Calgary
Bering Sea
Unimak
Unalaska
Umnak
Atka
Shemya
Agattu
Kiska
Amchitka
Attu
Adak

Map 8

Operating Battalion deployed to assist in the operation of the White Pass and Yukon Railroad. They also opened Whittier to serve a new cutoff on the Alaska Railroad. Motor transportation offered its own unique set of challenges and transporters tried a number of methods to maximize the use of existing resources. One of them was the construction of 5- and 10-ton tote boxes that could be hoisted onto a truck or removed from it by crane, an early version of today's containers. This effectively reduced turnaround time and made more efficient use of the available vehicles. The Transportation Corps also experimented with "tractor trains" formed by hauling sleds with Caterpillar tractors. These experiments markedly improved the Army's knowledge of vehicle transport operations in the Arctic.

During this hectic period, transporters in Alaska also had to support the Aleutian campaign and make contingency plans for supplying Alaska overland from the ZI if the sea lanes of transportation were cut. Fortunately, the need never arose.

The accomplishments of the Transportation Corps in Alaska were notable. Working in subarctic conditions with limited visibility during the long winter, the Corps found transportation operations in Alaska onerous and challenging, but effective management and positive actions to get adequate resources met the theater needs. Transportation soldiers made Alaskan operations one of the success stories of World War II. The early pressure on Alaskan forces was reduced with the successes of Allied operations in other theaters. By Victory in Japan (VJ) Day, Alaska was a static area, primarily supported by ocean shipping, but with more transportation alternatives and a much greater defensive potential due to the Alaska Highway, added air bases, and improved rail facilities and ports.[6]

GREENLAND

Greenland, the largest island in the world, halfway between Labrador and Iceland, became an important North Atlantic air route way station. It was a land of ice and snow in which all supplies and construction materials for U.S. troops had to be imported. The only "port" was the village of Ivigtut, where Greenland's major export, cryolite ore, used as a flux in making aluminum, was exported. The U.S. backhauled cryolite from Ivigtut but could not use the port for discharge. For much of the year, the seas around Greenland were blocked by pack ice or floes. In 1941, the first U.S. convoy with engineers, a small number of base operating troops, and an antiaircraft battery landed on the southern end of the island at Narsarssuak, near the site of a proposed air base. Even though

this was well before U.S. entry into the war, German propaganda attempted to frighten Greenlanders with the consequences of aiding the United States. Secrecy and censorship were required, and acquisition of shipping for the deployment was a major challenge. The ships were loaded to maximize lift rather than facilitate discharge and they were unloaded by inexperienced troops in a poor anchorage full of ice. It took two months using all of the personnel and resources available to move the cargo ashore in the few available lighters. Lessons learned were reported to the War Department and helped appreciably in planning for similar projects in the future.

When the United States entered the war, shipments to the island increased, which meant more ships waiting discharge. In order to mitigate transportation problems in Greenland, the Boston port of embarkation became solely responsible for the allocation of shipping space, and the Corps of Engineers project command element moved to the POE to improve coordination. The lack of local and military stevedores in Greenland was alleviated by the temporary hire of thirty-two experienced U.S. stevedores, who reduced the backlog in October-December 1942. Later, the 194th Port Company, specially trained for the task, deployed there. From 1943 to the end of the war support for the Greenland air bases was adequate and they accomplished their missions of speeding movement of planes and cargo to Europe.[7]

ICELAND

When the Nazis invaded Denmark and Norway in April 1940, Iceland's ties with Denmark were broken and the country became virtually independent. In May 1940, with reluctant Icelandic agreement, Britain sent a 25,000-man force under Maj. Gen. H.O. Curtis to forestall a Nazi invasion and protect convoy routes.

The island is subject to strong north winds reaching 130 miles per hour. Polar ice is piled ashore in the transition from winter to spring and temperatures range from cool to arctic. Iceland had no cross-island roads or railroads and highways were generally close to the coastline. Reykjavik, the capital on the southwest coast and Akureyri in the north were the largest ports. Both had limited docking and port clearance capability. Two ports on the east coast had docks for fishing boats and anchorages for large vessels. It was conventional wisdom that port operations were only feasible in the summer, but later U.S. transporters were able to off-load about the same monthly tonnage throughout the year in spite of shutdowns from winter storms.[8]

With agreement of the government, Iceland was placed under the umbrella of the Monroe Doctrine in the spring of 1941 because it was essential to the defense of the Western Hemisphere. United States Army forces were scheduled to relieve British forces stationed there, but in June 1941, when a Nazi invasion of England appeared imminent, the first Army echelon was not ready to go. A provisional Marine brigade of 4,100 men was substituted and arrived on 7 July 1941. With British help, the convoy was unloaded and left Iceland on 13 July 1941. Part of the success of the operation was due to the presence of a special representative of the War Department G-4, Maj. Richard S. Whitcomb (later Brig. Gen. and Commanding General of the Pusan Base Section in the Korean War), who arrived before the convoy and provided sorely needed planning information to General Curtis and his key logistics officials. Maj. Whitcomb assessed the capabilities of facilities to support the deployed force, identified transportation resources needed, and communicated directly to the Chief of Transportation his recommendation to assign a port battalion, a truck battalion, and watercraft to Iceland. He negotiated with Iceland authorities on allocation and use of selected port facilities by the United States and continued as a key figure in Iceland transportation operations.[9]

On 6 August 1941, the first Army contingent of 4,200 troops arrived. Discharge was hampered by lack of facilities and the inexperience of Company B, 392d Port Battalion, the deployed port operating element. The company had to be supplemented by Marines to expedite convoy turnaround. The second Army convoy with about 5,000 troops arrived on 16 September 1941 with the commander, Maj. Gen. Charles H. Bonesteel, and again the port had discharge problems. The Iceland Base Command (IBC) was established and Maj. Whitcomb was appointed Assistant Superintendent, ATS, in the Office of the Quartermaster where he was responsible for all port activity. Because there were not enough Army stevedores, General Bonesteel detailed the 10th Infantry Regiment to discharge ships with port company technical assistance, but unsatisfactory port operations and ship turnaround times persisted. As a result of representations made by Maj. Whitcomb to the Chief of Transportation and a report by two experts who inspected in March 1942, additional transportation resources were allocated to Iceland. The Marines and British departed. New facilities were constructed and three outports were opened and manned with elements of newly arrived port companies. Except for growing pains, transportation operations were over the hump. By May 1943, the 18th Port was activated with in-country resources, commanded by Col. Whitcomb. Ironically, as the unit was activated, the IBC was being reduced in strength. On 30 October

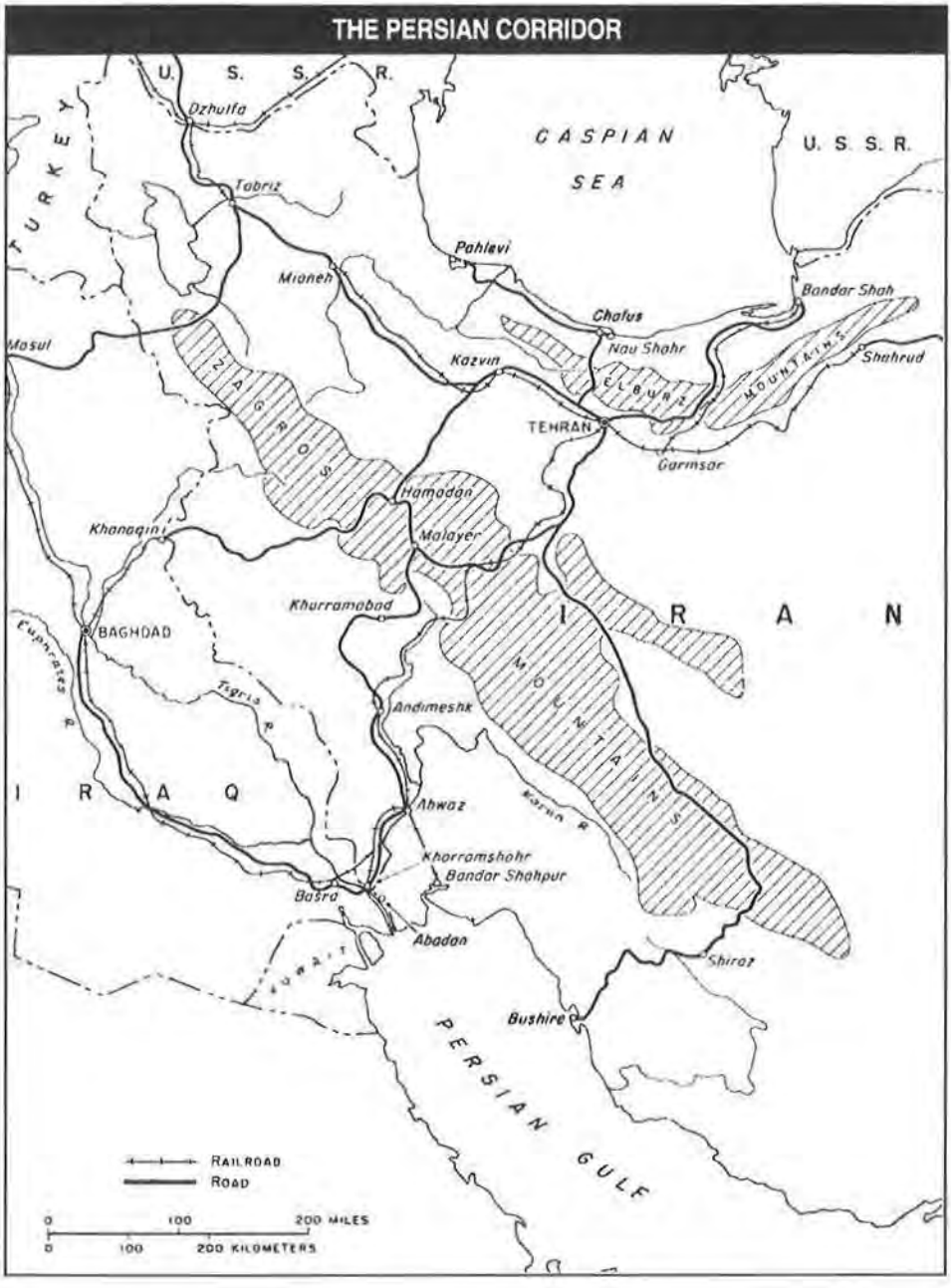
1943, Col. Whitcomb and 515 officers and 8,869 men of the Iceland Base Command sailed for England. The 18th Port was inactivated on 29 December 1943, and the command gradually phased down. The Iceland operation was an excellent case in point of the need to include base support troops in overseas deployments. Transportation units were particularly necessary in any base development situation. The experience indicated that they needed to arrive prior to combat elements, or as soon as possible, to provide for adequate support and productive use of shipping resources.[10]

THE PERSIAN CORRIDOR

American operations in the Persian Corridor were the most unusual in World War II because the command existed for the sole purpose of transporting military supplies to the Union of Soviet Socialist Republics (USSR). United States transportation operations were closely integrated with those of the British and Soviets over the same transportation net on a day-to-day basis. The corridor, which is displayed in Map 9, comprised areas that became well known again during the Iraq-Iran War of 1980-88 and Operation Desert Shield/Desert Storm in 1990-91. The area of operations included the towns of Basra and Abadan (the largest oilfield in the world during World War II) and the Tigris and Euphrates rivers. All these locations were key to operations in the theater.[11]

In the summer of 1941, British and Soviet military activities in Iraq and Iran focused on controlling the area because of the rapid advances of the Axis forces in the Soviet Union and North Africa. The British, who already occupied Iraq, moved into Iran, occupying the area from Teheran to the Persian Gulf, while the Soviets occupied Iranian territory north of Teheran. The United States, not yet a belligerent, sought to bolster British and Soviet efforts through lend-lease. In November 1941, the first elements of a U.S. Military Iranian Mission (USMIM) arrived in the area to manage that effort.

The defensive mission was overtaken in early 1942 by the urgent need to increase the use of the long and difficult Persian Corridor to provide military aid to the Soviet Union. The quantities of supplies that could be delivered through other support routes were insufficient to meet their minimum needs to defend the homeland. The difficulties posed by bad weather and the Nazi blockade made the prospect of getting convoys to Murmansk difficult at best. The Pacific route through Vladivostok could be used only for nonmilitary shipments. Although Japan was not at war with the USSR, its neutrality became increasingly uncertain. Due to lack of resources, the United States and Britain decided to postpone the cross channel invasion, promised the Soviets to take pressure


THE PERSIAN CORRIDOR
U. S. S. R.
Dzhulfa
TURKEY
Tabriz
CASPIAN SEA
U. S. S. R.
Pahlevi
Mianeh
Bandar Shah
Chalus
Nau Shahr
Shahrud
Mosul
Kazvin
ZAGROS MOUNTAINS
ELBURZ MOUNTAINS
TEHRAN
Garmsar
Hamadan
Khanaqin
Malayer
Khorramabad
BAGHDAD
I R A N
Euphrates R.
Tigris R.
Andimeshk
I R A Q
Ahwaz
Karun R.
Khorramshahr
Bandar Shahpur
Basra
Abadan
KUWAIT
Shiraz
Bushire
PERSIAN GULF
RAILROAD
ROAD
0 100 200 MILES
0 100 200 KILOMETERS

Map 9

off them by forcing Germany to move troops from the east to fight the invaders. Instead, the Western Allies invaded North Africa, an action which was calculated to draw troops from the eastern front. They also tried to improve the lend-lease program to the Soviets. Both of these measures were designed to aid the Soviet Union militarily by tying up Axis troops significantly, by getting more supplies to the Soviet Union, and by demonstrating to the Soviets that they were not fighting the Nazis alone.

In 1941-1942, the British operated ports, rail facilities, and highway transport activities south of Teheran. Basra and its port of Margil served as their principal transportation center. They used contractor and military resources to improve and operate facilities, but they possessed neither the manpower or equipment to handle the increased tonnage projected. By the end of 1942, ship turnaround time averaged fifty days, with seventeen ships lying idle because of the low discharge capacity and inadequate capability to clear the ports. In 1942, U.S. Military Iranian Mission, also using contractors, initiated construction of more docks and roads to enhance port clearance. The mission also established truck and aircraft assembly plants, moved assembled equipment and supplies on British-operated transport, and arranged onward flights to the Soviet Union of U.S. aircraft flown from the United States. The USSR operated the Russian Motor Transport activity in the area.[12]

American assumption of operations in the Persian Corridor began with a proposal by President Roosevelt to Prime Minister Churchill in July 1942 that the United States take over the British share of Iranian State Railroad (ISR) operations. After coordinating with Stalin and studying the situation on the ground, the prime minister added U.S. operation of Khorramshahr and Bandar Shapur ports. United States implementing plans, developed during the establishment of the Transportation Corps in Washington, proposed operation of even more ports and a motor transport service to augment rail capability and meet the throughput goal of 200,000 long tons a month. Those plans became the basis for the U.S. force of port, rail, and motor transport units to supplement British and Soviet transporters. Troops to staff the force were diverted from other operations or activated in the United States on an emergency schedule. The plans included extensive use of local labor as evidenced by the fact that U.S. forces employed as many as 41,000 local nationals at the end of 1943.[13]

The U.S. Military Iranian Mission was reconstituted as the command element, first as the Persian Gulf Service Command (PGSC) and later as the Persian Gulf Command (PGC) with three subordinate districts. Brig. Gen. D.H. Connolly (later Maj. Gen.) assumed command on 20 October 1942 at Basra and moved in late December 1942 to Teheran. Transition was scheduled for

January-March 1943. From the beginning, movement of U.S. forces to Iran was beset by delays and difficulties in obtaining shipping, particularly for vital rail, port, and motor transport equipment. By the end of May 1943 when 80 percent of troops had arrived, only 48 percent of equipment was on hand.[14] Nevertheless, transfer of operations began in December 1942 when the first U.S. troop increment arrived.

TRANSPORTATION OPERATIONS

Many factors affected the transporters' tasks in Iran. In the operating area, temperatures ranged from well below freezing in the mountains to 130 degrees F. and above in the gulf and desert areas. Railroads and highways were subject to frequent landslides and washouts. Attacks by bandits in up-country areas were common. Port facilities were poorly designed and improving them was a slow process. Local labor was not an adequate substitution for soldiers. Workers were hard to train and employ because of language difficulties. Literacy was also a problem and strong pro-Nazi sentiment was evident. Pilferage rates were high, as could be expected, reflecting the poor local economies. Facilities for U.S. troops, both in port areas and up-country, were primitive or nonexistent and had to be constructed, causing considerable delay. Almost all planning had to be coordinated with the British and frequently required Soviet concurrence.[15]

THE PORTS

On 13 December 1942, the 9th Port, commanded by Col. D.P. Booth, and the 378th Port Battalion began work at Khorramshahr, under British tutelage. The Americans took full control on 7 January 1943 and assumed operation of Bandar Shahpur a month later, becoming responsible to discharge the preponderance of cargo destined for the Soviets.

U.S. port operations were limited to Korramshahr, Bandar Shapur, Cheybassi across the river from Basra, and a lighterage basin near Basra. These were the only sites that could be operated with the forces available. The 9th Port had four U.S. port battalions and elements of PGC support troops, such as MP, medical, signal, and engineer. Local labor for all ports peaked at 7,400 in August 1944.[16] Pilferage was such a major problem that for a while an entire port battalion was diverted to guard duty. Through strenuous efforts the port elements overcame operational obstacles and discharged 4.4 million long tons of cargo from November 1942 through May 1945.[17] As tonnage to the command declined, Cheybassi was returned to British operation on 1 November 1944,

was subsequently redesignated the 791st Railway Operating Battalion and performed superbly throughout the campaign.[18]

Taking over the operation of the Iranian State Railroad had an even greater impact on overall operations than port discharge. Clearance capacity depended heavily on the ability to transfer cargo from the port to an adjacent area. At Bandar Shapur, the only means of clearance was by rail. More importantly, the measure of the command's success was the total tonnage delivered to the USSR, and it was considerable. Of some five million long tons delivered through the corridor from 1 January 1942 through 31 May 1945, about three million moved by rail. The 3d Military Railway Service reached a peak strength of 4,051 in late 1944.[19] The headquarters was reorganized using in-theater assets and reconstitution of the 702d Railway Grand Division as the 3d Military Railway Service. Under American operation, which included the infusion of U.S. rail equipment and construction effort, daily capacity increased to the point that the need for the supplementary Motor Transport Service (MTS) operations that had been filling the gap between rail capacity and the goal could be curtailed by September 1944. While much of the improvement in rail deliveries could be credited to added resources, American railroad know-how deserved a substantial share of the credit for overcoming exceptional challenges and improving operations through sound management.

HIGHWAY OPERATIONS

Headquarters, U.S. Motor Transport Service was organized with quartermaster personnel at Camp Lee, Virginia in October 1942 and was deployed to the Persian Gulf Service Command in late January 1943. It was commanded initially by Col. M.V. Brunson and later by Col. D. G. Shingler. The command included Quartermaster truck units equipped with 2 1/2-ton tractors with 7-ton semitrailers and 10-ton trucks. Ordnance maintenance units began arriving a month later. Road construction support was provided by the PGSC Construction Service. The requirements of Motor Transport Service Headquarters were unique and varied. In Teheran, the headquarters opened a school for interpreters, who were used in driver training classes. The headquarters deployed maintenance units, and prioritized and coordinated construction programs for the main supply route on which motor transport operations would be conducted.[20]

The Motor Transport Service (MTS) was originally established as a supplement to British and Soviet truck operations and the Iranian State Railroad. However, until late 1943 and early 1944 when the ISR reached its planned

Rail Yard in Teheran.

Bandar Shapur ceased operations in January 1945, and Korramshahr operated at greatly reduced strength and outloaded U.S. forces until December 1945. The Persian Corridor port operations were some of the most unique of the war.

RAIL OPERATIONS

The 711th Railway Operating Battalion took over the Iranian State Railway Khorramshahr-Ahwaz line on 1 January 1943 and by 18 January, was operating the 363 miles of the Southern Division. By 20 January, Col. Paul F. Yount assumed command as the director and general manager of the Military Railway Service (MRS) and assigned the 702 Railway Grand Division (RGD) and the 730th Railway Operating Battalion (ROB) to Teheran to operate the Northern Division. By April 1943, it became evident two ROBs could not operate the entire line. The 1st Provisional ROB was activated to take over the 220 miles and many tunnels of a newly formed Central Division. The provisional ROB

capacity, increased American highway operations were essential to pick up the slack caused by failure of other carriers to meet deliveries. In early January 1943, a provisional truck company, organized from theater assets and the 429th Engineer Dump Truck Company, formed a special convoy of some 200 vehicles to move tires and lumber from the Bushire USMIM-contracted General Motors Assembly Plant to Teheran. From this small beginning, truck operations peaked in July 1944, operating 3,430 trucks and tractors and 2,779 trailers with an overall availability rate of 90 percent. The operating units were the 516th and 517th Quartermaster Truck Regiments, with three battalions each, and the 26th Regiment with one battalion. There were also supporting ordnance maintenance and quartermaster service units. Motor Transport Service schools trained 7,500 local national drivers, of which a maximum of 3,155 worked for MTS at any one time, while the others worked for our Allies or in the civil sector. Local nationals were hired as mechanics and for other technical and overhead tasks. By November 1943, more than 9,275 local nationals were employed. A highly successful antipilferage program was established under which losses from all causes were reduced to 0.5 percent of all tonnage moved. This was an outstanding accomplishment considering that pilferage rates were as high as 10 percent at the ports in early operations. During its existence, the MTS hauled a total of 619,000 long tons and operated 100 million truck miles in all extremes of weather and over rough unsurfaced roads for much of the period. The command was disbanded on 1 December 1944, and most of the troops were transferred to the European Theater of Operations and China.[21]

After a slow beginning in early 1943 and hampered by delayed receipt of troops and equipment, the Persian Gulf Command went on to meet and exceed assigned goals for port discharge and rail and highway movements, which constituted the theater's main mission. Setting up the Motor Transport Service was more time-consuming than planners estimated, but its contributions were substantial. By October 1943, Soviet aid through the corridor exceeded the monthly goal of 200,000 long tons, and thereafter the command handled all receipts.

The Persian Gulf Command was drawn down and the last 1,000 troops left by freighter and Army transport in December 1945. The command was inactivated on 31 December 1945. The achievements of the Persian Gulf Command were an excellent example of how rail, port, and motor transport operations could be successfully conducted in a semideveloped area.[22]

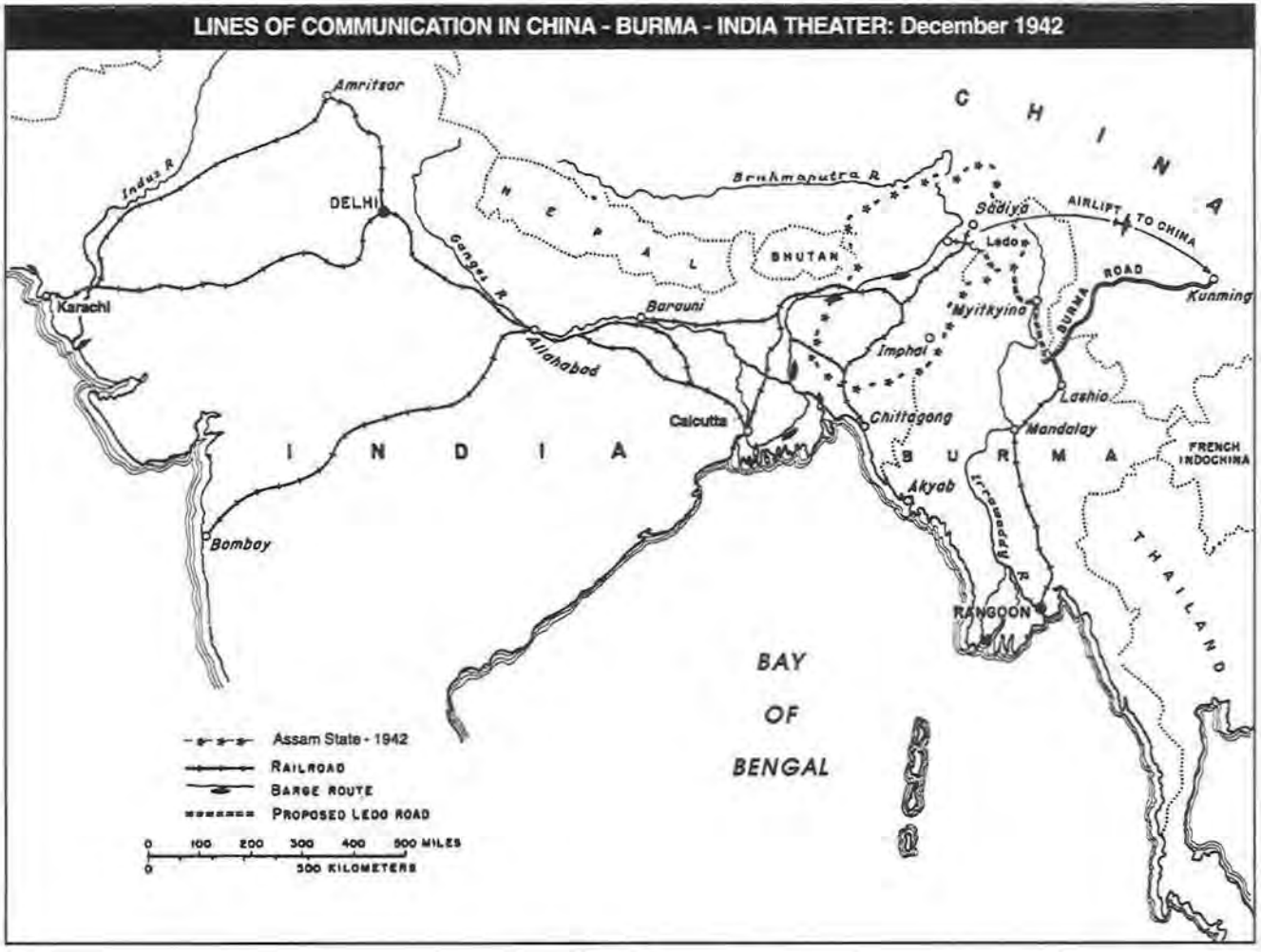
CHINA, BURMA, AND INDIA

Before and during World War II, a cornerstone of Japanese strategy in the Orient was the isolation of China to deny Chinese armies support from Manchurian and Chinese agricultural and industrial areas as well as foreign aid. The Japanese seized or destroyed agricultural resources and closed South China ports, cutting them off from all sources of supply, except a trickle coming through on the Burma Road. These measures effectively limited Chinese armies to guerrilla warfare because of lack of supplies. In March 1942, the Japanese seized Rangoon and cut the Burma Road. Not only was the Burma Road the last source of material which foreign aid had sustained, it was an important psychological link to the outside world. Only a modicum of supplies airlifted over the Himalayas could reach China after the Burma Road was cut. The area of operations is shown in Map 10.[23]

Since their commitment to conquering China tied down huge numbers of Japanese troops, a primary Allied objective was to keep China actively in the war. Implementing that strategy was a matter of logistics, with transportation the most essential element. Obvious solutions like reopening the Burma Road, liberating Burma and Malaya, or recovering China ports were militarily unfeasible in the early stages of the war. Other strategic objectives had much higher priorities.[24]

The Combined Chiefs of Staff (CCS) solution to reestablishing logistic support to China was the construction of a road from Ledo in Assam to the old Burma Road on the China-Burma border, through areas where China's offensive capabilities could be expected to maintain control.[25] Concurrently, augmentation of Assam air facilities was needed to increase airlift capability. This decision, in turn, required major expansion of the port of Calcutta and the lines of communication (LOCs) to Assam. The LOCs included the Bengal-Assam Railroad and the Brahmaputra Inland Waterway served by British commercial barge lines. Pipelines to airfields in upper Assam were necessary for the heavy equipment required for construction. All building materials had to be imported. There were limited LOC facilities to Ledo which could be expanded or used more intensively. From there, the trace of the Ledo Road was an almost trackless waste of rugged mountains, canyons, and broad swampy valleys. Those areas were some of the most pestilential in the world. In addition, 150 to 175 inches of rain fell in the monsoon season. Many considered the task insuperable because it required an immense engineering effort.[26]

Not only was the line of communication an engineering and logistic challenge, but India's eastern ports were blocked by Japanese naval activity in


LINES OF COMMUNICATION IN CHINA - BURMA - INDIA THEATER: December 1942
Amritsar
Indus R
DELHI
Karachi
Ganges R
Allahabad
Barauni
NEPAL
BHUTAN
Brahmaputra R
Sadiya
AIRLIFT TO CHINA
Ledo
BURMA ROAD
Kunming
Myitkyina
Imphal
Lashio
Mandalay
Chittagong
Calcutta
Akyab
Irrawaddy R
RANGOON
Bombay
INDIA
BURMA
CHINA
FRENCH INDOCHINA
THAILAND
BAY OF BENGAL
Assam State - 1942
RAILROAD
BARGE ROUTE
PROPOSED LEDO ROAD
0 100 200 300 400 500 MILES
0 500 KILOMETERS

Map 10

the Bay of Bengal. Until the Allies could regain naval control in that area, shipments for China had to be off-loaded at Karachi and moved 2,100 to 3,000 miles to eastern Assam over railroads already operating at full capacity and ill-prepared to accept added traffic. Bombay Port was also operating at full capacity and was generally used only for U.S. troop transports with too much draft for other ports.

The first phase of wartime logistics operations began when Brig. Gen. (later Lt. Gen.) Raymond A Wheeler and a small staff from the Iranian mission arrived in Karachi on 9 March 1942 to command the Services of Supply (SOS) of the China, Burma, India theater, commanded by Lt. Gen. (later Gen.) Joseph W. "Vinegar Joe" Stilwell. With a limited number of troops and orders from the War Department to "live off the land," Wheeler received reverse lend-lease from the British and decentralized control of operations to base and advance sections. Col. Yount transferred from the Persian Gulf and took command of Base Section 1 at Karachi where the 393d Quartermaster Port Battalion had just arrived to conduct U.S. port operations. In May, Wheeler moved SOS headquarters to New Delhi, collocated with British General Headquarters (India).[27]

In October 1942, the United States assumed responsibility for building the Ledo Road. By the end of the year, construction had begun. Transportation support was the responsibility of the regional sections that also controlled the assets. In April 1943, a Transportation staff section was formed in HQ SOS. It was mainly responsible for planning mode operations, so the sections continued to conduct operations. The United States relied as much as possible on the British for transport, which was booked through British movements authorities. There were limited U.S. transportation activities at Karachi, Bombay, and Calcutta ports. In the first phase of the activation of the China, Burma, and India theater, U.S. transportation field operations were minimal.

Decisions at the Casablanca Conference in January 1943, the TRIDENT Conference at Washington in May 1943, and the QUADRANT Conference in Quebec in August 1943 guided the Combined Chiefs of Staff strategic plan for Asia. The plans envisioned supplementing Allied forces in order to initiate offensive action in upper Burma and establish secure air and land routes to China. Maj. Gen. W. E. R. Covell took command of the Services of Supply, China, Burma, India in November 1943 and characterized transportation as "our most difficult and important problem."[28]

The Services of Supply Transportation Service was established at New Delhi on 1 January 1944, commanded by Brig. Gen. Thomas B. Wilson, former Chief of Transportation, Southwest Pacific theater. In addition to staff functions,

Ledo Road Burma

he commanded the Military Railway Service which, on 1 March 1944, was scheduled to take over the meter-gauge line between Katihar and Ledo, American Barge Lines (ABL) and Bombay Port. American Barge Lines had been deployed for inland waterway missions, but its equipment was not suitable for the Brahmaputra River, and it was reassigned to operations in Calcutta Port.

After a short time, it was evident that the Assam lines of communication were not operating efficiently under civilian control. The allotment of service troops to China, Burma, India by the QUADRANT decisions permitted the placement of Anglo-American officers in control of the lines of communication and the use of U.S. personnel in key positions. As they became available, U.S. operating units were incrementally added to the system. This resulted in an increase in tonnage just as the Japanese were reopening offensive operations.[29]

At the beginning of this period, only the 540th and 541st Port Companies of the 393d Quartermaster Port Battalion were in the command. Initially assigned to Karachi, they were subsequently moved to Calcutta. In mid-1944, the 705th Railway Grand Division, affiliated with the Southern Pacific Railroad and commanded by Col. Stanley H. Bray, arrived in the theater. The 705th had five railway operating battalions and one railway shop battalion to augment British and Indian units. The 497th and 408th Port Battalion Headquarters with ten port companies and the 326th and 327th Harborcraft Companies were also deployed in the theater. Bottlenecks at Calcutta Port and on the Assam line of communication ceased and Maj. Gen. Covell reported that Wilson had done "a splendid job in building our Transportation Service from practically nothing." Nevertheless, Wilson's plans for a centralized control communication zone-type organization did not materialize and section commanders continued to control transportation operations within their areas.[30]

The final phase of transportation operations was marked by the division of CBI into the India-Burma and China Theaters on 24 October 1944. At that time, Stillwell was recalled and Maj. Gen. (later Lt. Gen.) Albert C. Wedemeyer assumed command of the China theater, while Lt. Gen. Daniel I. Sultan commanded the India-Burma theater. Sections were redesignated elements of each theater's SOS, or in the case of Advance Section One as the China SOS, but without any major initial restructuring.[25] Because of the earlier continuing extensions of advance section operations, Wilson had assigned Col. Maurice E. Sheahan as his deputy and advance section transportation officer in February 1944.[31] As transportation service operations were extended into China, Sheahan established a significant motor transport operation in support of the 14th Air Force.

In early operations, cargo airlifted over the "Hump" of the Himalayas to Kunming was barely enough to keep Maj. Gen. Claire L. Chennault's 14th Air Force marginally operational and provide some aid to Chinese forces. From October 1944, resources of the theater Air Transport Command (ATC) were increased, and Hump airlift substantially overshadowed land lines of support to China through the end of the war. The completion of a four-inch fuel pipeline to Kunming in June 1945 also helped substantially. In October 1944, the ATC had an average strength of 298 assigned aircraft. By June 1945, the strength of the operational fleet was 622. The number of personnel in the Air Transport Command increased about 50 percent. The increasing lift is shown in Chart 7.[32]

AIRLIFT TO CHINA

Year and Month	To China	Intra-India
1944		
October	24,715*	12,224*
November	34,914	15,553
December	31,935	16,249
1945		
January	44,099	17,112
February	40,677	17,118
March	46,545	19,424
April	44,254	19,569
May	46,394	15,015
June	55,387	14,269

* Short tons

Chart 7

While the bulk of the supplies delivered to China was airlifted by the Air Transport Command, the cargo flown out of Assam was transported to bases there by Transportation Corps and Quartermaster troops and civilians of the India/Burma surface line of communication. Substantial increases in land transportation resources paralleled those for airlift. Chart 8 displays the relationship of overland deliveries within Burma and to China in 1945.[33]

Prior to the increased air deliveries made by ATC, transportation resources in Free China were hopelessly inadequate. Lt. Gen. Wedemeyer requested Lt. Gen. Somervell, the Army Service Forces commander in Washington, to

VEHICLE AND CARGO DELIVERIES TO CHINA AND BURMA BY MONTHS (1945)

	CHINA					BURMA
MONTH	Convoys	Vehicles	Trailers	Gross Weight*	Vehicle and Trailer Weight*	Cargo Weight*	Cargo Weight*
TOTAL	433	25,783	6,539	146,948	108,886	38,062	161,986
FEBRUARY	22	1,333	609	5,231	4,120	1,111	27,087
MARCH	22	1,152	745	6,788	5,279	1,509	34,579
APRIL	38	2,342	1,185	15,447	11,249	4,198	31,797
MAY	78	4,682	1,103	28,080	19,645	8,435	28,357
JUNE	82	4,901	964	27,962	20,977	6,985	14,923
JULY	75	4,745	828	23,370	17,470	5,900	16,085
AUGUST	51	2,652	647	15,866	11,582	4,284	5,046
SEPTEMBER	53	3,060	408	18,599	14,291	4,308	4,112
OCTOBER	12	916	50	5,605	4,273	1,332	.....

*Short tons.

Chart 8

expedite delivery of 2,000 U.S. Army 2 1/2-ton and 5,000 lend-lease trucks on order on an emergency basis. The turning point in the critical transportation situation was the opening of the Stilwell Road (combined Ledo and Burma Roads) in January 1945, when Chinese forces from India and China routed the last Japanese block of the road to China. Additional support, including the sorely needed vehicles, flowed in by road. Concurrently, rail facilities in China were improved with technical and material assistance.[34] In March and April 1945, the Japanese, reacting to the threat of the Iwo Jima and Okinawa invasions, began to withdraw and the Chinese followed, reoccupying the evacuated territory. For all practical purposes, the war in China, Burma, India was over.

While transportation was the most pressing logistics problem in the CBI, it could only be solved by extensive engineer projects for roads, rail improvements, pipelines, and airfields. American resources were needed to supplement local national labor and commercial management of transportation resources. The availability of the infrastructure and resources coincided with the phase-down of the war, and the full capabilities of the final force structure were never tested. Transportation management at section level was exercised by a variety of branch officers with local national truck units providing the highway capability. The effectiveness of Transportation Corps doctrine was not fully exploited in the China, Burma, India theater.

Elephants shunting cars in Assam.

NORTH AFRICAN AND MEDITERRANEAN THEATERS

STRATEGIC SITUATION

The combined Allied Forces Headquarters (AFHQ) controlled operations in the Mediterranean area and was responsible for logistical support of the forces that invaded North Africa, Sicily, Italy, and Southern France. Even though the Headquarters was combined, U.S. (NATOUSA/MTOUSA) and British logistical support elements remained separate. They operated on a cooperative basis, cross servicing each other and supporting Allies per political agreements.[35]

On 8 November 1942, a combined U.S. and British force invaded North Africa. The operation, codename TORCH, began with combined landings at Oran and Algiers in Algeria, and at Casablanca, Morocco. Subsequently, operations extended throughout the area shown on Map 11.[36] Vichy French North African forces capitulated in three days.

By 1 January 1943, 217,000 Americans of NATOUSA were deployed in units of a combined British, U.S., and French force attacking German Africa Corps and Italian units from the west. Concurrently, the British forces already in Africa attacked from the east. The U.S./British pincer movement compressed Axis forces into Tunisia and they surrendered on 9 May 1943.[37]

After briefly refitting and regrouping, NATOUSA forces invaded Sicily in Operation HUSKY on 10 July 1943. The invading forces were under U.S. Seventh Army, part of which deployed directly from the zone of the interior and the British Eighth Army. The island was secured by 18 August 1943.

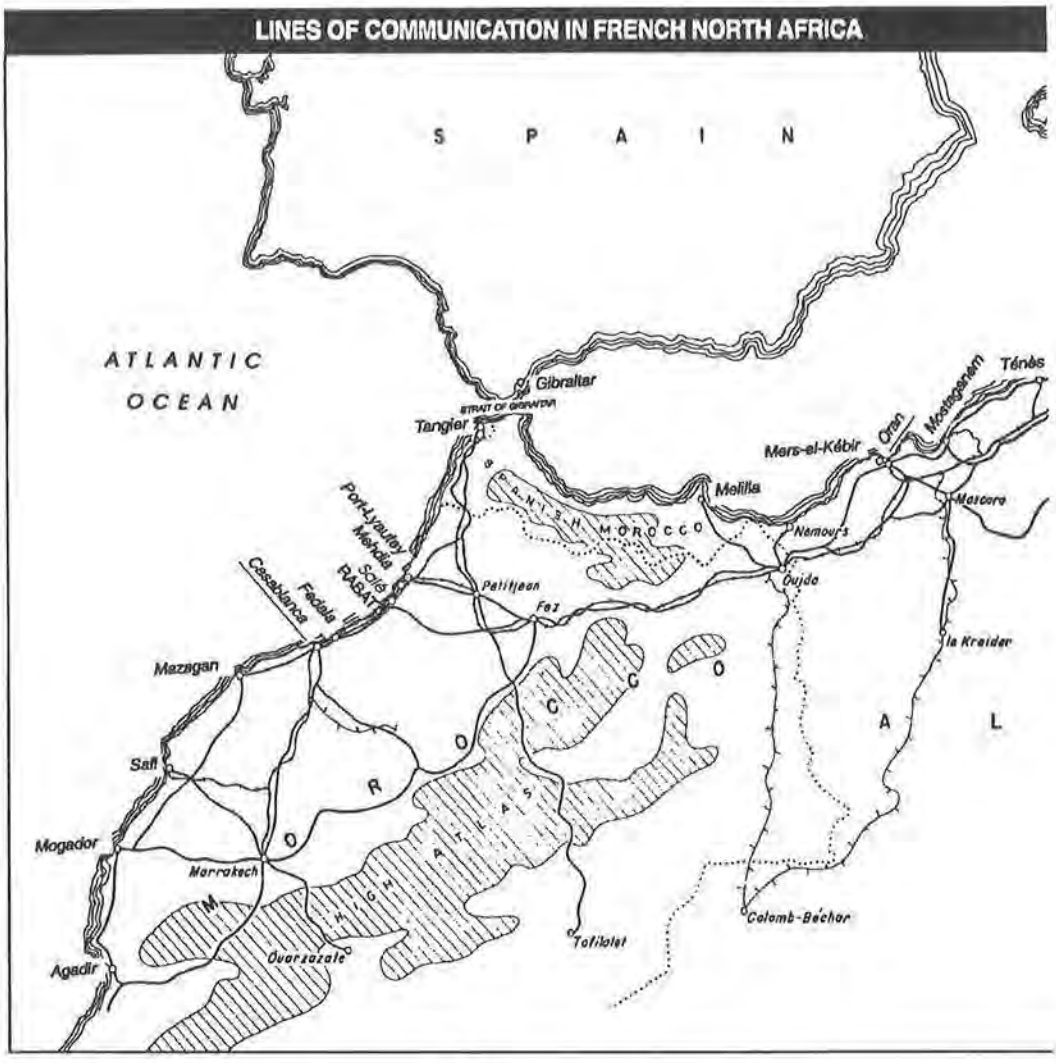
Less than three weeks later, Operation AVALANCHE, the invasion of Italy was begun at Salerno. By 1 October 1943, Naples was taken. Allied U.S., French, and British forces gathered for the long campaign up the peninsula with U.S. elements on the west supported by NATOUSA's successor, MTOUSA. The campaign was slowed through 1944 because of stubborn resistance from the Germans, who were operating in terrain ideal for defense, and by the fact that the campaigns in France and Germany received first priority for personnel, equipment, and logistics support. After a bitter winter offensive in the northern Apennine Mountains, the Allied armies finally defeated the Germans in the Po Valley. Axis forces in Italy capitulated 2 May 1945.

While heavily engaged in Italy, forces in the Mediterranean Theater also supported Operation DRAGOON, the invasion of southern France which took place in August 1944. The U.S. Seventh Army and French Army B (later redesignated as First French Army) mounted the invasion supplied from bases in Italy and North Africa. Mediterranean Theater (MTOUSA) supported both major fronts until 20 November 1944 when European Theater of Operation (ETOUSA) took over support of operations in southern France.

North African/Mediterranean Theater of Operation campaigns contributed markedly to the overall victory in Europe by holding Axis ground forces in place in Italy and threatening those in Yugoslavia. The theaters also provided bases for the 12th Tactical and 15th Strategic Air Forces, which operated against southern Europe and opened the Mediterranean route to the Middle East and India.

NORTH AFRICA

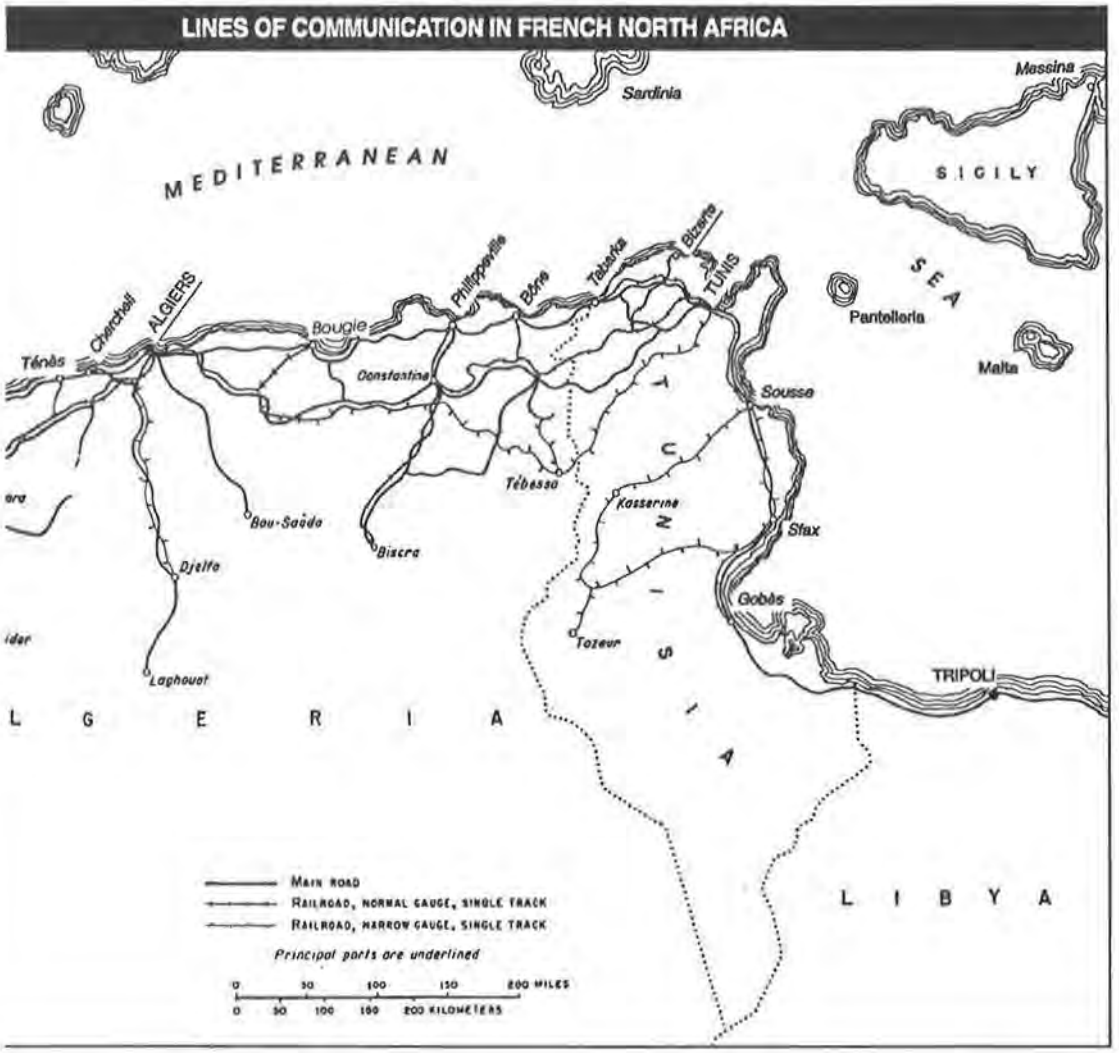
Prior to the TORCH landings, British and Axis armies had, since 1941 fought in the western desert between Tripoli in Libya and Alexandria in Egypt. The area was described as a tactician's paradise and a quartermaster's hell because in its 1,400 miles, there was only the coastal highway and the ports of Tobruk and Benghazi for support operations and few obstacles to mechanized maneuver.



Map 11

Opposing forces surged back and forth as each side's line of communication became more tenous with each advance.[38] In French North Africa, ports were more plentiful and lines of communication were more extensive, but they were limited in capacity and confined to the coastal plain. Roads became morasses in heavy winter rains, and the desert climate in dry seasons put a premium on water supply and equipment maintenance.

Planning for Operation TORCH was conducted by inexperienced staffs in only three months because the political decision for the invasion was delayed. From planning to execution, the operation was beset by tactical and logistics changes. As James A. Huston states in *Sinews of War,* "The invasion . . .was a



graduate school in logistics when too many officers had not yet completed even elementary school in that subject. . . . It was not only the first ground offensive undertaken by Americans against the European Axis, it was also the greatest overseas expeditionary assault ever undertaken up to that time."[39] As an operation carried out by one nation, it would have been difficult. The fact that it was a combined operation made coordination doubly complicated. Forces were mounted from the United Kingdom (U.K.) and the U.S., separated by thousands of miles from each other and the landing sites. Major shortages of equipment and supplies were exacerbated by the inability of U.S. depots in the U.K. to locate some 260,000 measurement tons needed to meet D plus 5 needs, and the

consequent need to reorder from the United States or procure those supplies in the United Kingdom. United States doctrine and procedures on combat loading were sorely lacking and potential losses from Axis submarine and air attacks in the Atlantic and Mediterranean fostered excessive emphasis on "what if" planning. A combined U.S./British transportation organization in Allied Forces Headquarters prepared general invasion and operational plans, while task force commanders in the U.S. and Britain performed detailed planning.

As the invasion drew near, uncertainty and confusion bordered on chaos. Nevertheless, the convoys were loaded out, landings made with varying degrees of success, and initial objectives seized. The U.K./U.S. Eastern Task Force, whose landing at Algiers was followed in by the British First Army under General Sir Kenneth Anderson, turned toward Tunisia, while a thousand miles to the east, the British Eighth Army under Montgomery attacked west. Both were attempting to capture Tunis before Axis forces could occupy it. The Allies failed and Axis forces withdrew into strong defensive positions in Tunisia. These moves created a stalemate just before the winter rains and delayed the ultimate Allied victory. Field Marshal Erwin Rommel, who commanded Axis forces during campaigns against the British in North Africa since February 1941, was absent from the theater during much of this campaign due to illness. General Juergen Von Arnim, whose forces had reinforced Tunisia in reaction to the British expulsion of Rommel's forces from Egypt in November 1942 and the TORCH landings, commanded in Rommel's absence.

TRANSPORTATION OPERATIONS

In the Tunisian campaign, transportation was the key to victory. The Axis had the initial advantage because their line of communication from Italy was very short. Not only was the Allied LOC much longer, but U.S. support elements in North Africa were short of units and equipment. Many U.S. units deployed with reduced or no organic equipment because of shortages in shipping. Vehicles were cut drastically on the premise that U.S. forces would be primarily in an occupation role. The thrust to Tunisia suddenly showed how flawed that decision was. Fortunately for the Allies, Lt. Gen. Somervell, the Army Service Forces Commander, attended the Casablanca Conference in January 1943. When he conferred with Eisenhower and his staff, Somervell recognized that equipment and service forces were insufficient to meet even current needs, let alone support an offensive. He directed the War Department in the zone of interior (ZI) to immediately form and send a special convoy with a huge quantity of equipment that included nearly 5,000 trucks, rail engines, and cars, as well as

4,000 more service troops. General Eisenhower hailed the arrival of the convoy as a godsend, and he later attributed to it the success of the Tunisian campaign.[40]

Once the U.S. forces were ashore, Allied Forces Headquarters established two U.S. base sections that were responsible for logistical functions in their respective areas. The Atlantic Base Section, located at Casablanca, was responsible for the Atlantic area. The transportation officer of the Atlantic Base Section (ABS) was Col. (later Brig. Gen.) George C. Stewart. The Mediterranean Base Section (MBS), headquartered in Oran, assumed responsibility for logistical operations in Algeria. Col. Thomas H. Stanley was was the section's transportation officer.

When North African Theater of Operations (NATOUSA) was activated on 4 February 1943, Colonel Stewart was appointed Staff Transportation Officer for the new organization and head of the U.S. transportation element of the Allied Forces Headquarters combined staff. This dual appointment centralized direction of U.S. transportation operations under Colonel Stewart, but execution remained the responsibility of the base section commanders and the Commander, Military Railway Service.

THE PORTS

Oran, by virtue of its central location, became, with nearby small terminals, the principal port for U.S. forces, although Casablanca handled substantial tonnages until the end of Axis resistance. As the lines of communication from the ports to Tunisia lengthened, it was evident that the highways and railroads were unable to support the traffic necessary to meet the armies' tonnage requirements, so support was diverted to or transhipped to ports farther east. United States port units assisted the British in the operation of Philippeville, and in turn, they authorized the U.S. to use the port of Bone. The U.S. 8th Port opened Bizerte on 8 May 1943 and not only supported the close of the Tunisian campaign, but also became a port of embarkation for the Sicilian and Italian campaigns.

Problems encountered in port operations were not unique to North Africa, but because it was the first large invasion, problems and solutions were highlighted and widely disseminated throughout the Transportation Corps to the benefit of future operations. The U.S.-operated ports in North Africa rolled up an impressive record and went on to provide outstanding service in future Mediterranean campaigns.[41]

HIGHWAY OPERATIONS

Preinvasion planners recognized that rail facilities for port clearance could be destroyed, leaving trucks as the only means of port clearance. Computations of requirements were based on short hauls, but in actual North African operations, 50 to 250 mile hauls were required to offset the paucity of rail services. The planned force structure was insufficient to provide for the additional transportation requirements, but even planned resources were reduced because of shortages of shipping. Locally owned vehicles were phased into service, but control of civilian drivers was difficult. In fact, control of all the facets of clearance—vehicles, storage space, and labor—was almost impossible to exercise initially because of the lack of adequate communications equipment, language problems, failure to bring adequate signage, and slow unloading at destinations. Ultimately, a workable control system was established and operated effectively, with exceptions for the normal hazards of combat operations such as road deterioration in the rainy season and enemy interdiction.

Highway long hauls were not significant until Rommel's forces broke through Allied defenses at Kasserine in February 1943. This battle, which also included French and British troops, was notable because of Panzer breakthroughs of American forces in one of the more severe U.S. "bloodings" of the war. Rommel broke off his thrust through the Kasserine Pass before achieving a decisive objective because of personal conflicts in the Axis command system. However, this development could not be foreseen by the Allies, and because of the loss of the rail net in the area, emergency highway movement of rations, POL, ammunition, and other supplies to U.S. II Corps at Tebessa was imperative. Several new truck battalions were activated from combat units and within a week, loaded convoys moved east toward Tebessa in spite of the fact that some drivers had never even driven a car in civilian life.

The tempo of long haul increased with that of the offensive to take Tunisia, and tight movement control in coordination with the British and French was established to maximize use of the limited road net. A system of "blocks," such as used on railroads, was developed with traffic control stations every thirty miles and telephone communications ensured pinpointing the location of each convoy at any time. By the final phase of the Tunisian campaign in April 1943, movement control procedures and experience made possible the successful movement of U.S. II Corps' 100,000 troops from the extreme southern flank to the coast across the rear of Allied forces and line of communication. Most of the move was by organic unit vehicles, supplemented by highway transport provided by the 2638th and 2640th Quartermaster Truck Battalions.

Highway operations in North Africa accomplished assigned missions in spite of enemy air attacks and almost impassable roads, frequently operating under blackout conditions. As General Ross wrote, "When you tell a driver to get those rations to such and such a place, they only have enough for breakfast, you know he'll get them there come hell, high water or Nazis."[42]

RAIL OPERATIONS

North African railways operated in three nets which conformed to the boundaries of French Morocco, Algeria, and Tunisia. Generally single-tracked, the railroads stretched some 1,400 miles along the coast and used both electric and steam locomotives. Main lines were standard and branches usually meter gauge. While the system was generally undamaged, infrastructure and equipment were far below U.S. standards and poorly maintained. Operations were conducted mainly by the remaining French and Arab civilian organizations and directed by Allied military officials. Civilian crews ran the trains except in forward combat areas where Allied military engineers were assisted by French pilots.

The initial U.S. supervisory component in the North African Theater of Operation Transportation Section was staffed with trained railroad men whose affiliations read like a roster of U.S. railroads. In Morocco, military control was almost entirely supervisory, and only limited aid was given to increase capability. The Algerian roads carried the largest tonnages. They also received the most troop and material assistance which eventually constituted about 70 percent of the Algerian system capacity. The Tunisian system, which was in Axis territory most of the campaign, was in the worst condition because of combat damage and sabotage, and required the most reconstruction help to support forthcoming Mediterranean campaigns.[43]

By early 1943, it became evident that support of tactical operations required a special military railway organization, in addition to Allied Forces Headquarters and base section rail staff offices, if it were to function on a theaterwide basis. Unfortunately, few qualified military railway people had reached the theater at this time. The need was addressed during General Somervell's Casablanca visit and he directed Brig. Gen. Carl R. Gray, Jr., General Manager of the Military Railway Service in the zone of interior, to deploy to North Africa. On 9 February 1943, Gray and an advance party arrived in Algiers, where he became Director General of the U.S. and British MRS organizations with British Brigadier R. F. O'Dowd Gage as his deputy. Gray reported directly to the AFHQ commander and was not under direct supervision of the AFHQ

Chief of Transportation (CofT).[44] This potentially awkward arrangement worked because everyone concerned handled it professionally with their focus on the mission. While Gray continued to look to the French to run the railways because of manpower requirements, the Military Railway Service immediately began efforts to supplement system resources with personnel and equipment. It aided infrastructure improvements, using both Military Railway Service and engineer resources.

Activation of the MRS Headquarters and the crucial stages of the campaign coincided, and Gray immediately assigned the bulk of U.S. railway units in-theater and those that were arriving to operational roles in the forward areas in the vicinity of Philippeville, Constantine, Tebessa, and Gafsa. MRS units frequently operated under enemy ground fire and strafing during February 1943, and operations were hindered by mines placed along the right-of-way. As the Allies advanced deeper into Tunisia, turnaround became increasingly important, and the common combat zone problems of cars being unloaded too slowly, fuel shortages, and track rehabilitation and replacement were solved by MRS. Following the Axis surrender, the Allies focused on rehabilitation of the Tunisian system, and the French resumed control of civilian operations as rapidly as possible. Some MRS units and resources continued to assist civilian operations temporarily to ensure support of the forthcoming campaigns, but the bulk of MRS units deployed to other operations in Sicily and Europe.[45]

The North African campaign was a primer for solving fundamental transportation problems that would be encountered in future campaigns. The list of challenges was long and varied. Despite the fact that protective packaging was designed and used and guards were posted in ports, pilferage was a continuing problem. Units were shipped without their equipment, a serious condition that called for immediate corrective action. Insufficient service troops to clear ports and gain control of theater stocks was an extremely grave problem that led to duplicate shipments and waste of transportation resources. Zealous efforts by units to avoid any conceivable shortage strained shipping and generated excesses in the theater that in turn overtaxed theater storage capacity and denigrated the supply system. The latter problem was acute in estimating automatic supply items such as rations. The solution was to stop automatic supply and implement requisitioning as soon as possible.

The North African campaign gave the Transportation Corps its first real opportunity to manage transportation in combat operations. Allied Forces Headquarters and base section transportation staffs closely managed all transportation resources, shifting traffic to coastal water movement to

supplement highway and rail capacity within port and beach capabilities. Existing water, rail, and highway facilities were integrated to form a single transportation system within the theater. Brig. Gen. George C Stewart, AFHQ CofT, stated in the campaign after-action report, "U.S. troops never lacked supplies as a result of the failure of transportation."[46] The experience gained in the campaign stood the Transportation Corps in good stead throughout the remainder of the war.

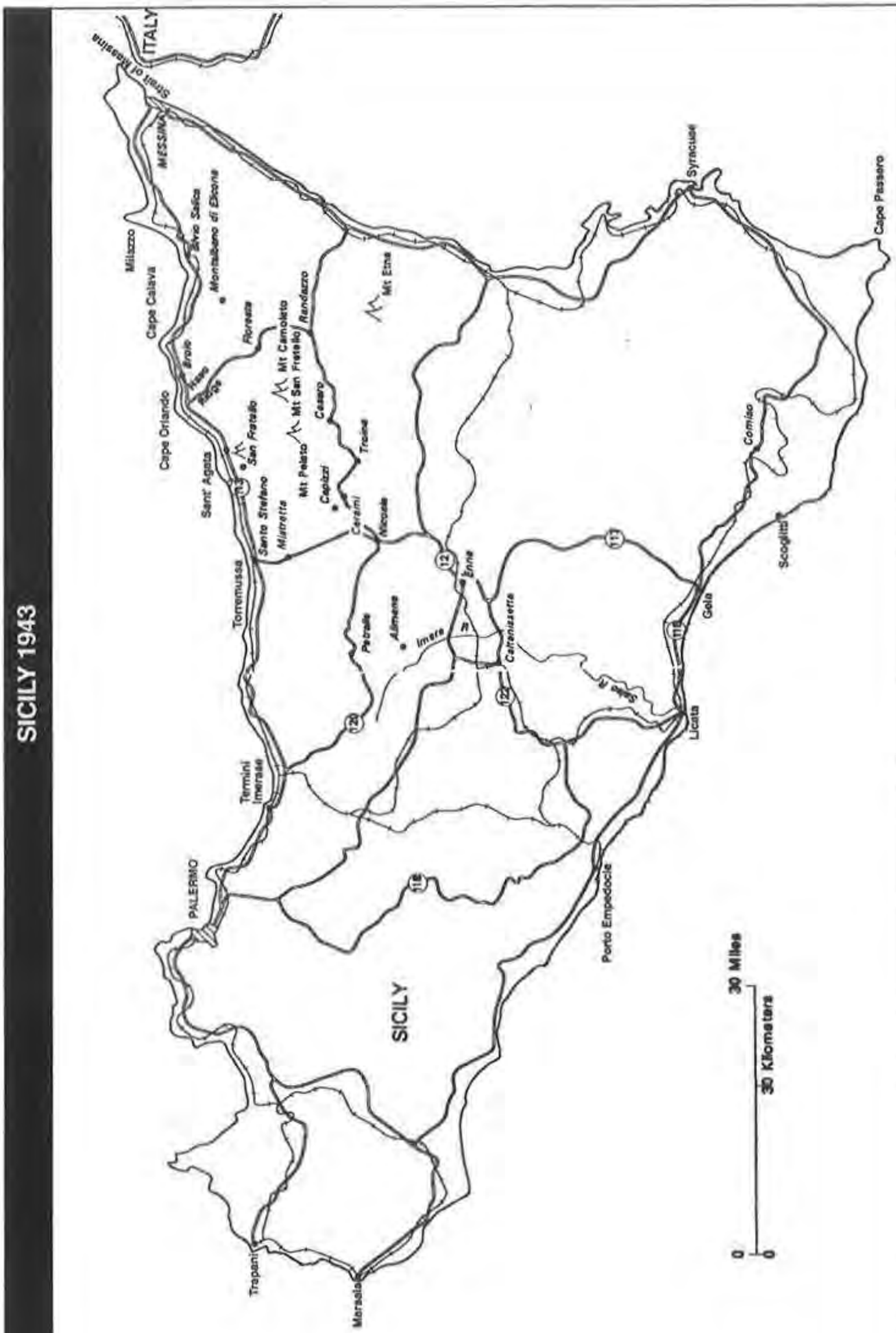
SICILY

Sicily, as shown in Map 12 is about the size of the state of Vermont and largely mountainous.[47] Movement was difficult except over main roads and through the eastern central plain, which is bounded on the north by Mount Etna, a peak over 10,000 feet high. The main mountain range runs along the north coast. Rivers and streams dry up in July and are not major obstacles to tactical operations. The northeast tip is directly across the narrow Straits of Messina, which gave the Axis a ready route to reinforce the island using train ferries that operated daily across the straits. The port of Messina was a key objective, but not for the initial assaults. Only the south coast offered practical landing sites that could be protected by Allied aircraft from Malta and North Africa.

Operation HUSKY was a combined U.S. and British operation planned and expedited by General Eisenhower's headquarters. General Sir Harold Alexander commanded the 15th Army Group (codenamed Force 141), which included Patton's Seventh and Montgomery's Eighth Armies as the invasion force. D-Day was 10 July 1943, just two months after the surrender of Axis forces in Tunisia.

Planning was conducted during the latter stages of the North African campaign by tactical commanders and staffs involved in both operations as well as AFHQ and North African Theater of Operation staffs. Logistical support elements in North Africa had to make the transition from support of the final assault in Tunisia to stage and outload the invasion force. Theater stock control procedures were in their infancy, and there was not time to stabilize records, align resources, and ensure follow-on support of HUSKY. As a result, the U.S. 45th Infantry Division was not staged through North Africa, but was combat loaded from the United States. Theater units were reequipped through emergency requisition to the zone of interior, and resupply was by automatic shipment from the zone of interior throughout the operation.[48]

At this stage in the development of U.S. amphibious assault doctrine, resupply of attacking units over the beach was considered very risky and early


SICILY 1943
ITALY
Strait of Messina
MESSINA
Milazzo
Cape Calava
Cape Orlando
Sant' Agata
San Fratello
Santo Stefano
Mistretta
Torremuzza
Termini Imerese
PALERMO
Trapani
Marsala
Porto Empedocle
Licata
Gela
Scoglitti
Comiso
Syracuse
Cape Passero
Mt Etna
Randazzo
Floresta
Brolo
Naso
Cesaro
Troina
Capizzi
Cerami
Nicosia
Mt Pelato
Mt San Fratello
Mt Camolato
Montalbano di Elicona
Enna
Caltanissetta
Petralia
Alimena
Imera R
Salso R
SICILY
113
120
117
12
115
118
30 Miles
30 Kilometers
0
0

MAP 12

capture of one or more viable ports was considered essential to the sustainment of the invasion force. Nevertheless, General Eisenhower decided to concentrate attacks in the southeast and capture important airfields early rather than ports in the initial stage of the invasion. This proved to be a wise decision, partly because of the advantage land-based airpower gave the Allies, but also because the new amphibious equipment was a great success. For the first time, U.S. forces used the oceangoing landing ship tank (LST) and landing craft tank (LCT), vessels that could sail on their own from North Africa, participate in the assault, and return for resupply. Sicily also heralded the appearance of the 2 1/2-ton amphibian truck (DUKW). Available for ship to shore movement of troops and cargo, the DUKW was highly effective, despite the fact that some of them were diverted by combat forces to haul cargo inland because of a shortage of trucks.[49]

Enemy opposition to the landings and subsequent operations generally did not prevent combat forces from attaining objectives on schedule. Allied forces were able to seize ports and other transportation facilities rather quickly. But the ports needed considerable repair, so resupply over the beaches and through small southern ports continued until Palermo came on line. Taking only thirty-eight days, the campaign was very successful. The only drawback was that the Axis were able to evacuate about 100,000 combat-hardened troops with their equipment before the island fell. The evacuees included three German divisions whose presence would be painfully felt in the coming Italian campaign.[50]

An organizational innovation for the Sicily landings was the designation of the 1st Engineer Special Brigade, which conducted amphibious training for all units in North Africa, to serve as the SOS for the Seventh Army. By operating engineer shore groups for the assault, the brigade quickly controlled all support activities in the objective area. Brigade operations were effective after successfully overcoming the chaos of the first few days and generated extensive lessons learned for the future.

THE PORTS

Transportation Corps units were phased in to take over operation of the ports as soon as engineer and Navy salvage teams cleared piers and ramps and made them safe for operations. On 1 August 1943, the 10th Port took over at Palermo, which became the principal port for Sicily even though operations were hampered by the extensive damage to facilities and lack of service troops. Licata and other small ports on the south coast were closed by the end of August, by which time Palermo had reached 60 percent of its peacetime capacity. On 1 September 1943, Island Base Section (IBS) took over from the

1st Engineer Special Brigade. All transportation operating units including Quartermaster truck and service-type units were assigned or attached to the IBS Transportation Division.[51]

RAIL OPERATIONS

Although it was not necessary to use all 759 miles of the Sicilian rail net, some sections played a key role in the support of U.S. forces because there were not enough vehicles to carry the tonnage the rapid tactical advance required. Advance parties of the experienced 727th Railway Operating Battalion arrived in Licata from North Africa on 12 July and immediately initiated operations using U.S. and local rail employees. On the 13th, they shipped 400 tons of supplies to the 3rd Infantry Division; on the 14th, the total jumped to 600 and gradually rose to a daily total of 2,000 tons. By the end of July, the rest of the battalion arrived just as the tracks to clear the port of Palermo were opened by the engineers and maintenance of way troops with the 727th ROB advance party. Soon rail shipments were exceeding the capability of recipients at railheads to unload. Normal combat zone operating problems like sabotaged track infrastructure and equipment, lack of water for steam engines, and inadequate communications were quickly overcome, and the 727th ROB won high praise from General Patton for its operations.[52]

HIGHWAY OPERATIONS

During invasion planning, the Transportation Section recommended and received approval to include the 6623d Regulating Co (Provisional), a highway traffic regulating unit, in the troop list. The 6623d furnished some of the staff of the Transportation Branch, G4, Seventh Army, which ultimately controlled highway operations and Quartermaster truck unit activities in Sicily. Key highway transport tasks included beach and port clearance which were initially controlled by the engineer brigade, line-haul from ports, and line-haul from railheads. The Transportation Branch was empowered to exercise close control over all highway movements that included routing, siting of supply dumps, and centralized dispatch control. The branch was even able to obtain workable restrictions on local civilian use of main truck routes. While truck operations did not move the quantities shipped by rail, they became increasingly efficient and provided a glimpse of what the future had in store for the truck units of the Transportation Corps.[53]

ANIMAL TRANSPORT

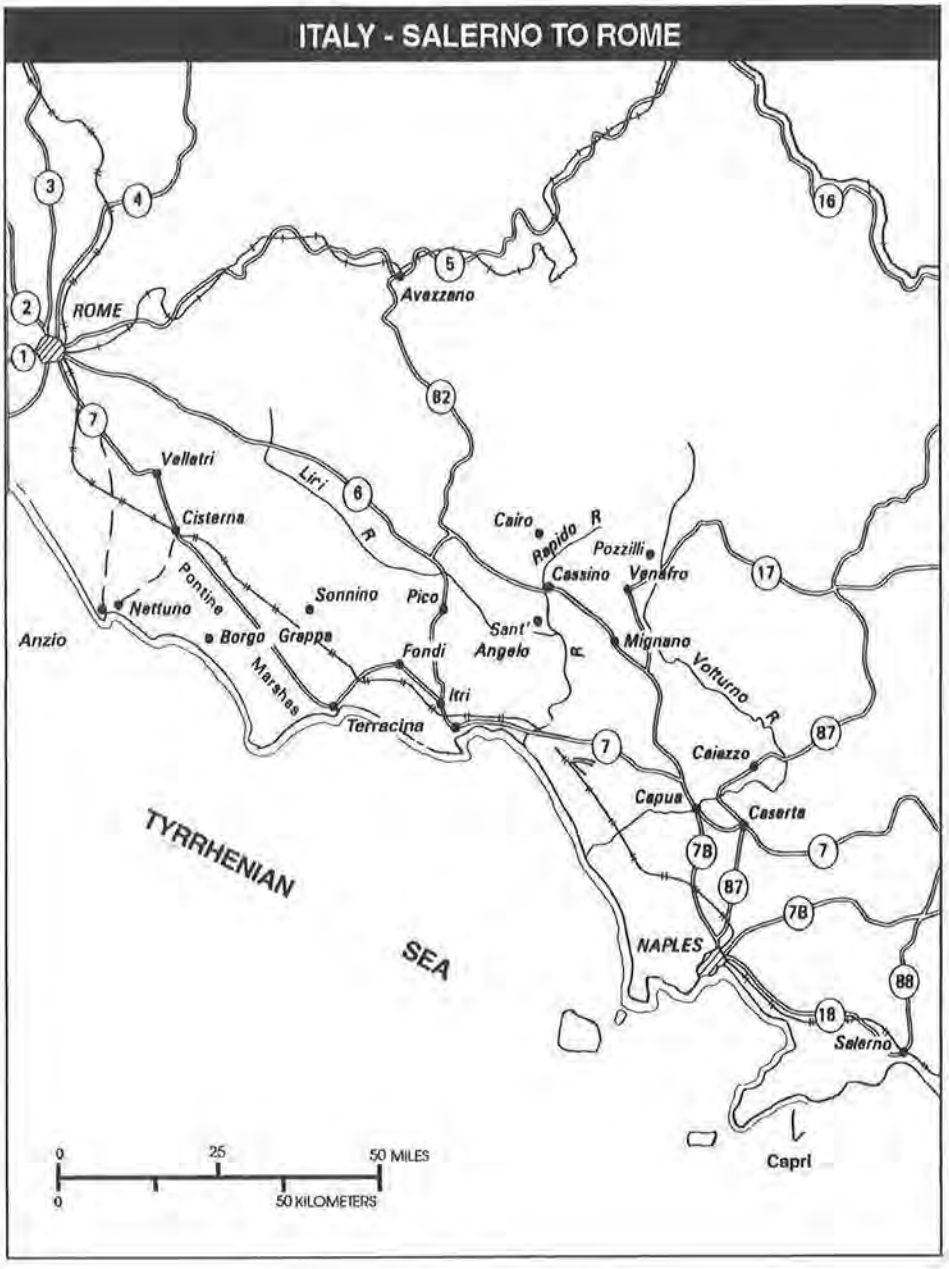
Sicily's rough terrain made the use of animal transport essential. Some 4,000 pack horses, mules, and donkeys were acquired through capture, purchase, and hire. Loads were from 250 to 275 pounds and of course had to include forage. Some 1,500 animals were lost through enemy action. The experiences gained in Sicily using all modes of transportation were soon put to good use on the Italian mainland.[54]

ITALY

TACTICAL OVERVIEW

On 24 July 1943, as Palermo fell to the Allies, the Italian Fascist Grand Council deposed Benito Mussolini. His successor, Marshal Pietro Badoglio, promised Hitler that Italy would continue the war, but soon began secret negotiations with the Allies. The Germans, realizing their ally was no longer reliable, began to pull back from Sicily. They realigned their forces to continue to control occupied areas and block the Allies from attacking north through Italy or across the Adriatic through the Balkans. Meanwhile, the Germans rescued Mussolini and established him as the leader of a German puppet regime in northern Italy. The Allies modified their strategy to take advantage of the changing situation. Operation OVERLORD, the invasion of northern France, continued as first priority, but AVALANCHE, the invasion of Italy, was scheduled for the Salerno area on 9 September 1943 (Map 13).[55] The major objectives of AVALANCHE were to force Italy out of the war and tie down as many German divisions as possible to keep them away from France and, if possible, pull more German divisions from the Eastern Front. Italy also offered the Allies control of Rome, a worldwide symbol, and access to airfields within striking distance of Axis industrial areas in Germany and Austria.

Neither the landing site at Salerno nor those further north were ideal for amphibious assaults. The beaches were adequate for landings, but the surrounding area was mountainous and the narrow coastal plain was dominated by steep, high hill masses which favored the defenders. Farther north, from the Volturno River to Rome, were over 100 miles of precipitous mountains divided by swift streams usually running east and west, well suited to delaying actions. Autumn was the wettest season of the year, bringing with it thick mud that hampered vehicle movement. The Germans, under Field Marshal Albert Kesselring, defended tenaciously and withdrew skillfully without undue casualties or losses of equipment and inflicted maximum delay and casualties on the Allies throughout the long campaign. Nevertheless, the Allies persevered and


ITALY - SALERNO TO ROME
ROME
Avezzano
Velletri
Cisterna
Liri R
Cairo
Rapido R
Pozzilli
Cassino
Venafro
Sonnino
Pico
Nettuno
Pontine Marshes
Borgo Grappa
Anzio
Fondi
Sant' Angelo
Itri
Terracina
Mignano
Volturno R
Caiazzo
Capua
Caserta
NAPLES
Salerno
Capri
TYRRHENIAN SEA
0 25 50 MILES
0 50 KILOMETERS

Map 13

made progress in spite of continued reassignments of their best units to other campaigns and their general status as a theater of secondary importance. The Germans held successively on strongly developed defensive lines south of Rome, fighting the Allies to a standstill by the end of March 1944 in spite of the Allied amphibious envelopment and small beachhead at Anzio from late January through March 1944. The Allies finally broke through and captured Rome on 4 June 1944, and continued to press the Germans through 1944 in operations in the area shown in Map 14. During that drive, Infantry Private First Class Leo J. Powers, later a Sergeant in the Transportation Corps, received the Army Medal of Honor for exceptionally heroic actions in the battle for Cassino, Italy.[56] The final Allied offensive was launched in early April 1945 and resulted in the surrender of all German forces and their remaining Italian Fascist allies on 2-4 May 1945.

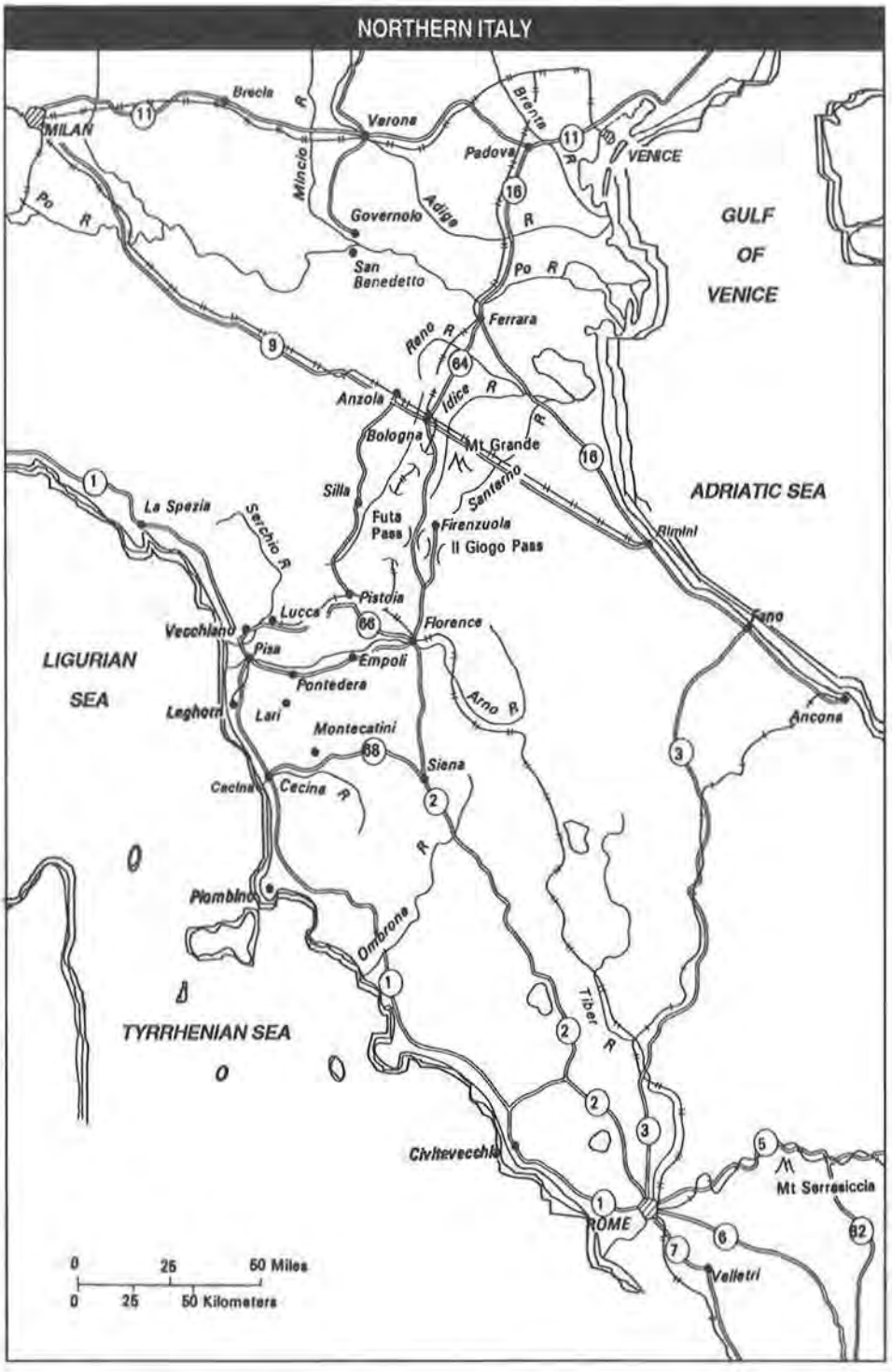
TRANSPORTATION OPERATIONS

The duration and slow progress of the campaign had a major bearing on transportation support requirements. The Allies literally inched forward. Damaged transportation infrastructure was rebuilt and ran very close to the rear of combat areas. Transport operations were subject to normal wartime interference, but not the long haul emergency challenges of Tunisia or the Third Army's attack across France. Transportation managers had to cope with the continuing problem of losing trained units to other theater operations and the need to replace them with local nationals or minimally trained replacements.

THE PORTS

The landing at Salerno was hampered by shortages of units and vehicles because of the chronic dearth of shipping that characterized all support in Italy. As in Sicily, the new types of landing craft did yeoman service. Salerno port could accommodate only coasters, and over-the-beach resupply was used until the capture and partial rehabilitation of Naples.

The 6th Port with the 389th and 480th Port Battalions operated Salerno, supplemented by Italian labor. It subsequently moved to Naples after the city was occupied on 1 October 1943. Although the Naples Port was thoroughly wrecked by Allied bombings and German demolition, American engineers and port troops soon had it working at a level exceeding its prewar capacity. A number of expedients were used, such as building ramps over the hulks of sunken ships to provide pier space. This was much quicker than raising or cutting them up. Local labor was used extensively with meals and night


NORTHERN ITALY
MILAN
Brecia
Verona
Padova
VENICE
Brenta R
Mincio R
Adige R
Po R
Governolo
San Benedetto
GULF OF VENICE
Ferrara
Reno R
Idice R
Anzola
Bologna
Mt Grande
ADRIATIC SEA
La Spezia
Serchio R
Silla
Futa Pass
Firenzuola
Il Giogo Pass
Santerno R
Rimini
Pistoia
Lucca
Florence
Fano
Vecchiano
Pisa
Empoli
LIGURIAN SEA
Pontedera
Leghorn
Lari
Arno R
Ancona
Montecatini
Siena
Cecina
Cecina R
Piombino
Ombrone R
TYRRHENIAN SEA
Tiber R
Civitevecchia
ROME
Mt Serrasiccia
Velletri
0 25 50 Miles
0 25 50 Kilometers

Map 14

differential pay as incentives. In six months, Naples, with its satellite ports, became the busiest port in the theater, a notable achievement. In addition to German demolition of the port, there was a myriad of other difficulties to overcome. At first, the port was a prime target for enemy air raids. There was a shortage of lifting equipment and labor at both the port and its supporting dumps, which was compounded by damage to the railroads that were the primary port clearance facility. The port also had to deal with high winds and rough seas. Nevertheless, Naples not only served as the principal port of debarkation, but also the port of embarkation for the amphibious assault at Anzio.

The Anzio assault was intended to cut the line of communication of the German Tenth Army, in conjunction with attacks by the U.S. Fifth and British Eighth Armies, and force the Nazis to withdraw north of Rome. Although the Germans were taken by surprise, Maj. Gen. John P. Lucas, commanding the operation, failed to exploit the surprise and dug in. Given a chance to react, the Germans aggressively counterattacked the expansion of the beachhead, threatening to destroy it. Instead of exploitation, survival became the mission. The 10th Port and 488th Port Battalion discharged cargo from Liberty ships, landing ships tank (LST), and landing craft. Enemy artillery, aircraft, and E-boats harassed the operation to the point the 488th Battalion was returned to Naples because of casualties, illness, and fatigue. Thereafter, a port crew was sent to unload and return with each Liberty ship. Landing Ships Tank were loaded with 2 1/2-ton trucks carrying 5 short tons of required items, backed onto the LST for rapid discharge at Anzio. Trucks moved rapidly to the appropriate dump, were unloaded and reloaded with salvage, and were concealed until the next returning LST was ready to load.

Failure to move out early from the Anzio beachhead meant another operation had to be supported from the sea. This caused a further strain on Army watercraft resources, which were already in short supply.

After the fall of Rome, the ports of Civitavecchia, Piombino, and Leghorn were opened. Leghorn required extensive rehabilitation, but by the end of the war, Naples and Leghorn were the two main ports in operation. Both would redeploy thousands of U.S. troops and equipment items in 1945 after doing a superb job of supporting the Italian and southern France campaigns.[57]

RAIL OPERATIONS

Allied bombing and Axis demolition left the railroads in Italy almost inoperable. However U.S. engineers quickly initiated temporary repairs so port

clearance rail operations could be conducted at Salerno. Two hundred fifteen carloads of ammunition, rations, and POL were moved out of the port by rail the last week of September, three weeks after the initial assault. More extensive engineer reconstruction was needed, but operations were handicapped by insufficient water for the operation of steam locomotives, diversion of a main railroad bridge to vehicular traffic, and the transport of refugees. Nevertheless, the rail system continued to move cargo to supplement truck clearance of Salerno, and the line to Naples was gradually put in operation by U.S. and British rail troops and Italian labor.

On 7 October 1943, General Gray, Allied Forces Headquarters Director General, Military Railway Service, took charge of all Allied railroad troops and the operation of all state and privately owned railways in Italy. British and U.S. rail units were assigned to separate zones, generally behind the Eighth and Fifth Armies respectively. They worked together on rehabilitating the entire system, a gargantuan task as the Germans had exercised great ingenuity in destruction. German engineers had blasted bridges and tunnels and used a device called the "big hook," which was towed on a flat car behind a train to rip up the ties and drop charges to twist the rails. Coal shortages were a particular problem. Large quantities were shipped to the theater, but were insufficient. Diesel fuel could be imported more easily, and the Americans brought in diesel locomotives and converted many coal-burning locomotives to burn diesel. This dual fuel system kept the railroads running. One of the most unusual challenges that faced the Military Railway Service was a thick layer of ash and cinders from the eruption of Mt. Vesuvius in March 1944, which stopped operations. All efforts were diverted for two days to clean up the ash.

By January 1944, General Gray's MRS had operational control of about 2,400 miles of lines. Rehabilitation and operations were pushed forward almost within sight of combat operations. Military railway troops assisted the engineers in rebuilding a 237-foot bridge over the Garigliano River, the longest span replaced in the theater. Military Railway Service operations were based in Rome after its liberation and moved to the Leghorn-Pisa-Florence area as operations advanced into northern Italy.

During July and August 1944, Allied forces moved to ports to outload for southern France. Included were several rail battalions under General Gray and his new Military Railway Service Headquarters. Brigadier R. D. Waghorn, the British Transportation Service Chief, was made Director of the Allied Military Railway Service in Italy. As operations extended to the north, portions of the

network were progressively released to the Italian State Railways, with all transfers completed by June 1945.[58]

HIGHWAY OPERATIONS

Early in the campaign, highway transport was the only mode available for most tasks. Trucks continued to be the workhorse for port clearance, base and depot hauling, and deliveries forward from the railheads, which in the early part of the campaign were far behind forward supply dumps. Enemy ground and air attack, always a threat, was best met by the movement and scheduling flexibility provided by truck transport.

With experiences in North Africa and Sicily, Col. (later Brig. Gen.) Ralph H. Tate, the G4, Fifth Army, fully recognized the need for centralized control of transportation resources. Despite the unwillingness of the Quartermaster, Tate insisted his Transportation Section control all truck unit lift capabilities, rather than the Quartermaster who was a user of transportation. The Transportation Section was headed by Maj. Franklin M. Kreml, an experienced officer, who had been on the theater transportation staff since the landing at Oran in November 1942. The Transportation Section was able to integrate and use the available lift of all modes to best perform port clearance and forward movement tasks. The section also established controls over traffic behind the combat zone by coordinating and prioritizing engineer road and bridge repair, military police operations, and convoy operations. Interface with other users of the road net, particularly the British and their Q-Movements staff were emphasized. All actions were designed to keep traffic fluid behind the armies. To increase productivity of vehicles, drivers, and the road net, the section requisitioned almost 600 6- and 10-ton tractor trailers by March 1945. The new tractor-trailer units were suitable for operations on improved roads, but the standard 2 1/2-ton 6x6, carrying 4 to 5 tons was the best vehicle for general use on long or short hauls in Italy. The Peninsular Base Section (PBS) had about 3,300 in service by December 1944. Motor transport remained a major contributor to port and depot operations as well as support of combat forces throughout the campaign.[59]

ANIMAL TRANSPORT

As in Sicily, the highly mechanized U.S. Army was forced to fall back on animal transport to support advances in the mountainous terrain north of Naples. However, few animals could be had and special agencies were set up to procure animals, forage, and equipment. By December 1943, the Fifth Army had about

2,300 mules and was highly dependent on them to carry essential supplies to forces in contact along the Axis Winter Line. Local animals could subsist on home-grown hay and chopped straw that was in short supply but could be procured locally. However, when the 10th Mountain Division arrived in late 1944, they had 7,100 American mules (with 500 replacements a month) that had to be fed their customary hay and grain. This markedly increased the importation of forage and required the diversion of nine mule ships from the Burma-India run for initial deployment and mule replacements. As in previous wars, logisticians learned that logistical support of animals had to be given detailed attention in planning deployment and support.[60]

PIPELINES

The pipelines operated by engineer and quartermaster troops played a major role in keeping the road and rail movement requirements within the capabilities of resources. The engineers constructed four- and six-inch pipelines to move huge quantities of aviation fuel to support airfields in the Foggia area. They also provided motor fuels to support Fifth Army's advance up the west side of Italy, easing the transportation task. During January 1944, pipeline support of Fifth Army was the equivalent of 50 tank cars or 250 to 300 trucks a day. Pipelines were a small target for enemy air and artillery fire, unaffected by weather and usable constantly up to capacity, although susceptible to pilferage and sabotage. Every effort was made to push pipelines to large consumption areas whenever possible.[61]

REDEPLOYMENT

In April 1945, redeployment from Italy began with Naples and Leghorn as the primary ports. A number of ships carrying materials no longer needed were returned to the United States, while other ships were loaded with ammunition, pierced steel planking, vehicles, and heavy weapons for the Pacific. The loss of Transportation Corps units and soldiers was offset by increasing the use of local labor and prisoners of war, the latter usually organized into service units. Mediterranean Theater transportation management was consolidated under the commanding officer, 10th Port and a Military Railway Service supervisory element to ensure support of U.S. occupation forces around Trieste and manage disposal of U.S. equipment. They remained long after hostilities ceased.

THE INVASION OF SOUTHERN FRANCE

TACTICAL OVERVIEW

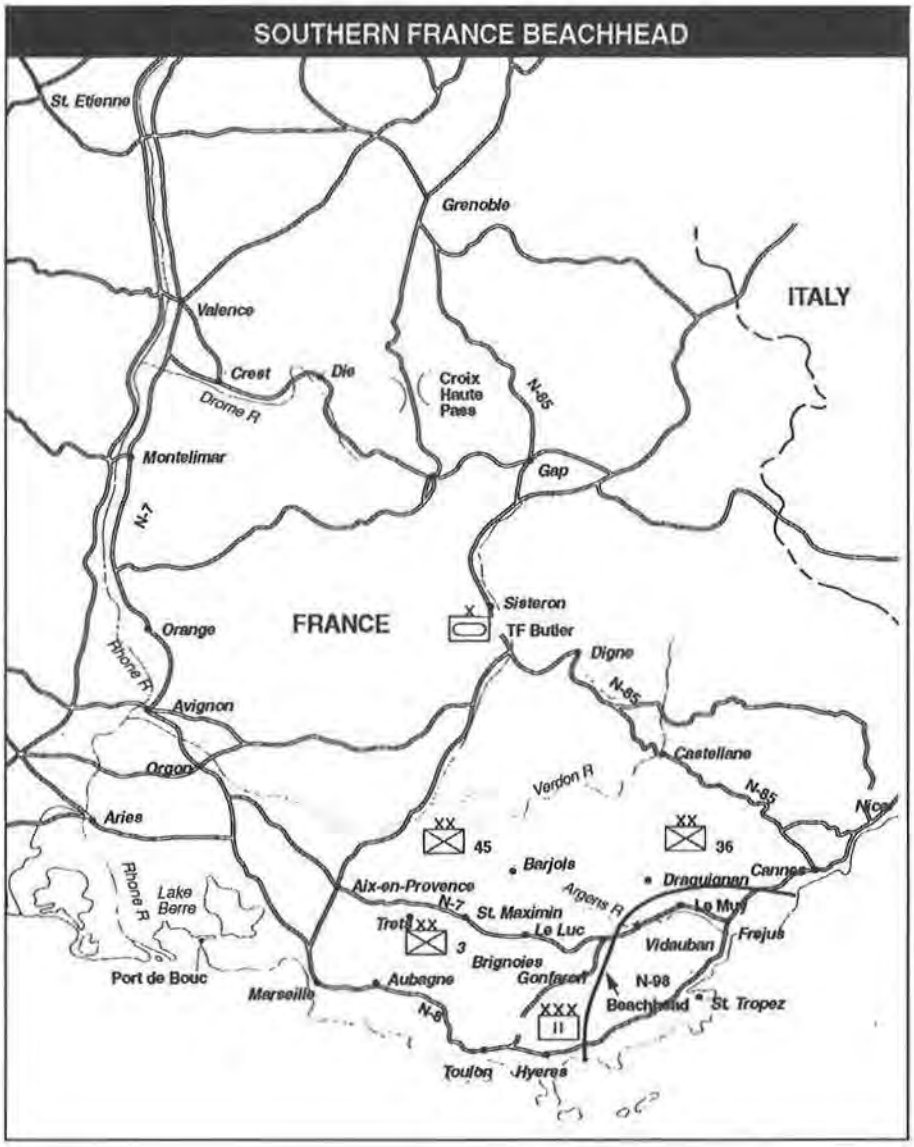
The original concept called for the invasion of southern France to be executed simultaneously with the Normandy landings. Detailed planning was initiated in Algiers by a Seventh Army task force working with Services of Supply, North African Theater of Operation in Oran under the codename of ANVIL. In March 1944, the invasion was temporarily called off due to lack of shipping, but in June 1944, the decision was made to mount the assault on 15 August 1944, under the codename DRAGOON.

As shown in Map 15, the invasion force of Seventh U.S. Army and French Army B (later First French Army) of some 522,000 troops (of which 72,410 were in service units) and 110,000 vehicles was to make the initial landing in three division task forces on the beaches between Toulon and Nice, capture Marseille, and other ports, attack north through the Rhone Valley to join with U.S. armies, and provide supplemental combat power and supplies for the continuing attacks to the east to defeat Germany.[62] The invasion and follow-on operations were to be supported from within the theater and the zone of interior. It was considered a secondary operation to provide support for Eisenhower's main attack.[63]

The landings were successful and combat forces advanced rapidly. They covered about 330 miles by 15 September and joined up with the 6th Army Group of U.S. and French armies. Base and advance sections were established to support the combat forces with an advance element of Communication Zone (COMZONE), Mediterranean Theater of Operation at Lyon providing overall coordination. Communication Zone was eventually replaced by HQ, Southern Line of Communications (SOLOC), commanded by Maj. Gen. Thomas B. Larkin, under the European Theater of Operations (ETO) Communications Zone Commander, Lt. Gen. John C.H. Lee. The Southern Line of Communications commander was given wide latitude to direct SOLOC operations. Existing arrangements for support from the Mediterranean area and the zone of interior remained in effect.

TRANSPORTATION OPERATIONS

Brig. Gen. George C. Stewart was appointed as Maj. Gen. Larkin's Transportation Officer. Stewart had jurisdiction over Transportation Corps


SOUTHERN FRANCE BEACHHEAD
St. Etienne
Grenoble
ITALY
Valence
Crest
Die
Drome R
Croix Haute Pass
N-85
Montelimar
Gap
N-7
FRANCE
Sisteron
TF Butler
Orange
Digne
Rhone R
N-85
Avignon
Castellane
Orgon
Verdon R
N-85
Nice
Aries
XX
45
XX
36
Barjols
Cannes
Draguignan
Aix-en-Provence
Argens R
Le Muy
N-7
St. Maximin
Rhone R
Lake Berre
Le Luc
Frejus
XX
3
Vidauban
Brignoles
Port de Bouc
Aubagne
Gonfaron
N-98
Marseille
N-8
XXX
II
Beachhead
St. Tropez
Toulon
Hyeres

Map 15

activities, installations, and troops, and coordinated transportation operations between sections. However, the Military Railway Service, under Brig. Gen. Carl R. Gray, Jr. remained autonomous under Southern Line of Communication.[64]

Tactical and strategic planners expected stronger German resistance than that actually encountered. Consequently, the assault and follow-up convoy was weighted heavily in favor of combat units and munitions at the expense of petroleum, oil, lubricants (POL), service units, and vehicles. However, transportation planning and operational experience gained in North Africa, Sicily, and Italy helped offset late arrivals. Transportation operations were well planned and executed, and transportation contributed substantially to the success of the overall operation.

THE PORTS

The initial assaults encountered relatively light resistance on the beach, and the division task forces operated independently until the Beach Control Group assumed over-all direction for Seventh Army on D plus 2. Amphibian trucks and landing craft, tank (LCT) moved cargo from ships in the stream to beaches. There were insufficient trucks to move cargo from LCT and other landing craft, which had sailed directly from Italy and North Africa, and the rapidity with which cargo was put ashore (about 300,000 tons of dry cargo by D plus 30) swamped the capabilities of the limited numbers of beach control group troops. As the campaign became a pursuit of a fleeing enemy, transportation forward movement requirements greatly increased. Emergency measures were taken to expedite arrival of troop and cargo-handling equipment, but convoy schedules were hard to change, and the priority of forward support missions absorbed assets as they arrived. The use of civilians was limited by the dearth of able-bodied men, most of whom had either fled to North Africa or been conscripted by the Germans for forced labor elsewhere. The early capture of Toulon and Marseille, about four weeks ahead of schedule, allowed accelerated base development and took pressure off the beaches sooner than anticipated.[65]

Toulon was used briefly for invasion support, but subsequently became a naval base and the principal discharge point for Civil Affairs cargo. The Coastal Base Section (CBS) advance party entered Marseille on 24 August. Destruction was enormous and all channels were blocked by seventy-five sunken ships. Mines were scattered everywhere in the harbor, and on land all of the buildings were demolished or badly damaged and booby-trapped. Railroad tracks were ripped up. The Navy and the 36th Engineer Combat Regiment immediately started rehabilitation. On 1 September, the 6th Port and engineer port

construction units came ashore. On 8 September, 6th Port began discharging amphibious craft and lighters with cranes brought from Naples. On 15 September, the first Liberty ship was berthed. At first, most cargo was off-loaded to lighters, and troops and vehicles to landing craft, both beached in the port area. Rehabilitation progressed rapidly. By the end of September, operable pier berthing spaces for fifteen Liberties and five coasters were accessible through cleared ship channels. Port-de-Bouc, a satellite port two miles west of Marseille, was captured by the French Forces of the Interior (FFI) and became a bonus supply base. It initially handled only general cargo, but as pipelines and three nearby refineries were rehabilitated, it eventually became the principal POL port, handling 70 percent of Allied POL requirements as well as substantial general cargo. Port-de-Bouc also became the origin terminal of pipelines to the north.[66] In the last two weeks of September 1944, southern ports discharged an average of 5,000 tons of general cargo a day, and Marseille and Port-de-Bouc quickly became the funnel through which the line of communication in southern France was supplied.[67]

On 8 September, Coastal Base Section, which was redesignated Continental Base Section two days later, opened at Marseille. The CBS became responsible for noncombat activities from the coast to the Seventh Army's moving rear boundary, then at Lyon. It sent supply representatives to work with the Army G4 staff and coordinated with corps and Army staffs to move supplies, dumps, depots, and supply points forward.

The initial transportation support of combat elements was by necessity limited to highway and pipeline modes because of initial delays in getting main rail lines operating. A huge shortfall of transportation assets and capabilities was evident as early as the initial landings, and it overshadowed all other logistical challenges. The situation was the culmination of combat-heavy assault loading, a theater-wide shortage of truck and rail assets, and a shortage of POL. The rapidity of the Seventh Army's link-up with Third Army exacerbated all other obstacles. The linkup occurred on 12 September, eleven days prior to the planned capture of Marseille and well before the planned breakout and aggressive movement into Northern France.

HIGHWAY OPERATIONS

Truck requirements escalated at an alarming rate, and fuel consumption rates immediately exceeded estimates. For example, the 3d Infantry Division developed shortages on D plus 1 and the VI Corps the following day. By 19 August, shortages were critical. The crisis was barely solved by focusing

DUKW operations on packaged POL and by exploiting captured German stocks and those at French refineries at Port-de-Bouc. The construction of military POL storage at Port-de-Bouc and the initiation of pipeline construction toward Lyon helped.

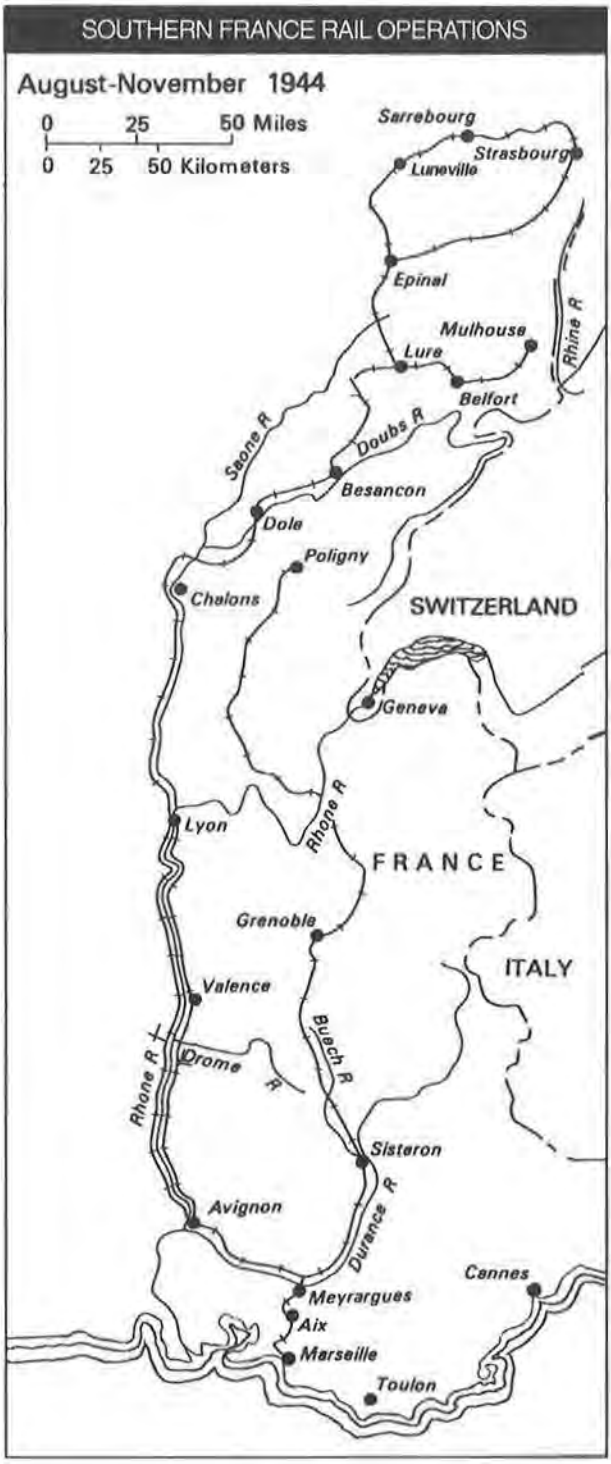
The Seventh Army Transportation Officer's centralized control over all army truck assets, to include some at division level, was a large factor in averting a halt to Seventh Army's advance. The Continental Base Section Transportation Section's Highway Division took drastic measures to alleviate the crisis. Service units were held in the port areas temporarily for general supply operations rather than moving directly to their assignment, and arriving units were required to load their trucks with supplies for the forward combat units. They were required to make one round trip before deploying to their destination. A Movements Control Office was opened at Continental Base Section headquarters which established control of U.S. and French military convoys and rerouted them over the best routes.

By the end of September, actions were underway to convert two antiaircraft battalions to truck battalions and organize other battalions with Italian prisoners of war (POW). By October, truck requirements eased as railroad rehabilitation reached the point where the miitary railway system could handle the bulk of the line haul.[68]

RAIL OPERATIONS

The rapidity of the German withdrawal left rail facilities in good condition compared with those previously encountered, except in Marseille where the majority of rail facilities were destroyed and bridges demolished. Rehabilitation was begun as rapidly as possible. The arrival of the 703d Railway Grand Division (RGD) and 713th Railway Operating Battalion was accelerated to 29 August, while the 1st Military Railway Service opened an advance element in Lyon on 14 September.

Sections of a narrow gauge railroad in the beachhead area were made operational with French crews by D plus 2, and main lines paralleling the coast began operations as far west as St. Maxim by 23 August. French train crews were recruited, and sections of rail lines were opened as soon as they were repaired. Sometimes trucks were used to transfer cargo between breaks in the line. By mid-September, the line north was open for 220 miles over temporary bridges. By the end of the month, the line was open to Besancon for 1,500 tons a day, as indicated in Map 16.[69] Nevertheless, railroads did not attain the ability to carry the bulk of support for some time. For example, during September,


SOUTHERN FRANCE RAIL OPERATIONS
August-November 1944
0 25 50 Miles
0 25 50 Kilometers
Sarrebourg
Strasbourg
Luneville
Epinal
Mulhouse
Lure
Belfort
Rhine R
Saone R
Doubs R
Besancon
Dole
Poligny
Chalons
SWITZERLAND
Geneva
Lyon
Rhone R
FRANCE
Grenoble
ITALY
Valence
Buech R
Drome R
Rhone R
Sisteron
Durance R
Avignon
Cannes
Meyrargues
Aix
Marseille
Toulon

Map 16

trucks moved some 220,000 tons forward from coastal areas and rail hauled only about 63,000 tons. A major problem was the lack of adequate bridging. High priority was given to accelerating the shipment of portable Bailey Bridges and heavy bridging construction materials to the theater.

Part of the solution lay in reducing U.S. air strikes which had caused much of the bridge damage already encountered. Seventh Army planners estimated that continuation of the bridge destruction program at the current pace would slow the Allied advance more than it would impede German withdrawal. Air strikes against bridges were limited thereafter. By early October, the railroads reached a capacity of over 8,000 tons a day and were ready to take over the majority of the support movements. An embargo was placed on use of COMZ trucks for line-haul, and the railroads carried steadily increasing traffic thereafter.[70]

In early 1945, the direction of transportation activities in the theater was consolidated. The European Theater of Operations Communications Zone assumed control of Southern Lines of Communications transportation operations and jurisdiction over the 1st Military Railway Service. The invasion of southern France and the opening of the line of communication from Marseille contributed immensely to supporting the drive across France, not only of the U.S. Seventh and First French Armies, but the more northern armies as well.

CHAPTER VIII

World War II
The Normandy Invasion and Assault on Germany

"The manner in which you picked up and delivered our two divisions into the battle area was about the finest job of its kind we have ever seen."

Major General Matthew B. Ridgeway,
Commander XVIII Airborne Corps, Ardennes Campaign

STRATEGIC AND TACTICAL OVERVIEW

The invasion of France and the drive into the heart of Nazi Germany was the decisive campaign on the Western front in World War II. It began in England with Operation BOLERO, the buildup of troops, equipment, and supplies for the invasion of France, which was tentatively scheduled for Spring 1943. As plans grew more detailed, the codename ROUNDUP was used to refer to the combat service support portion of BOLERO, while SLEDGEHAMMER was used for the combat arms portion. The first combined BOLERO Committee met on 29 April 1942, and on 31 May, issued its first Key Plan, which called for an eventual U.S. troop level of 1,049,000 troops to be in Great Britain by spring 1943.

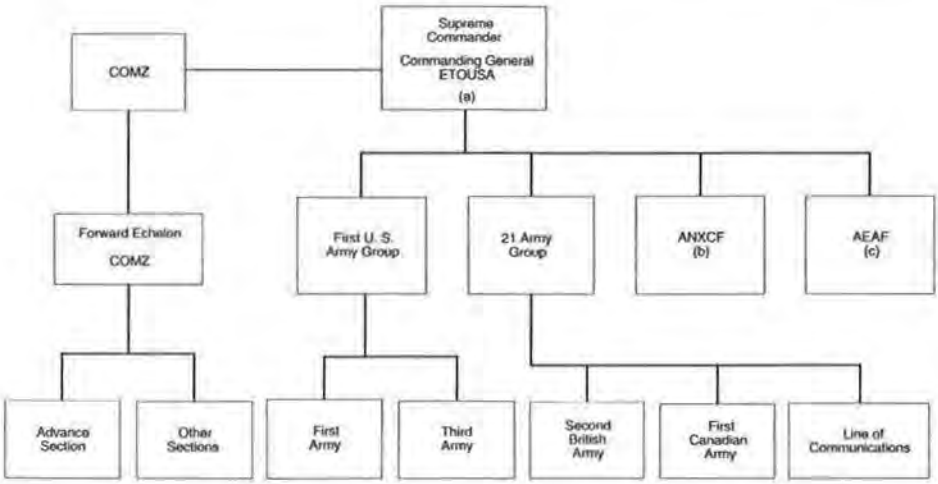
In August 1943, the QUADRANT Conference in Quebec affirmed both the TRIDENT and the Chief of Staff to the Supreme Allied Commander (COSSAC) plans for the invasion, codename OVERLORD, for May 1944. Total U.S. strength to be available for the invasion was increased to 1,446,000 troops. The build up in Britain eventually included 1,340,000 U.S. troops.

The Teheran and Cairo Conferences confirmed the previous plans and added ANVIL, which was the planning phase for the invasion of Southern France, and DRAGOON, the execution phase, which had a target date of August

1944. A simultaneous landing was ruled out due to the shortage of shipping and amphibious resources.

OVERLORD, the invasion of Normandy, was designed to seize ports and a lodgement area in which troops and supplies could be built up and staged for offensive operations over a three month period. Allied forces were then to attack east across France and into Germany, link up with the Soviets, and force the Germans to surrender, ending the war in Europe.[1] Detailed tactical and logistical planning was conducted in the United States and England, guided by the Combined Chiefs of Staff and the Supreme Headquarters, Allied Expeditionary Force (SHAEF), commanded by General Eisenhower (Chart 9).[2]

PLANNED COMMAND ARRANGEMENTS FOR OVERLORD

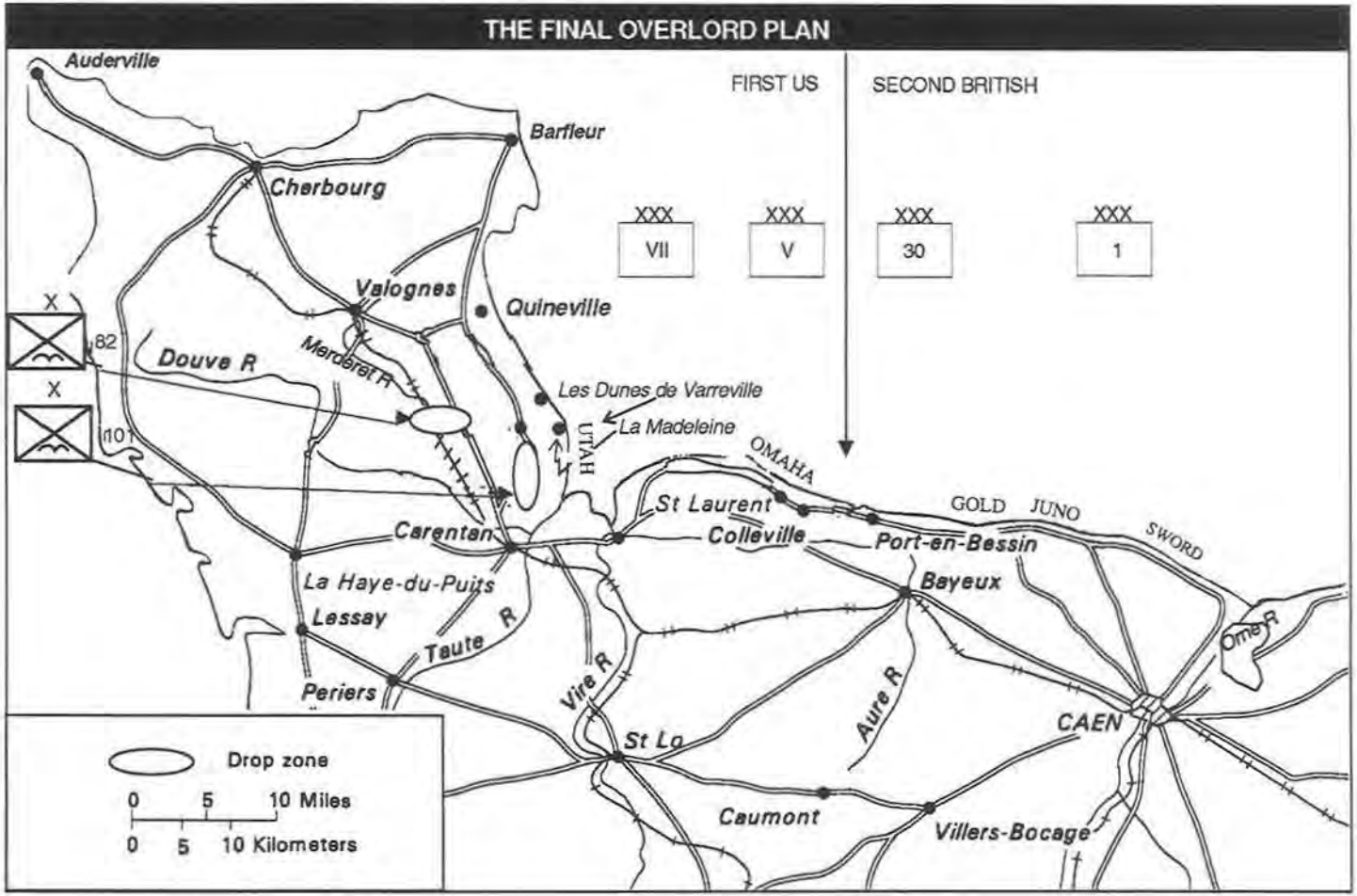


(a) ETOUSA = European Theater of Operations, U. S. Army
(b) ANXCF = Allied Naval Expeditionary Force
(c) AEAF = Allied Expeditionary Air Force

Chart 9

The landing and initial beachhead areas for the U.S. First and British Second Armies are shown in Map 17, the final OVERLORD plan.[3] Additional corps, divisions and service troops were to reinforce assault elements as soon as they could be landed and deployed.

On D-Day, 6 June 1944, the amphibious assault succeeded in securing a beachhead despite heavy enemy opposition, unfavorable weather, rough seas, and inexperienced U.S. forces.


THE FINAL OVERLORD PLAN
Auderville
Barfleur
Cherbourg
Valognes
Quineville
Douve R
Merderet R
Les Dunes de Varreville
La Madeleine
UTAH
OMAHA
St Laurent
Carentan
Colleville
Port-en-Bessin
GOLD
JUNO
SWORD
Bayeux
La Haye-du-Puits
Lessay
Taute R
Periers
Vire R
Aure R
Orne R
CAEN
St Lo
Caumont
Villers-Bocage
FIRST US
SECOND BRITISH
XXX
VII
XXX
V
XXX
30
XXX
1
X
82
X
101
Drop zone
0 5 10 Miles
0 5 10 Kilometers

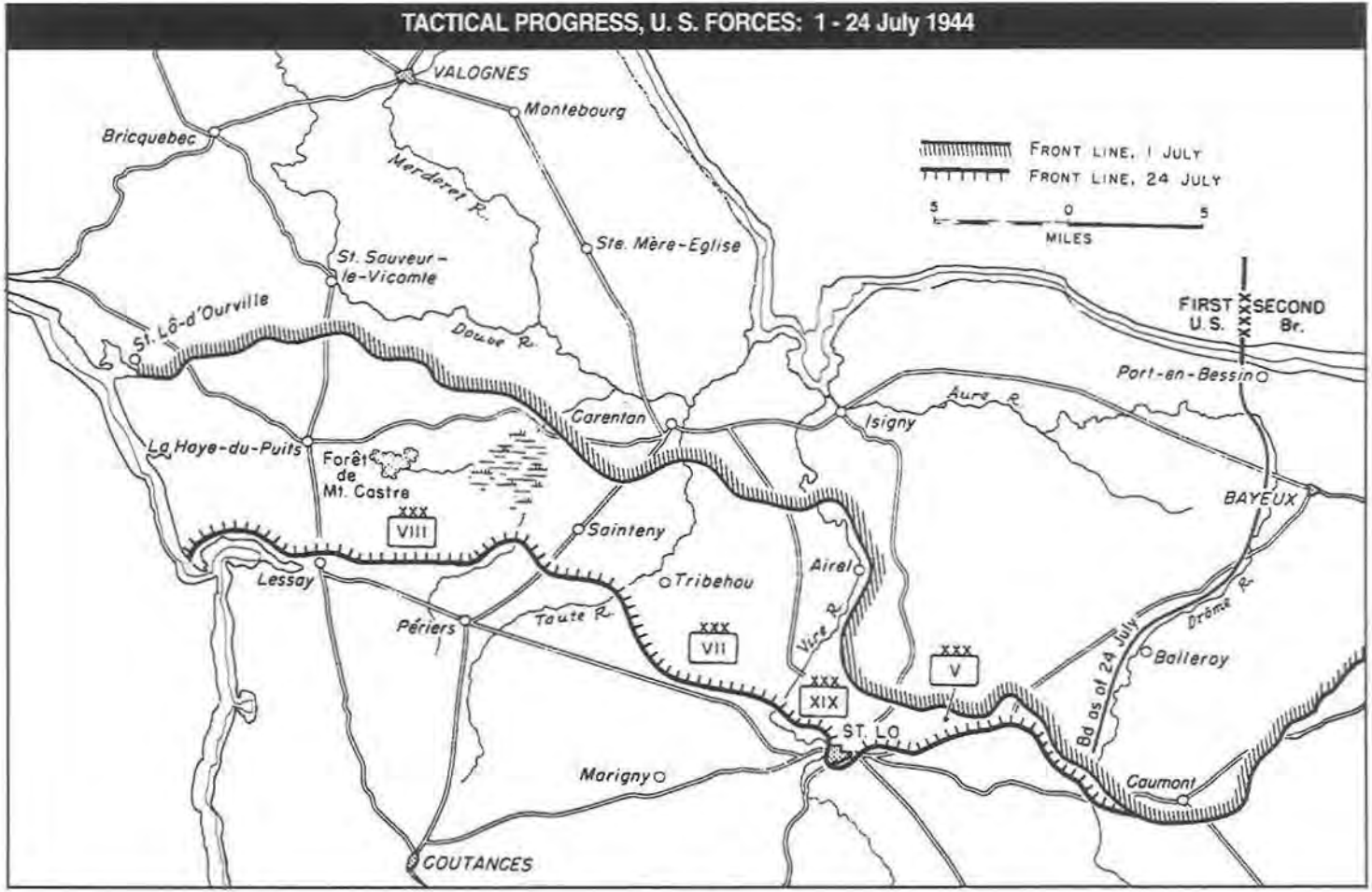
Map 17

Combat forces captured the badly damaged port of Cherbourg on 27 June 1944 (D plus 21). By 1 July 1944, advances were about sixteen days behind the OVERLORD plan schedule, but the Allies were firmly established on the Continent. Further expanding the beachhead to secure the planned lodgement area faced rough going against stubborn enemy resistance, as depicted in Map 18, which shows the tactical progress of U.S. forces from 1-24 July 1944.[4] Capture of Brittany ports, such as Brest, fell far behind schedule. Logistical operations in the lodgement area were so congested that they were only permissible with total air superiority. The limited area constrained beach clearance and the build-up of reserves, limiting the force that could be supported. However, the relatively short lines of communication temporarily reduced some transportation needs and the delay gave some time to get the severely damaged port of Cherbourg into partial operation.

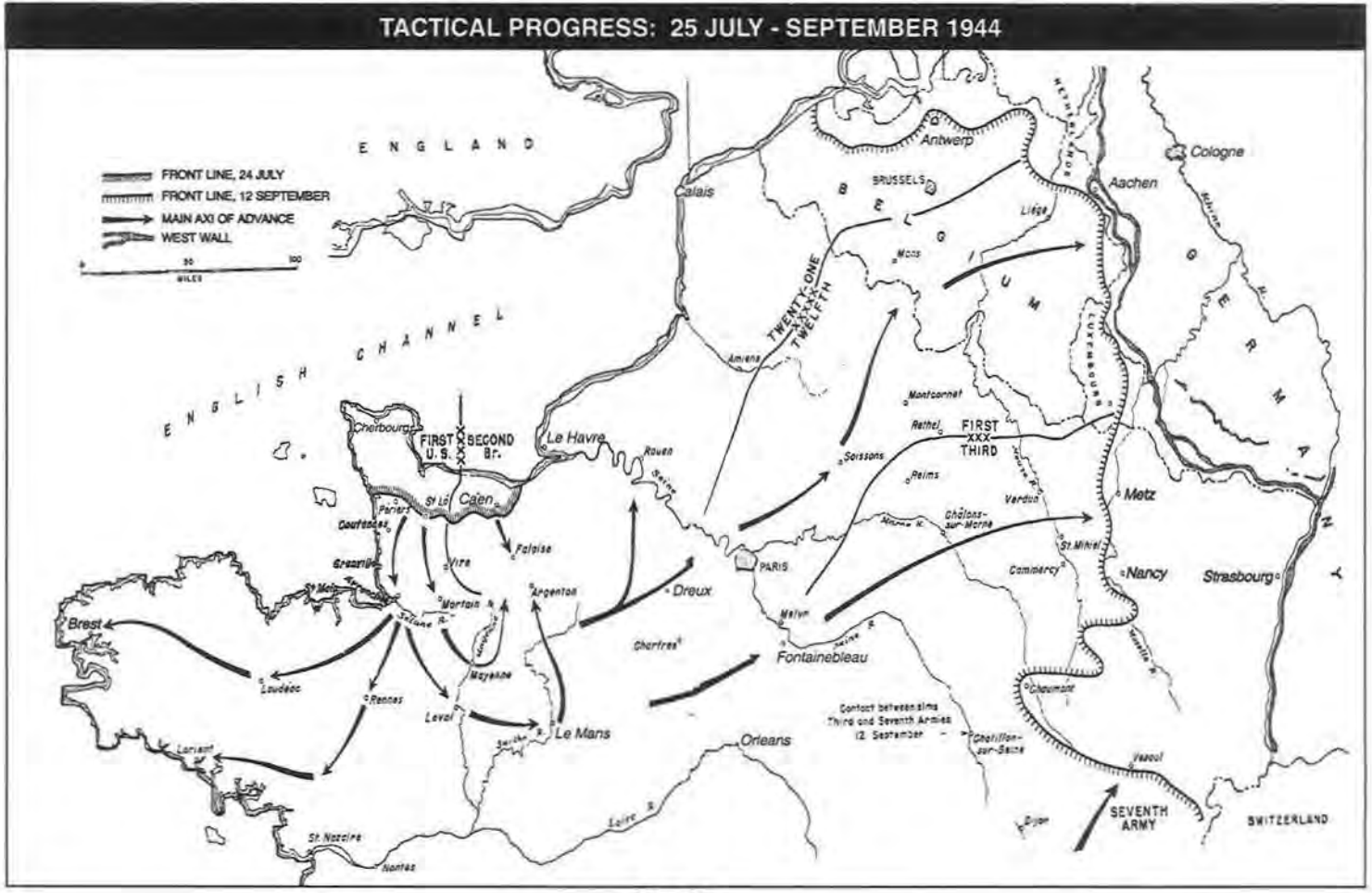
Operation COBRA, the breakout from the lodgement area, began on 25 July 1944. Much of Brittany was occupied, but only minor ports were captured. None of the main Atlantic coast ports, which figured heavily in OVERLORD port discharge estimates, were captured in time to be of any use. The advance to the east was highly successful. By D plus 79, the Allies reached the Seine, the original OVERLORD D plus 90 objective. That advance covered in 30 days what planners said would take 70. During that time, transportation and supply support were to have phased forward, but with the rapid breakout, logistical support was provided only with great effort, marking the beginning of even more serious support problems.

At this stage, the armies had used their reserves to reach the Seine. Advance depots had not been established because of the delayed breakout and rapid exploitation. There was a motor transport deficiency which had been predicted well before D-Day, and equipment was badly worn from the relentless advance. Nevertheless, General Eisenhower made the tactical decision displayed in Map 19 to take advantage of the disorganization of the enemy, cross the Seine, encircle Paris, and pursue the retreating Germans without delay. The attack continued successfully and Paris was liberated.

In the south, Third Army reached the line Metz - Nancy by 31 August 1944. In the north, progress was slow at first against better organized resistance. Good progress was made by 12 September 1944 by U.S. First Army, which held a line generally along the German border.[5] (Map 19) The British Twenty-first Army Group was equally successful and, by 4 September 1944, had captured Antwerp with most of its facilities intact. The Twenty-First Army Group bypassed and invested the port of Le Havre, which surrendered on 12 September 1944. By mid-September 1944, British Forces were on the Dutch border. The latter phases


TACTICAL PROGRESS, U. S. FORCES: 1 - 24 July 1944
VALOGNES
Montebourg
Bricquebec
Merderet R.
Ste. Mère-Eglise
St. Sauveur-le-Vicomte
St. Lô-d'Ourville
Douve R.
Carentan
La Haye-du-Puits
Forêt de Mt. Castre
XXX
VIII
Sainteny
Lessay
Tribehou
Périers
Taute R.
XXX
VII
Airel
Vire R.
XXX
V
XXX
XIX
ST. LO
Marigny
COUTANCES
Isigny
Aure R.
FIRST U.S. SECOND Br.
XXXX
Port-en-Bessin
BAYEUX
Drôme R.
Balleroy
Bd as of 24 July
Caumont
FRONT LINE, 1 JULY
FRONT LINE, 24 JULY
5 0 5
MILES

Map 18


TACTICAL PROGRESS: 25 JULY - SEPTEMBER 1944
FRONT LINE, 24 JULY
FRONT LINE, 12 SEPTEMBER
MAIN AXI OF ADVANCE
WEST WALL
ENGLAND
ENGLISH CHANNEL
BELGIUM
GERMANY
LUXEMBOURG
NETHERLANDS
Antwerp
BRUSSELS
Cologne
Aachen
Liège
Mons
Calais
Amiens
TWENTY-ONE
XXX
TWELFTH
Montcornet
Rethel
FIRST
XXX
THIRD
Soissons
Reims
Verdun
Metz
Châlons-sur-Marne
St. Mihiel
Nancy
Strasbourg
Commercy
PARIS
Melun
Fontainebleau
Chaumont
Chatillon-sur-Seine
Vesoul
SEVENTH ARMY
SWITZERLAND
Dijon
Contact between 3rd & Third and Seventh Armies 12 September
Cherbourg
FIRST U.S.
SECOND Br.
Le Havre
Rouen
Seine R.
St Lô
Caen
Périers
Coutances
Granville
Falaise
Vire
Mortain
Argentan
Dreux
Chartres
Brest
Loudéac
Rennes
Mayenne
Laval
Le Mans
Orleans
Loire R.
Lorient
St Nazaire
Nantes
Sarthe R.
Oise R.
Meuse R.
Moselle R.
Marne R.
Yonne R.
Aisne R.
Somme R.
Mayenne R.
Sarthe R.
Loire R.
WILES
100

Map 19

of the advance were characterized by increasing enemy resistance and substantial supply/transportation shortages.

During the period of the advance across northern France, the U.S. Seventh Army invaded southern France and moved rapidly to link up with Third Army. United States Seventh and First French Armies came under the Sixth Army Group, which held the southern Allied flank adjoining Switzerland. DRAGOON's success contributed substantially to the Allied drive. This was due in part to the support provided to the northern armies from the second LOC into France, through the port of Marseille.

By mid-September 1944, logistic limitations in northern France clearly dominated operations. In October 1944, tonnage discharged was not enough to support the existing force, and what was available could not be cleared from ports. The LOC capacity from Normandy was insufficient to move resources forward to build up advance depots and support combat operations. General Eisenhower decided to give priority of support to the British 21st Army Group, which was to secure bases that would provide control and speed development of the Antwerp-Rotterdam port complexes, essential to the final invasion of Germany.[6]

Eisenhower also gave priority to secure advance bases in the Metz-Nancy area, directing that further attacks on main Brittany ports be reduced to holding efforts and let enemy forces there "die on the vine." He authorized continuing attacks into the Alsace area by forces supported through the southern LOC to maintain a U.S. offensive posture. Three incoming divisions and other traffic were diverted through Marseille, while the priority effort to increase the capacity of the channel and North Sea ports was continued. The Supreme HQ, Allied Expeditionary Force (SHAEF) recognized that large scale offensive operations could not be maintained until Antwerp and adequate rail lines of communications were made available to support them. Consequently, there was a temporary hiatus on operations to penetrate deep into Germany.

From September 1944 until February 1945, Allied armies either marked time or made minor gains. The combination of inhospitable terrain, restricted logistic support, and stubborn German resistance prohibited any substantial advances, in spite of a U.S. effort to launch a new offensive in November 1944, to close on the Rhine. That objective had not been reached when, on 16 December 1944, the German counteroffensive in the Ardennes area struck a lightly held sector and created a large bulge in the American line. Tenacious defense by U.S. combat units prevented the attack from attaining its first objective, the Meuse River. Prompt U.S. reaction reestablished contact with the

beleagured garrison at Bastogne, and after severe fighting in winter weather, erased German gains with an overall delay in Allied offensive operations of about six weeks. By early February 1945, the Western Front had stabilized on the German border-the "West Wall."

Early in February 1945, the Allies launched the offensive that would not end until the German surrender. Allied armies attacked across the front, with the main effort in the north, but there were major successes in every sector. The Rhine was bridged and Allied forces advanced to the Elbe in the north, as shown in Map 20, and linked up with Soviet forces.[7] On 7 May 1945, the German high command signed the Act of Surrender which brought an end to hostilities in Europe.

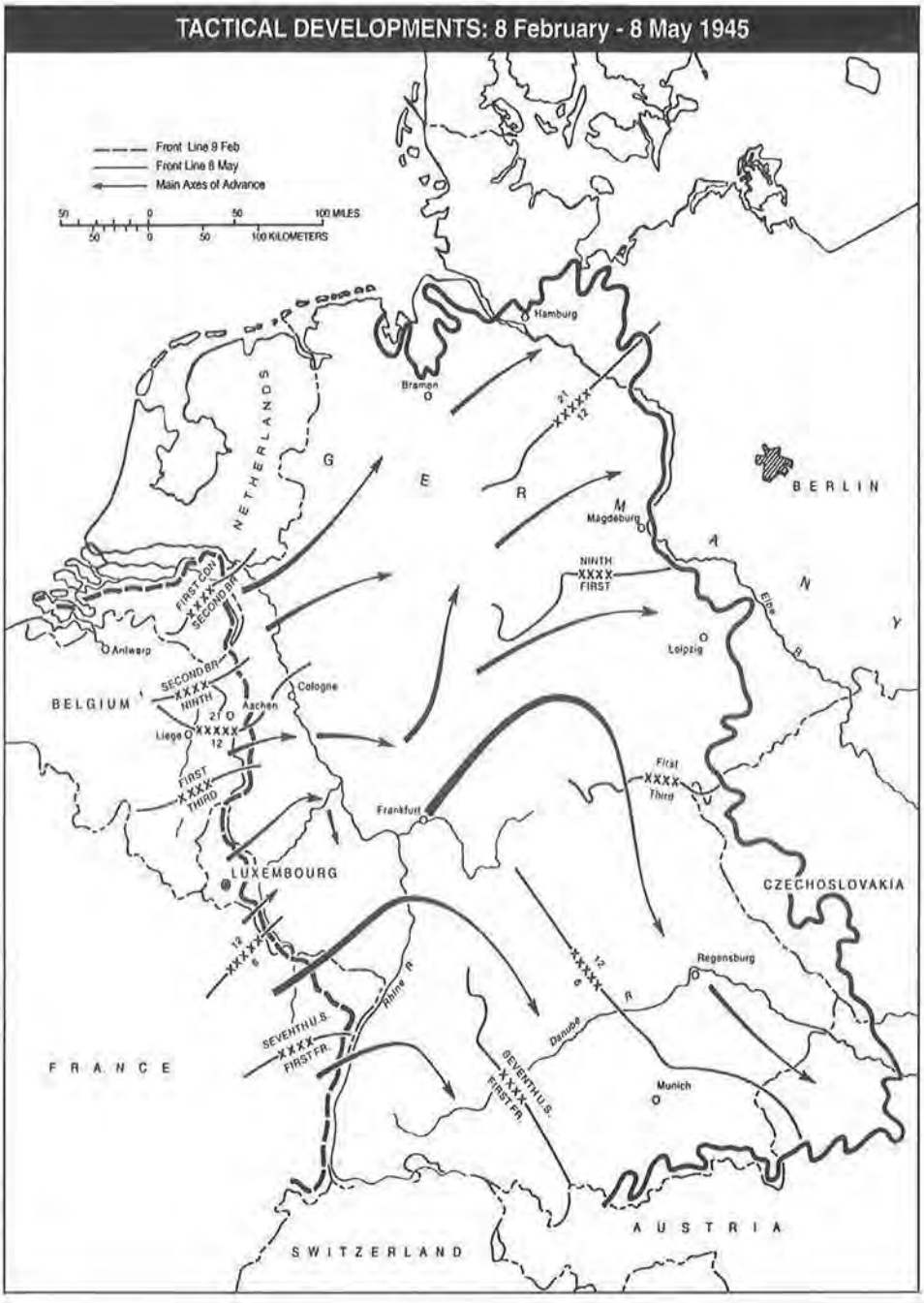
BUILD UP IN BRITAIN

The strategic position of Great Britain, only 35 miles from the mainland of Europe, made it a place of immense strategic importance. To U.S. strategists, it was clearly the most obvious place from which to launch an invasion of Nazi-occupied Europe. On 19 May 1941, the War Department created the Special Army Observer Group (SPOBS) under Maj. Gen. James E. Chaney and sent it to London to coordinate with the British.

Shortly after Pearl Harbor, Allied planners at the Arcadia Conference confirmed the general understanding reached before the United States entered the war, that Germany would be defeated first. On 8 January 1942, SPOBS was enlarged and redesignated U.S. Army Forces, British Isles (USAFBI). In March 1942, an embryonic quartermaster staff under the direction of Maj. Gen. John C. H. Lee was formed. On 24 May 1942, Lee became the head of the Services of Supply (SOS) of USAFBI, with Brig. Gen. Robert M. Littlejohn as Chief Quartermaster.

The issue of transportation was addressed even before the SOS was fully organized. United States troops began to arrive in Great Britain shortly after Pearl Harbor. The first group of 4,058 arrived in Belfast, Northern Ireland, on 26 January 1942, followed by 8,555 more on 19 February 1942. By the end of June 1942, 56,090 U.S. troops were in the British Isles.

The British, with over two years of wartime experience, realized that U.S. troops and equipment would soon become a burden on their already strained and damaged transportation network. They requested that USAFBI provide liaison personnel to coordinate U.S. forces transportation needs. General Cheney concurred, and the War Department assigned Col. (later Maj. Gen.) Frank S. Ross as the Chief of Transportation for USAFBI.


TACTICAL DEVELOPMENTS: 8 February - 8 May 1945
Front Line 9 Feb
Front Line 8 May
Main Axes of Advance
50 0 50 100 MILES
50 0 50 100 KILOMETERS
Hamburg
Bremen
NETHERLANDS
G E R M A N Y
BERLIN
Magdeburg
NINTH XXXX FIRST
Elbe R.
Leipzig
Antwerp
FIRST CDN XXX SECOND BR
SECOND BR XXXX NINTH
Cologne
Aachen
Liege
21 XXXXX 12
BELGIUM
FIRST XXXX THIRD
Frankfurt
First XXXX Third
LUXEMBOURG
CZECHOSLOVAKIA
12 XXXXX 6
Rhine R.
SEVENTH U.S. XXXX FIRST FR.
Danube R.
Regensburg
Munich
FRANCE
SWITZERLAND
AUSTRIA

Map 20

On 8 June 1942, USAFBI became The European Theater of Operations, United States Army (ETOUSA), the name it retained for the remainder of the war. On 24 June 1942, General Cheney was replaced by Maj. Gen. (later General of the Army) Dwight D. Eisenhower. General Lee remained chief of SOS, with Ross as his Chief of Transportation, and in the summer of 1942, they organized a series of five U.S. base sections in the British Isles, which are shown in the inset of Map 21.[8]

Base section commanders were responsible for nearly all SOS operations in their sections. In the beginning, many transportation activities were exempt from their control, but the commanders argued that they could not adequately control their sections unless they were responsible for all activities in those sections. General Lee concurred and eventually made base sections responsible for all SOS activities, including ports. Ross did not concur with this decision, because he felt it inserted an additional headquarters in the transportation chain of command and decentralized control of transportation resources, a situation that caused difficulties throughout the European theater.

On 11 June 1942, 135 officers reported for duty at the office of the Chief of Transportation (OCofT), ETOUSA, at No. 1 Great Cumberland Place, in London. Few realized the magnitude of the task that lay before them. Despite the fact that on 20 June 1942, Ross became a special staff officer to the CG, ETOUSA, and on 31 July 1942, the Transportation Corps became a separate branch, hardly anyone understood the duties and functions of the new branch. In the midst of changing headquarters and responsibilities, which were not yet defined, and with constantly shifting priorities, the transporters in London began planning the greatest amphibious movement of troops in the world's history.

In July 1942, Operation TORCH, the invasion of North Africa, brought BOLERO to an abrupt halt. This was proof indeed, of Moltke's dictum that "It is a delusion to believe that a plan of war may be laid for a long period. . .The first collision with the enemy changes the situation entirely. . ."[9]

The North African invasion reduced U.S. influx to Britain considerably. Whereas U.S. Army cargo discharged monthly in British ports during the first half of 1942 had risen to 279,092 tons per month, by March 1943, discharge fell to 65,767 tons. The reduction was accompanied by cuts in the transportation staff and loss of units in the United Kingdom like Third Port, and three port battalions which were sent to North Africa. Declining shipments also meant the remaining staffs and units in the British Isles were not overwhelmed by the workload, and augmentation was not necessary. The Transportation Corps gained considerable benefit from Operation TORCH. It was the first large scale

Map 21

embarkation and debarkation in the European theater, and both transportation units and staff personnel acquired valuable "hands on" experience.

In early 1943, BOLERO resumed as U.S. troops and equipment once again began to arrive in the U.K. in great numbers. British troops were pulled out of Southern England, which became the marshalling and training area for U.S.

forces. A planning staff was established for a possible invasion of Northwestern Europe in April 1943, but commitments in the Mediterranean and heavy shipping losses to U-Boats precluded any such possibility.

TRANSPORTATION IN GREAT BRITAIN

When Lt. Gen. Brehon Somervell, Chief of SOS, returned from a fact finding tour of Britiain in June of 1942, he reported that the greatest difficulties to be overcome in the U.K. were transportation and transportation-related issues.[10] Among them were labor for loading and unloading ships and trains, and transport of building materials for airfields and facilities. Somervell estimated that the Army would require somewhere between 90,000 and 200,000 laborers to accomplish the mission. A secondary problem was the reassembly of trucks shipped in knocked-down configuration. He also noted a number of other items, including landing craft which, while not critical in June 1942, soon would be.

When the United States entered the war, the transportation system in the U.K. was working at its limit. There were personnel shortages, due to the allocation of manpower to combat units. Railroads were running efficiently, but operating at maximum capacity. Some port facilities had been badly damaged by German bombing and not been repaired. To make matters worse, some British ports could only handle shallow draft vessels.

The British had two agencies managing their traffic with which US transportation personnel had to deal and from whom they would learn much. The first was the primary coordinating agency of the British Government, the British Ministry of War Transport (BMWT). Under its leader, Lord Leathers, the agency exercised control over shipping, ports, coastal and inland waterways, and inland transport, including the rail system. One of its most important elements was the Diversion Committee, which assigned the ships at sea to their destinations.

The second agency, the Movements Control Directorate of the Quarter-master-General of the British Army, more commonly known as "Q Movements," was military. This organization was headed by a director who operated through several key subordinates, one of whom controlled the movement of "stores" (freight in American parlance), while another controlled the movement of personnel. A movement control officer (MCO) was assigned to each of the British commands.

The MCO also operated through his subordinates. In the lowest echelon were the railway traffic officers (RTOs), who were stationed at all critical points of the railway. At the ports, movement control was in the hands of embarkation

commandants and staff officers. In addition, the Royal Air Force (RAF) had its own movement control agency, which coordinated with the Army Movements Control directorate. This organization was the model that the U.S. Transportation Corps adopted for its own. British transportation personnel, from the general officer level down to the noncommissioned officer level, were to be the mentors for the Transportation Corps.

From the beginning, U.S. organization mirrored that of the British and followed their procedures as closely as possible. But the objective was not to slavishly copy them. In fact, when the British recommended absorbing U.S. liaison personnel into their own system, Ross refused. He knew that the U.S. Army would require a functional Transportation Corps of its own, with procedures adjusted to U.S. needs when it landed in Europe.

The first U.S. Army Regional Transportation Office was established in Belfast on 14 July 1942. By mid-August 1942, an additional five were established. The regional offices paralleled the British Military Commands, rather than the structure of U.S. Base Sections. This was because the U.S. did not follow the British system in which movement control units came directly under the control of the Director of Movements in London. Instead, a transportation officer was placed on the special staff of each base section commander. By 1943, there were eight transportation regions and five base sections as shown in Map 21. Ross later recommended that the position of Regional Transportation Officer be dropped, since it only applied to the U.K. Both the British and the Americans found the system very workable. Ross' only complaint was that the British were too polite and did not put his men to work quickly enough.[11]

The first priority for General Ross and the Transportation Corps in the U.K. was, of course, the ports. The Army had to cope with both operational and labor problems, which included strikes, slow downs, and the habit of working only one or two hatches on a four or five hatch ship. Stevedores and crane operators took their "tea" breaks at different times, thereby lengthening the time it took to work a ship. British dockworkers were loath to use labor-saving devices like forklifts because they felt machinery meant a loss of jobs. In deference to the labor unions, British authorities were reluctant to allow U.S. personnel to unload cargo. While all of this was extremely frustrating to General Ross and his staff, it must be remembered that U.S. cargo amounted to less than 10 percent of total cargo delivered to British ports until the invasion. From the dockworkers' point of view, American cargo did not seem as important as the import of foodstuffs or other commodities destined for the civilian population.[12]

First American crew to operate a train in the UK.

Labor problems also included a shortage of port personnel, estimated in July 1943 to be approximately 850 men per port. Added to this was an equipment shortage, leading to the backlog of ships, which was especially noticeable in mid-1943, after the successful campaign in North Africa and the revitalization of the BOLERO plan. By August 1943, the British conceded that U.S. troops were necessary and General Ross requested an additional nine port battalions, bringing the number to fifteen, the quantity allocated by the British for U.S. BOLERO port operations.[13]

The movement of U.S. troops and cargo from the ports to their inland destinations was the responsibility of British railways, which had been under wartime controls since the beginning of the war. When U.S. troops began arriving in the U.K., they found the railways operating under severe handicaps. There were personnel shortages similar to those in the ports, due to the assignment of railway personnel to wartime duties. There was also a lack of railway equipment, which was due to combat losses at Dunkirk and overseas requirements in North Africa.

In addition, the existing equipment was suffering excessive wear and tear because of extremely heavy wartime traffic. Another problem that was not immediately evident was a limited capacity to move tanks, engineer equipment, and other bulky cargo, because of the small size of British rolling stock and clearance restrictions imposed by tunnels. At the beginning of the war, Britain had a total of 19,273 miles of track serviced by 19,463 locomotives, 1,241,711 freight cars, and 45,838 passenger cars, with a seating capacity of 2,655,000. On the basis of rolling stock to mileage, this was a very favorable ratio, but when compared to U.S. rolling stock, the picture was not very bright. The average British freight car, or "goods wagon," had a capacity of 6 tons, compared to 40-50 tons for an American box car.

However, the system was efficiently run and the Army did not try to set up the customary staging system for troops debarking in the British Isles. Because of the meticulous scheduling of trains, newly arrived troops were able to march directly from shipside to railway cars for the journey inland.[14] Despite the efficient running of the railways and the excellent coordination between the Transportation Corps and its British hosts, the shortage of equipment, especially locomotives, began to tell.

A requisition for 400 U.S. 2-8-0 steam locomotives, which were similar to British locomotives, and fifteen 0-6-0 switching locomotives was forwarded in mid-August 1942. In November 1942, the first locomotive arrived, but only 26 had arrived by December 1942, and, by early 1943, the situation was so critical

that the British were canceling 1,000 to 1,500 trains per week due to the lack of locomotives. General Lee pressured Washington to speed up delivery, and by May 1943 a total of 184 had been received.

These locomotives were U.S. Army property, but they were put in a stockpile under joint control. The British operated and maintained the locomotives, while the Chief of Transportation kept track of them. In 1944, as D-Day approached, the locomotives were returned to U.S. military control for use on the Continent. Other equipment lent to the British included 50, 0-6-0 locomotives for use in coal mines, 700 flat cars for moving large loads, 500 tank cars, and 42 refrigerator cars. All of this equipment was due for return on 14 day's notice.

The Transportation Corps performed no rail operations in the U.K. except at U.S. depots. This gave the Transportation Corps a chance to train some of its nonrailroad personnel in an easily controlled environment, and develop plans for operations on the Continent.

In the early stages of BOLERO, U.S. Forces in the U.K. made only limited use of motor vehicle transportation to save gasoline, oil, and tires. Safety also influenced the decision. British roads were narrow and winding with visibility severely limited by the hedges that flanked many of them. Training drivers to drive on the left, especially in blackout conditions, also proved difficult. However, when the shortage of railway engines compelled British authorities to cancel trains, trucks were needed to take up the slack. In mid-1943, operational control of motor transport vehicles was assigned to the Transportation Corps, and by March 1944, nearly one-third of cargo clearing U.K. ports was carried on American and U.S.-contracted civilian trucks.[15]

OUTLOADING FOR THE INVASION

During preparations for the assault on Europe, troops and equipment were concentrated according to a meticulous plan devised by the Build-up Control Organization (BUCO), which was formed in spring 1944, under the direction of the Allied Army, Navy, and Air Commanders in Chief. The BUCO controlled "the build up of personnel and vehicles and set priorities for their movement as desired by the tactical commands."[16] Movements were controlled by formal orders. Once Allied forces moved into their assembly areas, the massive task of loading the troops and equipment began.

To control the marshaling and embarking of troops, Embarkation Control (EMBARCO) was formed to coordinate the complex undertaking. The validity of outloading plans was assessed with a series of preinvasion exercises, the most

significant of which was called Harlequin. That exercise took place on 3 September 1943, under conditions that closely simulated those expected in the D-Day operation. Though primarily a British exercise, it also involved U.S. Army Transportation Corps officers and enlisted men, who participated in the activities in the assembly areas, transit areas, and embarkation points.[17]

The preloading of the actual invasion fleet began on 4 June 1944, and went smoothly with a total of 107,606 tons of cargo loaded by D-Day, 6 June 1944. However, once the invasion commenced, confusion in the ports mounted. From the outset, the ports suffered from a serious shortage of personnel and there were not enough vessels returning from the objective area to lift all the forces moving into the ports. Movement planning in the port of Southampton called for the planned return of 5 personnel ships, 12 motor transports (MT), and 21 landing ships tank (LST), lifting approximately 19,000 troops and 2,700 tons per day, but after the initial embarkation on D-Day, these goals were not met.[18]

The ports suffered from severe congestion and confusion, resulting in part from constantly changing loading priorities. The EMBARCO was unable to regulate this because the tactical commanders in Normandy had the authority to change the sequence of unit loads. Moreover, embarking unit commanders frequently ignored movement plans which called for support personnel to embark later, preferring instead to move their units as one body.

By 9 June 1944, EMBARCO was unable to furnish accurate information regarding the location of units. In an effort to clear the ports and get as many troops to Normandy as possible, BUCO directed ships to be loaded regardless of priority. If a unit was ready to depart, it was immediately loaded and shipped out. By 12 June 1944, as ports began to clear, and vessel turnaround times were reduced, EMBARCO and BUCO were able to regain control. Despite the early confusion and disorganization, 317,765 soldiers were moved to Normandy in June 1944, with another 466,568 in July. By December 1944, a total of 2 million had been shipped.[19]

In retrospect, embarkation difficulties resulted from a chronic shortage of motor transport vessels (MTV) and LSTs, insufficient loading personnel in the ports, and the fact that BUCO and EMBARCO lacked sufficient authority to take firm control of a situation, which was subject to a barrage of taskings from frontline commanders. Recommendations of the post-war review included attachment of movement control organizations to the highest tactical commander's staff to prevent conflicting load requests from disrupting plans.

INVASION OF THE CONTINENT

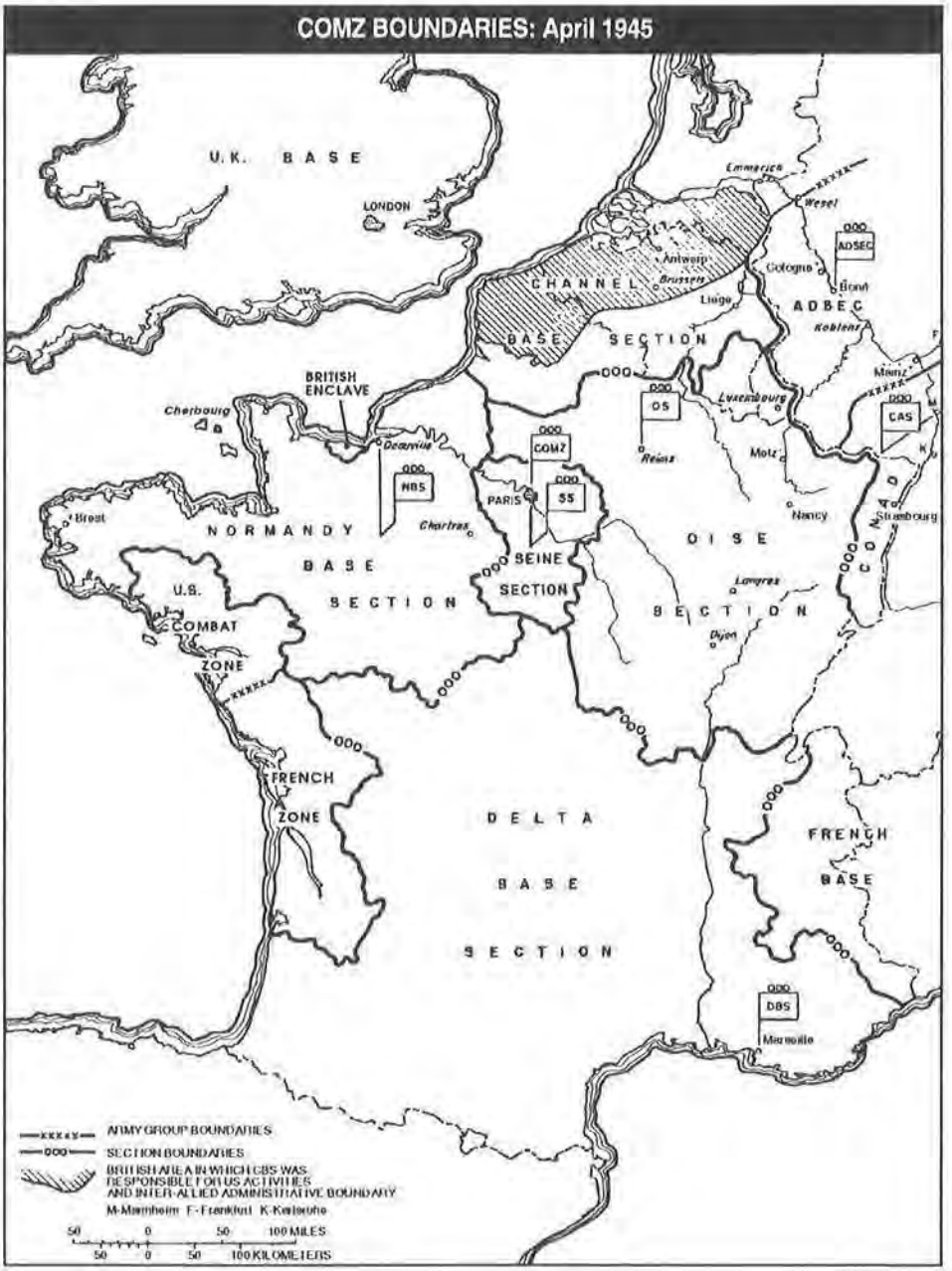
LOGISTICS ORGANIZATION

Logistical support on the Continent was managed by the Communications Zone (COMZ) behind field army rear boundaries, and by the Army G-4, and service chiefs in the combat zone. The COMZ managed most operations through subordinate sections, which were established as field army rear boundaries moved forward and COMZ areas of responsibility expanded. The number of sections depended on the volume of work, terrain, priority of supported combat effort, and similar factors. Selected intersectional services were commanded directly by COMZ. A Forward Echelon of the COMZ (FECOMZ) was supposed go to France in the early stages of the invasion, but was not sent because of the slow initial expansion of the lodgement area.

For the Normandy assault, forward elements of an advance section (ADSEC) were attached to First Army, some arriving as early as D plus 1. These forward elements worked closely with the G-4 staff and Engineer Special Brigades, which operated the beaches until the tactical situation permitted ADSEC and COMZ to assume control. The slow tactical advances in Normandy delayed the decision by First Army to designate an army rear boundary and initiate ADSEC operations. However, SHAEF HQ intervened, and on 1 August 1944, ADSEC took over what later became the Normandy Base Section. By 17 August 1944, COMZ HQ was established in Valognes (between Cherbourg and Carentan). Following the breakout, ADSEC moved forward to keep up with the swiftly advancing armies, and COMZ HQ moved to Paris. Additional sections were opened as the armies crossed France. By April 1945, the COMZ organization was deployed as shown in Map 22, COMZ Boundaries.[20]

On the Continent, the OCofT was organized substantially as it had been in England with Maj. Gen. Frank S. Ross as Chief of Transportation. The main operating sections were supply, movements, motor transport service, military railway service, and marine operations, which included inland waterways - later made a separate section. By this time, Ross had clear staff responsibility for motor transport operations in the COMZ, and quartermaster truck units carried the suffix "(TC)" in their designation. In addition, Ross had established a Motor Transport Brigade (MTB) in ADSEC, which was prepared to assume control of motor transport assets.

Anomalies persisted. The COMZ G-4, rather than the CofT, continued to control shipping and exercise important functions of movement control. In addition, the sections, particularly ADSEC, maintained operational control of


COMZ BOUNDARIES: April 1945
U.K. BASE
LONDON
CHANNEL
BASE SECTION
Antwerp
Brussels
Liege
Cologne
Bonn
Koblenz
Mainz
Emmerich
Wesel
ADSEC
ADBEC
BRITISH ENCLAVE
Cherbourg
Deauville
NBS
COMZ
PARIS
SS
OS
Reims
Luxembourg
Metz
Nancy
CAS
Strasbourg
NORMANDY BASE SECTION
Brest
Chartres
SEINE SECTION
OISE SECTION
Langres
Dijon
U.S. COMBAT ZONE
FRENCH ZONE
DELTA BASE SECTION
FRENCH BASE
DBS
Marseille
ARMY GROUP BOUNDARIES
SECTION BOUNDARIES
BRITISH AREA IN WHICH CBS WAS RESPONSIBLE FOR US ACTIVITIES AND INTER-ALLIED ADMINISTRATIVE BOUNDARY
M-Mannheim F-Frankfurt K-Karlsruhe
50 0 50 100 MILES
50 0 50 100 KILOMETERS

Map 22

many transportation assets, notably truck units. The semiautonomy of DRAGOON forces resulted in a transportation section and a military railway service supporting 6th Army Group that were not directly responsible to Maj. Gen. Ross. These inconsistencies were not finally remedied until February 1945, when all Transportation staff activities in the COMZ became the responsibility of Maj. Gen. Ross. The final wartime organization is shown in Chart 10: Organization of the Office of the Chief of Transportation, COMZ, ETOUSA: 1 April 1945.[21]

TRANSPORTATION OPERATIONS

THE IMPACT OF SHIPPING

In the pre-invasion period, plans and procedures drawn up in the United States and England by Transportation Corps personnel and others, helped the TC in the theater to react to changes and major challenges which developed during and after the assault. These included movement programs, special express supply support shipment procedures, and plans for alternative shipping programs. However, the problem of the marginal availability of sealift, exacerbated by slow discharge and ship turnaround, plagued the landings in France, and solutions eluded even the most prescient planners.

The dearth of landing craft was a particular problem for this assault because much of the shipping from England was scheduled for repetitive trips. Excessive delays disrupted supply and troop movement plans. Similarly, slow discharge of ships from the United States affected worldwide shipping commitments. Delays in discharge were due to cargo handling problems, and policy decisions to selectively discharge cargo from munitions carriers and other vessels, rather than fully discharging and then releasing them. Also, ships that were not designated as floating warehouses were used in that capacity, further reducing the number of ships available.[22]

THE BEACHES

For the Normandy assault, the two special engineer brigades at OMAHA Beach supporting V Corps were heavily reinforced by the direct attachment of port, truck, and amphibian truck units, totaling 6,300 troops. UTAH Beach was a smaller operation with proportionate transportation troops attached to the 1st Engineer Special Brigade supporting VII corps, whose mission was to capture Cherbourg. In addition, the 11th Port with about 8,600 troops commanded by Col. Richard S. Whitcomb, an experienced commander, was attached to the Provisional Engineer Special Brigade Group, which commanded the three

ORGANIZATION OF THE OFFICE OF THE CHIEF OF TRANSPORTATION, COMZONE, ETOUSA: 1 APRIL 1945

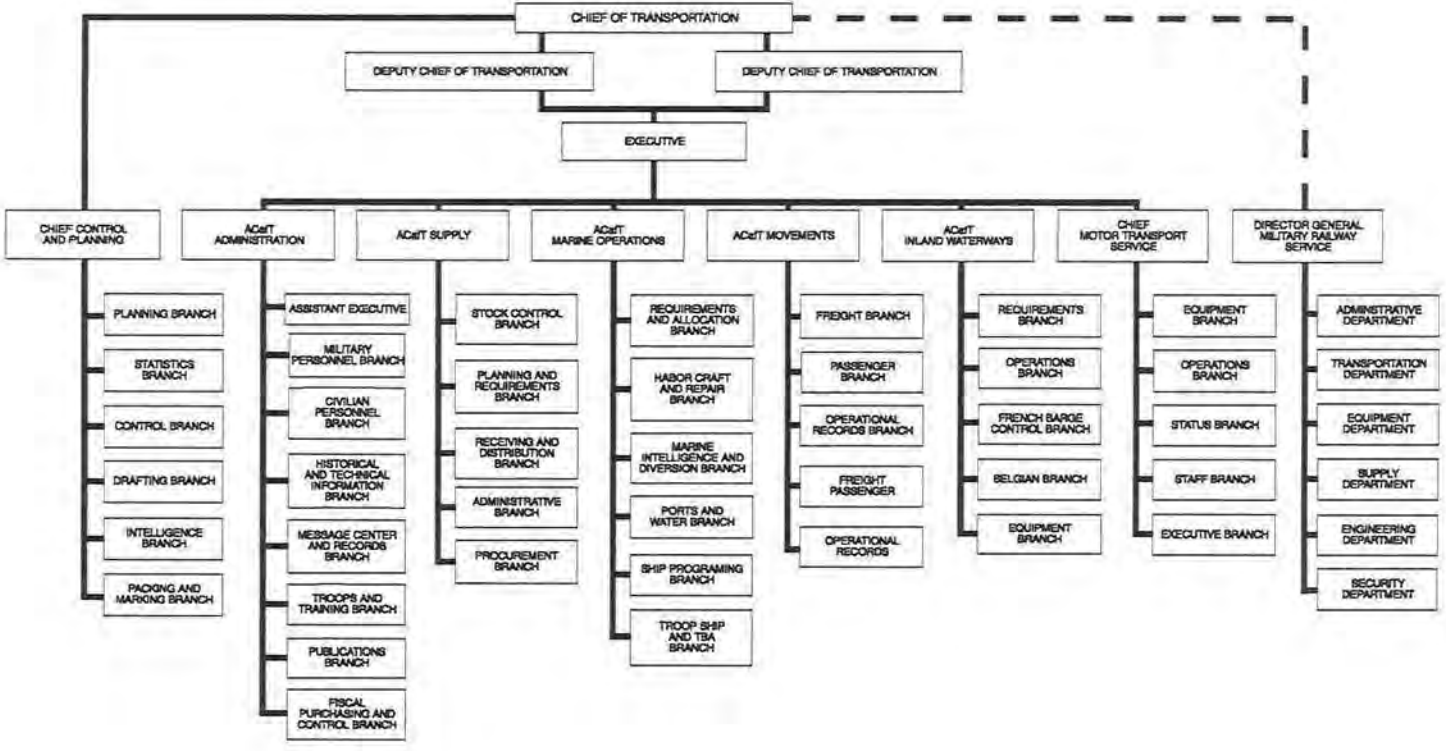


Chart 10

brigades. The 11th provided an advance party for the assault, and the entire unit arrived on D plus 10 to operate artificial harbors and breakwaters and small nearby ports as they became operational.

Almost from the beginning, transportation units participated in discharge operations. On both beaches, casualties and equipment damage from enemy fire and mines, and other obstacles, including debris from the landing, hampered initial operations. The experience of the 453d Amphibian Truck Company is typical. The company arrived on D-Day with its DUKW's, drivers, and assistants on an LST. The rest of the troops on a transport were offloaded to an LCI that was hit by enemy fire, killing six men during debarkation. The DUKW sections, which offloaded 10-14 miles from shore, lost 17 craft in landing through beach obstacles and wrecked landing craft. Thirty-six surviving vehicles delivered preloaded ammunition and began evacuating the wounded. From D-Day until 8 September 1944, the company worked 12-hour shifts around the clock, clearly demonstrating that DUKWs were invaluable to the success of the landing.

Port companies operated in a similar manner. They unloaded the vessels on which they arrived, moved ashore, set up a bivouac, and began working assigned vessels with the same shifts as the DUKWs. Quartermaster service companies generally performed cargo handling ashore. The challenges were vast, ranging from enemy fire to inadequate communications, to requirements for selective discharge to dig out priority cargo without proper documentation on location, which resulted in a major backlog of ships offshore. This, in turn, disrupted the turnaround schedules for reutilization of vessels to such an extent that priorities were abandoned on 9 June 1944. This decision resulted in low priority cargo usurping beach clearance and storage capability, so priorities had to be reinstituted.

As part of the beach operations plan, artificial harbors (codename MULBERRIES) were to be emplaced in the U.S. and British beach areas to bridge the gap between beach operations and the capture and rehabilitation of ports. From 19-21 June 1944, gale winds pounded the invasion coast, wrecking scores of craft and smashing the U.S. MULBERRY A off OMAHA Beach beyond repair. The British MULBERRY B was not as severely damaged. It was repaired and handled 48 percent of all British support tonnage for the next three months. The loss to planned U.S. discharge capability was severe, but was partially offset by improved beach operations and opening of minor ports.

In spite of the unimaginable challenges faced by U.S. beach parties exacerbated by the loss of MULBERRY A, beach operations were undeniably

successful. They demonstrated beyond a doubt that an invasion force could be supported in reasonably favorable weather, without large port facilities. The success of initial Normandy operations is evident from the supply buildup data in Chart 11.[23] Even though planned deliveries were not met, the landing of almost 290,000 long tons of supplies, and 71,000 vehicles in 25 days, was an unparalleled feat that reflected immense credit on the participants.

This achievement ensured the success of subsequent combat operations, and opened a new chapter in the projection of military power overseas. The invasion beaches remained in operation until late November 1944, when bad weather and high seas curtailed operations and ports were able to take over the load. During beach operations, some 1.265 million long tons of cargo were discharged at OMAHA and 726,000 at UTAH, plus thousands of personnel and vehicles.[24]

SUPPLY BUILD-UP OVER THE BEACHES: 6-30 JUNE 1944

DATE		SUPPLIES (Long Tons)			VEHICLES		
D Days	June	Planned	Actual	Percent of planned build-up achieved	Planned	Actual	Percent of planned build-up achieved
D Day	6	4,650	[a]	[a]	6,810	2,870	42.1
D + 10	16	128,750	88,045	68.4	52,606	34,549	65.7
D + 15	21	207,350	126,961	61.2	74,482	44,567	59.8
D + 20	26	289,950	203,719	70.3	95,170	58,612	61.6
D + 24	30	359,950	[b]289,827	80.5	109,921	70,910	64.5

[a] No record.
[b] Includes 4,558 long tons discharged at Isigny and Grandcamp ports.

Chart 11

THE PORTS

The ports in the theater were opened as quickly as they were captured and repaired. Openings fell into three phases. First was the capture of Cherbourg and the smaller ports in Normandy and Brittany, of which St. Michelle-en-Grève and Morlaix were the most important. The second phase consisted of the opening of Le Havre and other channel ports in the north and Marseille, which served the southern lines of communication. In the third phase, Antwerp and the

Belgian ports were opened. Except for most of the minor ports, all remained open throughout the campaign and were returned to national control after V-J Day. After the end of hostilities, the workload was transferred to German ports which served occupation forces.

Minor Normandy ports in the vicinity of landing beaches were opened and operated by the 11th Port. They were suitable mainly for coasters and had limited capacity, but were operated to the maximum permitted by the availability of shallow draft shipping and the weather. The coal port of Granville, which was opened by the 12th Port, provided additional port capacity through mid-1945. It was commanded by Col. August H. Schroeder. Minor Brittany ports were put into operation by the 16th Port and later replaced by the 5th Port, following the breakout when every ton discharged was needed to support the advancing armies. Priority for development was given to the major channel ports, therefore, the potential of Brittany ports was never realized. The major Brittany port of Brest was captured on 17 September 1944, but was so damaged it was not worth rehabilitating. The ports of Lorient and St. Nazaire were held by the Nazis for the remainder of the war as part of Hitler's plan to keep as many ports as possible out of the hands of the allies.[25] The minor ports made a substantial contribution during the period before major ports could be rehabilitated enough to cover the shortfall of support over the beaches.

Following its capture on June 27 1944, Cherbourg was the first major port opened by the 4th Port. It was commanded by Col. Cleland C. Sibley, until mid-September and then by Col. James A. Crothers. Damage was severe, but U.S. and British naval elements and the U.S. Army Engineers attacked the problem vigorously, using imaginative field expedients proven during prior campaigns. They employed French locals and German prisoners of war (POW) extensively for labor, and used captured supplies of cement and building materials to offset shortages caused by the inability to unload supplies from ships offshore. After setting up landing ramps made of debris, the port was ready on 16 July 1944, to receive four ships for lighterage discharge.

Initially, only DUKW and barges were available. Later, LCT and rhino barges, which were built of ponton units and powered by outboard motors, were used. The barges could carry heavy loads and discharge vehicles on almost any gradient. Eventually, harborcraft, cranes, and cargo handling equipment were brought in from the beaches or offshore. The rebuilding effort focused first on lighterage facilities because the construction program was only 75 percent completed by mid-September and only five of 28 planned deep water berths were operational. Berth reconstruction accelerated and as more alongside

Off-loading ships to railcars at Cherbourg Port

discharge space became available, port capacity increased markedly from about 32,000 long tons in July 1944, to a peak of 433,000 in November.

Thereafter, tonnage received averaged around 270,000 long tons, due to diversions to newly opened channel ports with their shorter line of communication. Cherbourg did remain an important port, particularly for ammunition, which was not moved through Antwerp because of attacks by V-1 and V-2 guided missiles. Cherbourg was also the terminal for rail equipment ferried on converted LST's and the seatrains *Lakehurst* and *Texas.* The port

discharged a total of about 2.7 million long tons from its opening until 8 May 1945, a feat exceeded only by Marseille.[26]

The port of Le Havre, which also suffered heavy damage, was operated by the 16th Port and initiated over-the-beach discharge on 2 October 1944. Rehabilitation progressed rapidly and discharge increased commensurably. Le Havre was especially valuable during the German counteroffensive in December 1944, by rushing ammunition to beleaguered U.S. troops. It also became the principal troop debarkation point for the ETO, and as a corollary, a major embarkation point following V-E Day for redeploying forces. About 1.2 million long tons were discharged and over a million passengers were debarked by 8 May 1945.

Up the Seine River from Le Havre, the port of Rouen was operated by the 11th Port and was initially restricted to shallow draft vessels. However, as rebuilding progressed, deep draft berths were made available and by the end of the war, Rouen had discharged about the same tonnage as Le Havre, although it was a secondary passenger terminal. At its peak in March 1945, Rouen received nearly 9,000 U.S. troops, 5,000 French civilians, and 9,000 POWs.[27]

The southern port of Marseille was unique in that it became operational ahead of schedule and discharged the most cargo of any of the ETO ports - 4.1 million long tons, as well as almost a million passengers during its relatively long wartime period of operation.

In spite of Marseille's quantitative record, Antwerp was the crown jewel of ETO military ports. Because of its location and immense capacity, Antwerp was able to support both U.S. and British requirements. Its capture, in relatively undamaged condition, was one of the most fortuitous developments of the war, and both U.S. and British forces cooperated in its rehabilitation. The size of the installation was indicated by the fact that in negotiating joint use, the United States was assured of the availability of 62 working deep-draft berths, as well as the joint use of outer harbor berths, inner basins, and other ancillary facilities. The British were responsible for local administration, with a British naval officer in overall command of the port. It was estimated that the Americans would move 22,500 tons a day, other than petroleum, oil and lubricants (POL), from the port. The 13th Port, which previously operated the port of Plymouth, in England, initially commanded U.S. operations and was later supplemented by the 5th Port.

The first vessel to be unloaded carried the 268th Port Company with its equipment, and began discharge on 28 November 1944. By mid-December 1944, full scale operation of the port was attained and discharge exceeded port clearance capacity. Buzz bombs, V-2 rockets, and air attacks interrupted, but

Discharging ammunition directly from ship to railcar.

did not stop operations. However, these attacks did cause high level concerns and pressure on the ETO to develop other continental ports continued.

Port operations were also interrupted by the German counteroffensive of December 1944, which threatened outlying depots, particularly Liege. The unwillingness to ship cargo to areas threatened by German forces backed up shipments at the port and created congestion of storage areas. United States personnel were detailed as guards to provide sentries for the port, and anti-sabotage security. Labor was diverted to ship winter supplies and selected defensive items to the front. By V-E Day, Antwerp was the principal cargo port in the theater and through October of 1946, continued receiving supplies for occupation forces and outloading materials deploying to the Pacific or retrograding to the United States.

The Belgian Port of Ghent was also a joint U.S./British operation established as a standby for Antwerp, with the 17th Port commanding U.S. activities. After dredging the harbor and other rehabilitation, Ghent handled substantial American tonnage, discharging almost 800,000 long tons by the end of May 1945. At that time, the 13th Port at Antwerp assumed responsibility and the 17th moved to Bremerhaven, which was developed as the supply port for U.S. occupation forces.[28]

The operation of most ETO ports was hampered by delays in their capture and extensive damage and destruction that took immense effort and time to fix. Once operational, the ports had to cope with insufficient troop units and equipment in the force structure, poor weather, backlogs of shipping that had to be worked off as quickly as possible, and frequent inadequacies in port clearance. Notwithstanding these challenges, TC units displayed initiative, industry, tenacity, and imagination in meeting goals, eliminating backlogs, and forwarding needed resources to the supported troops. In roughly eleven months, they discharged 15 million long tons of cargo and debarked 3.7 million passengers. Ports were a principal cog in the logistic support gear that helped drive the ETO machine to victory.[29]

MOTOR TRANSPORT OPERATIONS

Transportation planners preparing for OVERLORD understood the truck would be the workhorse of the theater land transportation system by carrying a higher proportion of the logistical burden than in any other theater. There were clear needs for myriad "short haul" requirements in beach, port, and depot complexes. There was also an obvious requirement to move supplies from the ports all the way to army depots and supply points early in the campaign. As soon as the railheads became operational, truck units would move supplies forward; however, due to severe damage to the rail infrastructure, trucks would have to meet long haul needs until the rail system was repaired. The greatest challenge transportation planners faced was convincing the theater staff that the theater would need a large number of truck units. With only limited data available for planned deployment of combat forces, drastic shortages of sealift, competing tactical and other combat support claimants, and War Department constraints, the TC faced an uphill battle. The TC estimate of 240 truck companies was reduced to 160 on the theater-approved troop list.

Maj. Gen. Ross continued to lobby vigorously for additional units, but without success. In August 1943, he requisitioned heavy trucks, tractors, and trailers in lieu of 2 1/2 ton trucks, to increase unit productivity. Ross also

requested two drivers per vehicle, to allow round-the-clock operations. The War Department provided substitutes for the heavy trucks requested, but few arrived before D-Day. Nevertheless, in the later stages of the war, these trucks proved their immense value.

The War Department also approved authorization for extra drivers at the last minute. The requirement for the extra driver was partially filled by a draft on other COMZ units, which did not transfer their best soldiers. Fourteen quartermaster truck companies were used to provide their personnel and equipment resources throughout the COMZ. First, the truck assets from these companies were transferred to two Engineer general service regiments augmenting their organic truck transport to form truck companies. Then, the drivers from the companies were assigned to existing truck companies to provide the extra drivers in those units. By D-Day, in spite of these actions, in Maj. Gen. Ross' view motor transportation was the least satisfactory mode of the transportation function. The Advance Section (ADSEC) hoped to offset the shortage of trucks to a degree by forming a Motor Transport Brigade (MTB) (Prov), which would reduce the waste of resources by central management of all truck assets. The brigade was initially tasked to perform clearance hauls, assist the armies in the beachhead and lodgement areas, and then to move forward to support the advancing armies. Units performing truck tasks behind ADSEC would be assigned to newly established COMZ sections.[30]

At the two Normandy invasion beaches, truck companies landed shortly after the assault waves. Many trucks were swamped while debarking from LST that simply could not beach in shallow water. Other trucks were damaged by enemy ground fire and artillery fire, but truck units began operating at once. They discharged their prestowed loads, then moved cargo to beach dumps from landing craft, DUKW-to-truck transfer points, or from the backpile on the beach further inland, sometimes in gaps through minefields. Rain and mud gave a foretaste of the "real" Normandy and Brittany mud they would later encounter. Units sandbagged truck cab floors against landmines, but snipers took their toll for several days, and air attacks and artillery fire were a continuing hazard. The tonnage handled increased until more than 10,000 tons a day was cleared from each beach.

Units operated 24 hours a day through sand, sea, rain, and mud, leaving no time for satisfactory maintenance. Constant use, plus a shortage of spare parts, created a 40-50 percent deadline rate by Fall. This led to the pernicious practice of cannibalization to keep the remaining trucks running and further exacerbated the shortage of vehicles. This shortage required drastic measures to support the

armies in the breakout and pursuit of the Germans across France. Until then, truck assets were adequate for clearing beaches and ports, supporting depot hauls to ADSEC, hauling supplies to field army customers, and relocating stocks forward in the limited lodgement area.[31]

The ADSEC Motor Transport Brigade, with Col. Clarence B. Richmond commanding, landed in increments starting on D plus 3. The MTB assisted the Engineer Special Brigades and the 11th Port in organizing and managing vehicle operations. By 20 June, the MTB joined ADSEC HQ, where several Transportation Corps officers of the COMZ forward echelon Motor Transport Division (MTD) were temporarily attached to the brigade, with Col. Loren A. Ayers, MTD chief, assigned as deputy to Col. Richmond. In August of 1944, when the COMZ Chief of Transportation and staff arrived in Valognes, the MTD elements rejoined Maj. Gen. Ross and the division was redesignated the COMZ Motor Transport Service (MTS), with Col. Ayers as chief.

The Motor Transport Service was responsible for technical supervision of the 90 ADSEC quartermaster truck companies and their parent groups and battalions, but the ADSEC Motor Transport Brigade had operational control. The bulk of the units were assigned to the beach or port commands and dispatched from pools based on the priorities of the owning command. The remaining units were allocated for line-hauls to field army rear areas and assigned directly to the MTB. An increasing number were permanently committed to the line-haul POL fleet, which reached 14 companies by mid-November 1944. These consisted of 750 and 2,000 gallon tankers, and 2,000 gallon semi-trailers and cargo trucks for packaged POL. Rail bridges and other facilities west of the Seine were still under construction or rehabilitation.[32]

In August 1944, pursuit of the fleeing enemy and slow rehabilitation of the devastated rail net created a demand for large movements to support the First and Third Armies. In addition to these requirements, large numbers of trucks were needed to haul materials for pipeline construction, and the forward displacement of 100,000 tons of depot stocks to supply operations beyond the Seine, of which only 18,000 tons could be moved by rail. An express highway route was absolutely necessary. Prior to the invasion, TC planners attempted to organize and test a truck express system, but equipment and manpower were not available, so it had to be activated without a test.

In seeking a name for the new operation, COMZ turned to the railway parlance for fast "through freights," and named it "Red Ball Express." The concept for the operation was to give the Red Ball Express exclusive use of a one-way loop highway, draft all available motor transport, operate

Convoy assembly area on the Red Ball Express.

around-the-clock, and establish bivouac and maintenance areas. The concept also provided TC and Military Police traffic and vehicle control measures, as well as engineer, ordnance, signal, and medical participation.

The urgency to get tonnage forward left little time for planning. The MTS Chief Col. Ayers and Maj. Gordon K. Gravelle, COMZ HQ, developed a plan to assign 141 truck companies for the line of communication line hauls, except for five to make distribution from recently opened railheads in the Le Mans-Chartres area. Truck company allocations were filled from resources in the MTS and Normandy base section, and operations began immediately.

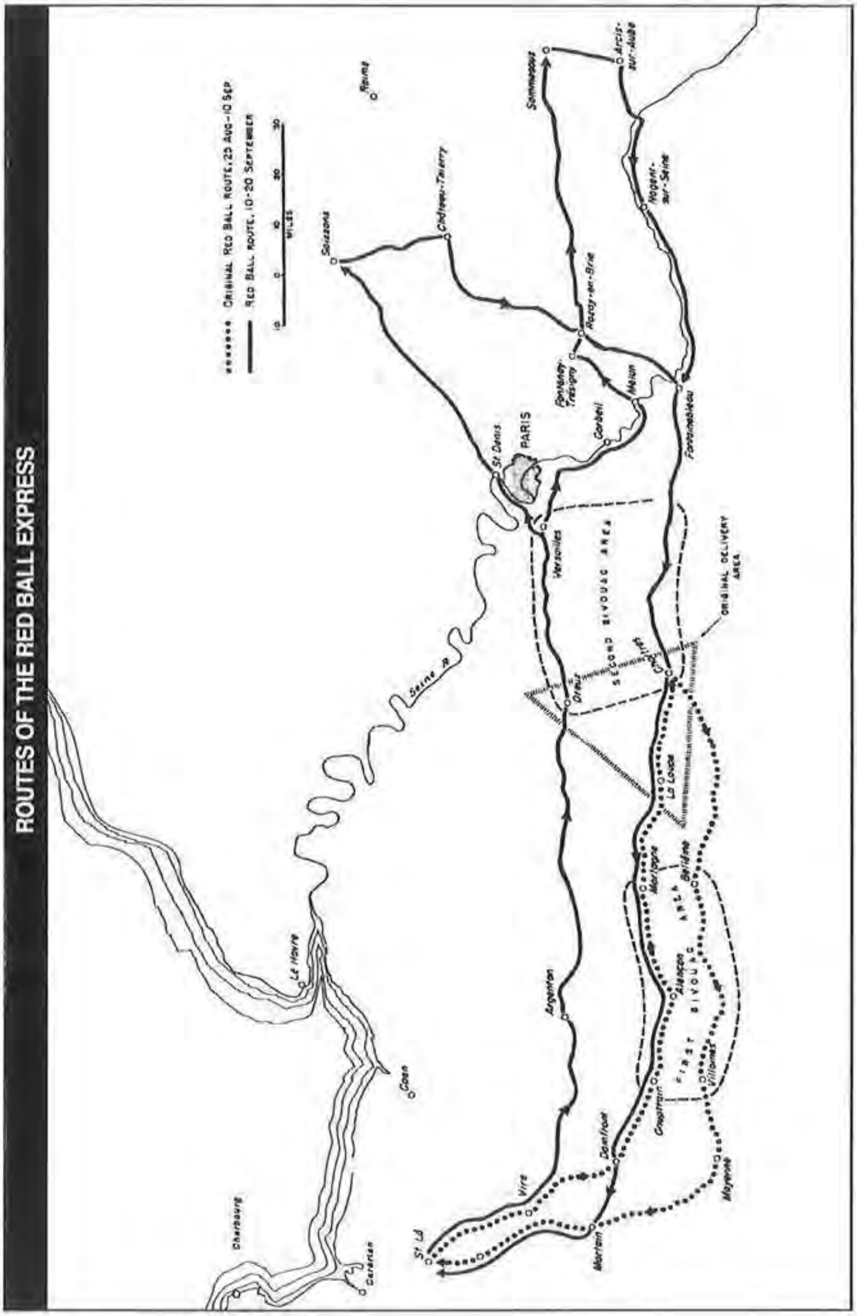
In order to build truck and driver strengths as rapidly as possible, the Motor Transport Service took unique courses of action. Two 45-ton tank transporter companies were converted to cargo carriers. Ten additional trucks were issued to each of 55 companies, and 1,400 replacements were assigned on temporary duty as drivers. Forty truck units were transferred from base sections to the Motor Transport Brigade, and base sections exercised stringent transportation economy by using organic vehicles of other service units for local hauls. Activity at ports and beaches was reduced and U.K. depots were directed to ship

only items for which there was an urgent need. Later, even more stringent actions were taken. Two general service engineer regiments were converted to seven truck companies each, and a smoke generator battalion was converted to a truck battalion. Ten truck companies were made from antiaircraft units. The most drastic step of all was the immobilization of three recently arrived infantry divisions, so 40 provisional truck companies could be activated from their personnel and organic vehicles plus 1,500 vehicles which the COMZ withdrew from stocks intended to equip other units. In the field army areas, similar measures were taken with engineer, artillery, and antiaircraft units operating as provisional truck units.[33]

Major General Ross continued efforts to get more truck units and to equip existing units with heavier equipment. Support from the War Department did not arrive until November 1944, when 690 tractors and 1,800 semitrailers were discharged at Marseille to reduce the workload in northern ports. The vehicles were integrated into line-haul operations by sending drivers to Marseille where they received an orientation and then drove the vehicles north. While these vehicles were valuable in the long term, they arrived too late to help the August shortages.[34]

The original and successor routes of the Red Ball Express are shown on Map 23.[35] Throughout its life, the Express faced a number of organizational and operational problems. Strict rules were set for operations, but enforcement was spotty. There were never enough MP's to police the routes. Convoys of First and Third Armies, and Ninth Air Force encroached on reserved roads and interfered with operations. Convoy discipline left much to be desired, because many drivers had little or no training. Low productivity resulted from slow loading and unloading, and underutilization of vehicle capacity. Both organic and higher echelon maintenance fell far short of standards. Also, field armies regularly diverted convoys to other than designated delivery points, some convoys traveling as far as 100 miles further than planned, which increased turnaround time up to 30 percent.

Much of the early confusion was due to the hasty organization of the project, inexperience at all operating levels, and a command structure that invited jurisdictional problems. Advance Section (ADSEC) had responsibility for the operation itself, but not all the territory the route covered. The route originated in Normandy Base Section, and transited other sections that were activated as ADSEC moved its rear boundary forward to keep up with the armies. Jurisdictional problems were not exclusive to the Red Ball and were not solved until ADSEC MTB was inactivated in October 1944 and its personnel


ROUTES OF THE RED BALL EXPRESS
ORIGINAL RED BALL ROUTE, 25 AUG–10 SEP
RED BALL ROUTE, 10–20 SEPTEMBER
MILES
Cherbourg
Carentan
St Lô
Vire
Mortain
Domfront
Mayenne
Caen
Le Havre
Argentan
Seine R
Couptrain
Villaines
Alençon
Mortagne
Bellême
La Loupe
FIRST BIVOUAC AREA
SECOND BIVOUAC AREA
ORIGINAL DELIVERY AREA
Chartres
Dreux
Versailles
St Denis
PARIS
Corbeil
Melun
Fontenay-Trésigny
Rozoy-en-Brie
Fontainebleau
Soissons
Château-Thierry
Reims
Sommesous
Arcis-sur-Aube
Nogent-sur-Seine

Map 23

Refueling dump on the Red Ball Express route.

integrated with the COMZ MTS. At that time, MTS was given technical supervision and operational control of those truck units assigned to the sections that were used on intersectional hauling missions.[36]

By the time Red Ball was scheduled to end on 5 September 1944, it had delivered 89,000 tons of cargo to the Dreux-Chartres delivery area, which exceeded it's original tasking. While the Red Ball was a TC operation, other services contributed greatly to its success. Military Police provided traffic control, the Corps of Engineer troops labeled routes and maintained roadways

and bridges, the Ordnance Corps provided road patrols and maintenance units at bivouac areas, and Signal Corps units furnished radio and courier services. Medical service units were responsible for ambulance service and set up aid stations along the route.

Tactical requirements dictated the Red Ball would not end on 5 September as planned, but instead continued without pause on routes extended to support both First and Third Armies. Round trip mileage was 686 miles on the northern route, and 590 miles on the southern. Reopening of rail lines east of Paris permitted truck to rail transfer in the Paris area and reduced forward hauling on the Red Ball by some 4,000 tons a day. Nevertheless, the need for truck augmentation continued and Red Ball was extended to operate through 16 November 1944. Some 412,000 long tons were carried throughout its 81 days of operation, an impressive record. However, for comparison, the XYZ operation, which operated east of the Rhine, hauled 630,000 tons from 25 March 1945 through V-E Day on 8 May. [37]

There is no doubt that centralized control of truck resources, epitomized by the Red Ball, was essential to support the pursuit across France, and merits the praise it received, because of the way transporters overcame obstacles. However, the Red Ball Express was also an operation which should never have taken place. It occurred because of the failure of planners to provide an adequate number of truck units to the invading forces. That failure was especially surprising in view of experiences in North Africa and Italy. Even if the initial lodgement area was too small for the necessary number of companies, units could have been staged in England, ready for deployment when the breakout occurred. Neither could Red Ball be cited as a model operation of an express route. It was carried out at a considerable cost in terms of operator stress and fatigue, fostering malingering and causing accidents, as well as immeasurable negative physical effects on personnel. Inadequate management and maintenance caused serious deterioration of equipment from wear and tear to damage from neglect and abuse. The Red Ball Express also disrupted other operations, with the immobilization of three infantry divisions to provide provisional truck companies to the project. Lack of command and control also fostered black marketing along the route, as civilians were willing to pay high prices for goods unavailable in the shattered French economy.[38]

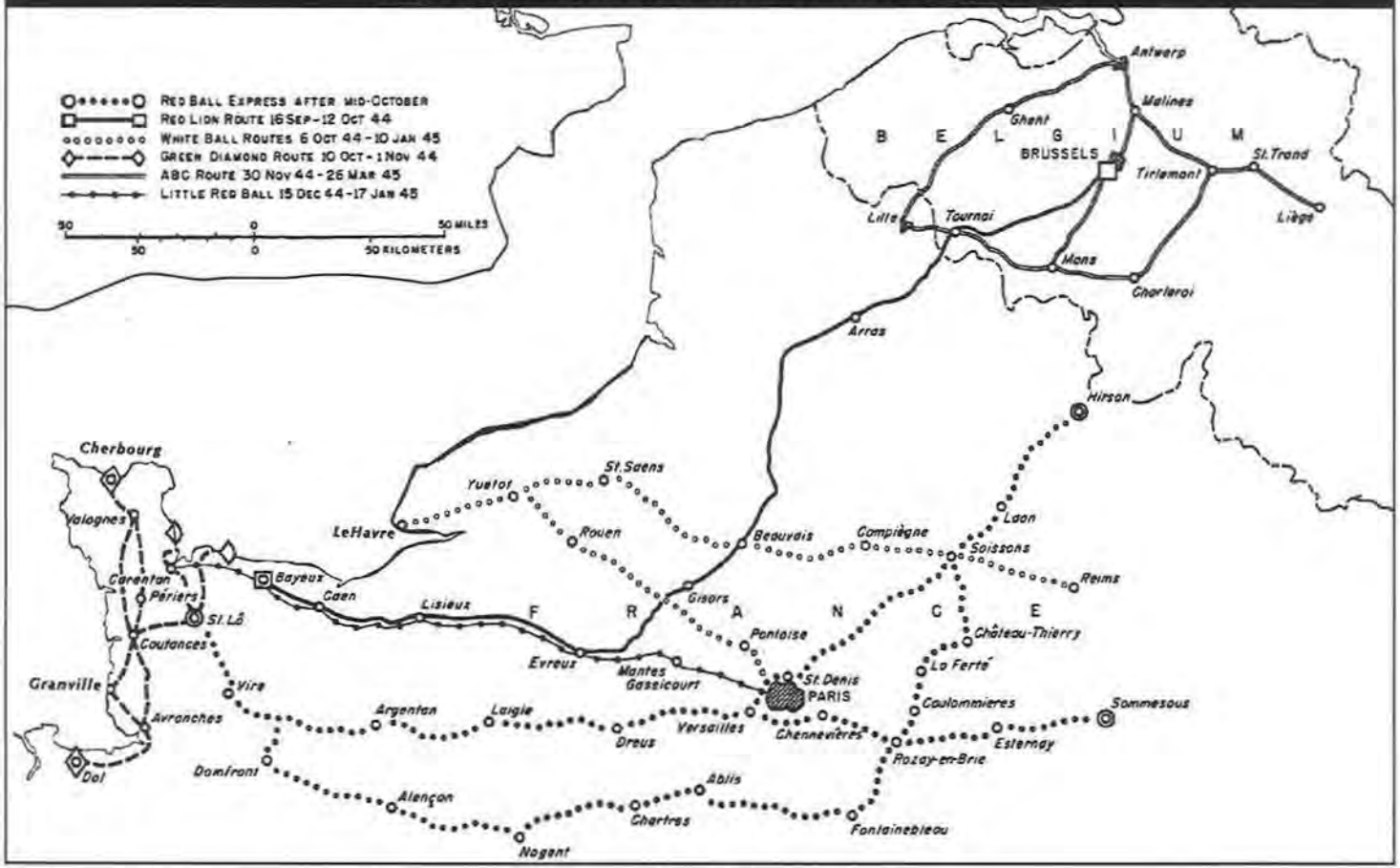
The continuing need to support the rapidly moving field armies and cope with the German counteroffensive generated requirements for more "color routes" to take up the slack. Main routes are shown on Map 24.[39] All highway express successors benefitted greatly from the Red Ball experience, especially

Vehicle recovery operations in France.

the improved procedures developed and implemented in the second phase. All of these had specialized missions, and with the exception of the ABC (America/Britain/Canada) route, were of relatively short duration. The ABC route was established to clear cargo from Antwerp to depots in the Liege-Mons-Charleroi area. It was an excellent example of a well run operation in the complex environment of operating jointly with other nations.[40]

Meanwhile, the MTS became better organized and more experienced. But efforts to establish a routine transportation system were shattered on 16 December 1944 when Hitler launched a surprise offensive through the Ardennes

HIGHWAY EXPRESS ROUTES: September 1944-February 1946



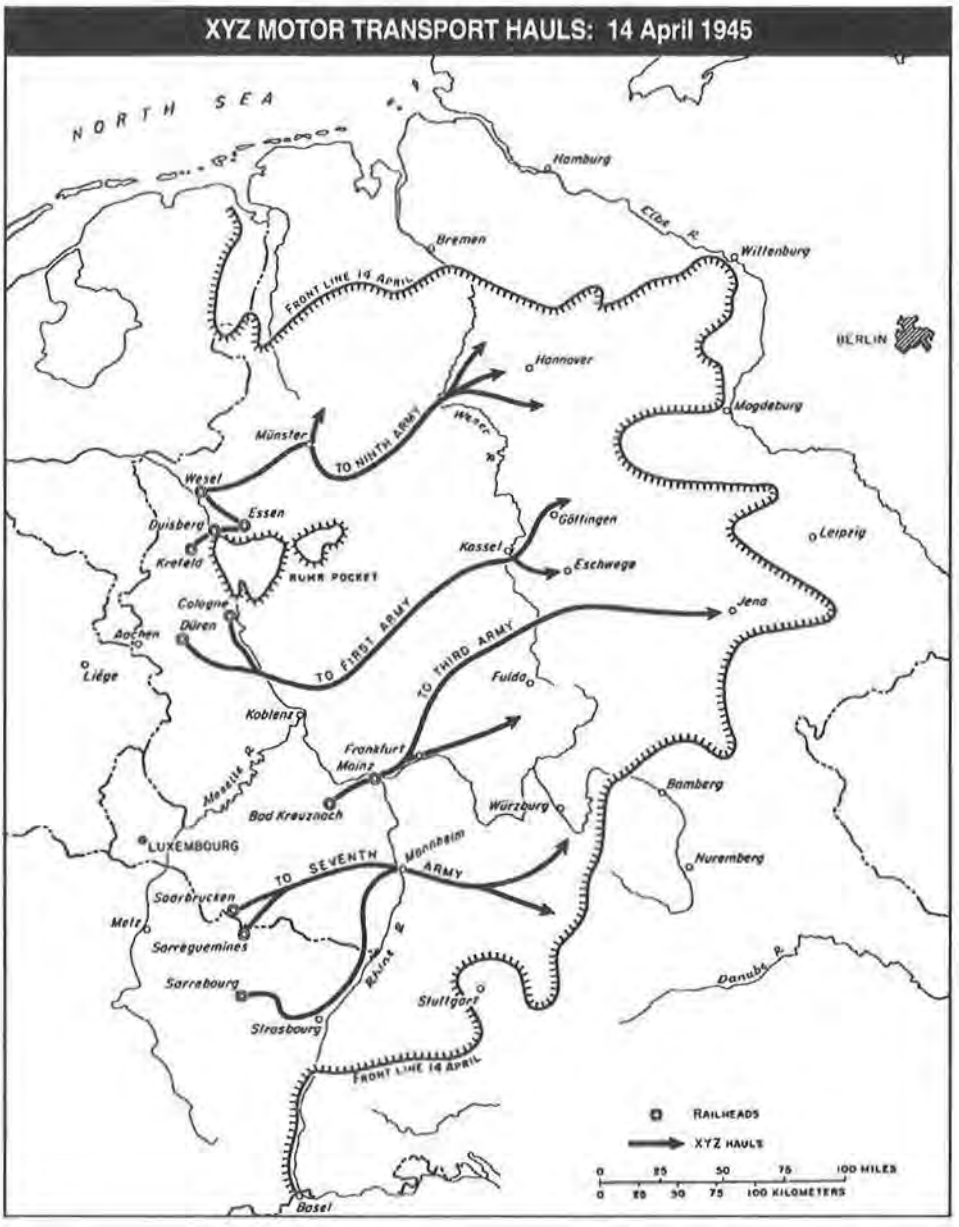
Map 24

and began the Battle of the Bulge. The MTS reacted quickly, developing contingency operations plans that were executed rapidly and effectively to help the armies cope with the Ardennes Campaign from 17 December 1944 to 16 January 1945. Motor Transport Service operations started with the marshalling of 600 trucks at Rheims. Within 13 hours, these vehicles were moving the 101st Airborne Division to Bastogne. Throughout the campaign, over 90,000 troops and one million tons of supplies were moved on TC trucks. Some truck units trapped in Bastogne fought alongside the infantry. They helped move troops in combat maneuvers, losing 50 trucks in the process. Twenty-eight men were killed, wounded, or listed as missing. Maj. Gen. Matthew B. Ridgeway, commanding the XVIII Airborne Corps in the Ardennes Campaign, wrote to Brig. Gen. C. O. Thrasher, commanding the Oise Section: "I should like you to know that all feel that the manner in which you picked up and delivered our two divisions into the battle area was just about the finest job of its kind we have ever seen. You should all. . .take deep satisfaction in a contribution. . .which time may show was of far greater scope than any of us now realize."[41]

By February 1945, transportation operations had become "routine" to the extent possible in the active wartime environment, but there were still unique challenges. One of these was the movement of landing craft (LCVP, LVT, and LCM) from ports to forward areas for crossing the Rhine River, the last water barrier to the heart of Germany. The MTS modified tank transporters to carry the landing craft and reconnoitered special routes for the moves. In the rush period from 11 February through 11 March 1945, MTS hauled tremendous tonnages - about 2.8 million tons of cargo and over one million passengers, principally to support the Rhine crossing.[42]

The last and greatest trucking operation in the theater was the XYZ operation. The operation was designed to execute three similarly lettered plans to move three levels of tonnage (8, 10 and 12,000 tons a day) forward to support four field armies' advances beyond the Rhine. The routes began at railheads near the western border of Germany, with the origin points leapfrogging forward as rail rehabilitation progressed, thus keeping truck hauls reasonably short as shown in Map 25.[43]

All truck units used in XYZ were assigned to the 6955th Headquarters and Headquarters Company of the MTS. Three provisional Highway Transport Division (HTD) headquarters were organized, and one Quartermaster group was directed to act as an HTD. Each HTD was designated as the central agency to manage transportation operations and be the sole authority for movement instructions for a field army. The 6956th supported Ninth Army with 15 truck



Map 25

companies, while the 6958 HTD supported First Army with 31 companies. The 6957th HTD supported Third Army with 62 companies, and the 469th QM Group supported Seventh Army with 20 companies.[44]

Detailed plans and procedures were developed for each level of operation, drawing heavily on the SOP of the successful ABC haul. Organization and

ABC Truck Route

control incorporated the experience gained in all prior express operations. Maintenance was heavily emphasized and the necessary resources were provided. Quartermaster elements managed supply aspects and operated marshalling yards. Other ancillary services were in support of or attached to the Motor Transport Service, as in the Red Ball. Truck units were equipped primarily with 10-ton trucks or tractor-semitrailers, with substantial numbers of tank trucks and semitrailers included. Operations were highly successful and thousands of tons of cargo, fuels, and passengers were transported. These operations also demonstrated the advantages of using central control organizations, such as the MTS and HTD, to exercise overall management.

Highway transportation played a vital role in the success of the campaign against Germany in northern Europe, as it did in the Mediterranean campaigns. Trucks took up the slack from initial delays in railroad rehabilitation and they responded to the crash requirements generated by the pursuit across France and Germany which seized objectives well ahead of OVERLORD forecasts. Truck units also allowed the U.S. Army to respond rapidly and decisively to Hitler's last offensive. The Transportation Corps conducted operations successfully in spite of serious cuts in the truck troop list by using provisional units, field expedients, and imaginative management. When Maj. Gen. Ross listed outstanding TC achievements of the war in Europe, highway operations got prominent billing, having overcome his early concerns about truck prospects.

RAILROAD OPERATIONS

The French railway system was similar in structure and operating procedures to most European systems. It had a closely knit network of some 26,000 miles of track, a quarter of which was double-tracked. The main lines led primarily from the industrial and agricultural areas to Paris, where it was operated by the *Societe de Chemins de Fer Nationale Francais (SCNF).*

The Germans kept up the lines they used for military support, but most equipment was old and not well maintained. The equipment also differed markedly from its American counterparts. Chain and hook fasteners were used to link cars instead of high pressure air couplers. The standard French freight car carried 20 tons rather than 50 tons. On double tracked lines, trains moved on the left rather than the right track.

Planning for rail operations on the Continent began in 1942, when joint planners established estimates for equipment required to augment captured stocks. Stockpiling in England began shortly thereafter and this laudable foresight was to stand the Allies in good stead as the French and German rail infrastructure was made operable. Rail operation planning reflected OVERLORD scenarios and visualized the following schedule:[45]

From D-Day to D plus 41, advance parties from the 2nd Military Railway Service (MRS) headquarters would reconnoiter and survey railroads, including port clearance lines. They also would provide work trains and crews to assist engineer and signal troops working to rehabilitate the lines. In this period, the advance party was to prepare operating plans.

On D plus 25, the ferrying of equipment from the United Kingdom would commence and on D plus 41, the 2d MRS HQ would be in France with one Railway Grand Division, two Railway Operating Battalions and two Railway

Shop Battalions. Rail operations would reach from Cherbourg to the vicinity of Carentan and be pushing southward.

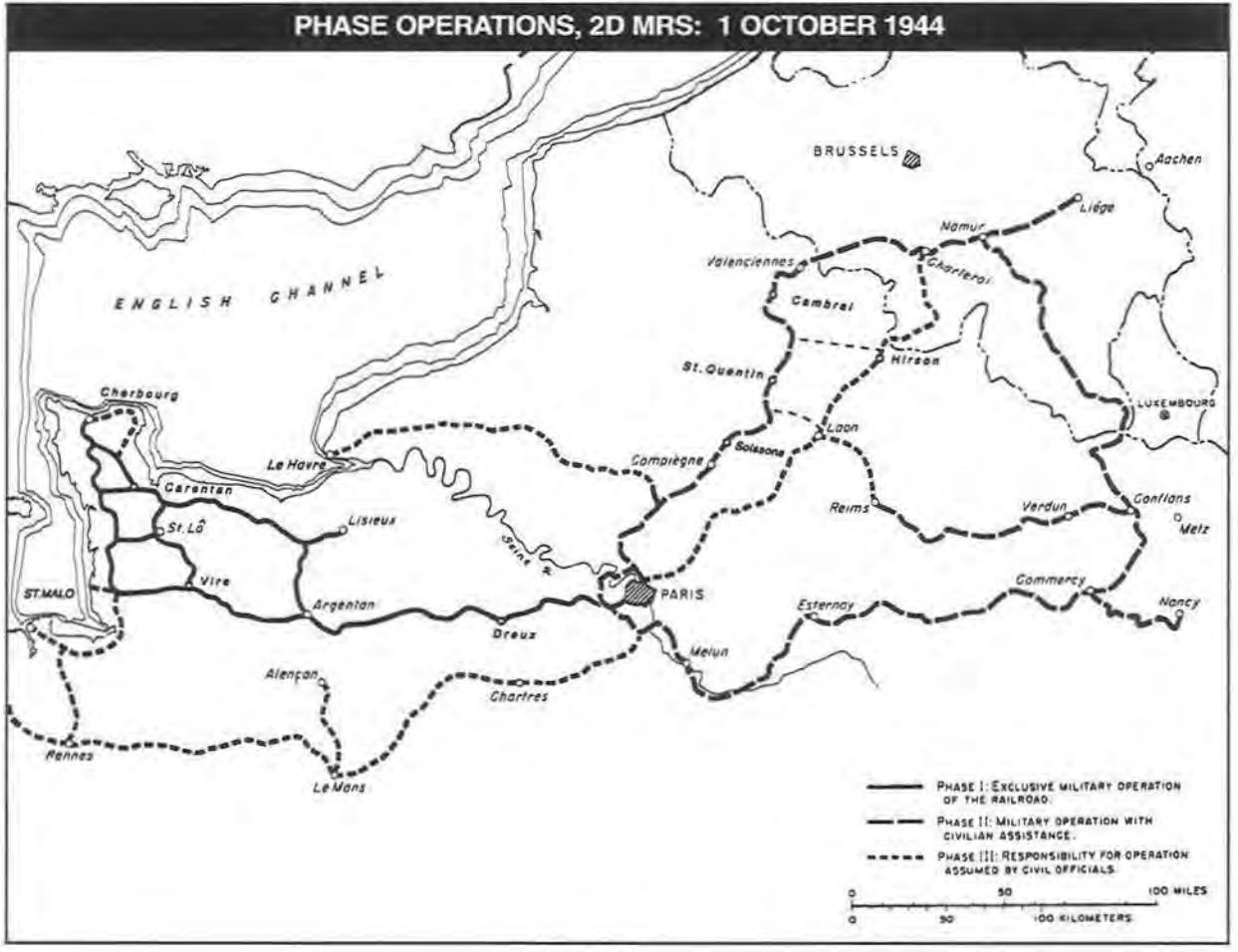
From D plus 90, operations would extend south to Le Mans and through the Brittany peninsula. Some 350 locomotives, 7,100 freight cars of all types, and six hospital trains would be available and in-service.

By D plus 120, the system would encompass mainly double track lines as far east as Dreux and Chartres with some of these lines transitioned to French operation under the U.S. military railway Phase I, II and III concept, which is shown in Map 26.[46]

Planned objectives were not met because of the delay in capturing Cherbourg, and fierce German resistance which limited the depth of the lodgement until the end of July. Only short rail hauls were possible and they were generally uneconomical because of multiple handling by trucks at origin and destination. Rehabilitation of rights-of-way and equipment in the lodgement area progressed as far as the tactical situation allowed, and by the end of July, some 126 miles of track were in operating order. By D plus 90, rail operations had expanded rapidly, reaching Rennes, Le Mans, and beyond. Thereafter, railroad rehabilitation could not keep pace with the rapid pursuit from the St Lo breakout, an event unforeseen in the OVERLORD plan. Neverthless, the plans identified the resources that enabled the MRS to reduce the quantities or distances of hauls on the highway express routes, and eventually catch up and surpass long haul truck capacities.

During the breakout, railroad movements were closely integrated with express highway hauls. For example, the first heavy rail traffic was over branch lines from Cherbourg to Le Mans, where Third Army trucks picked up the cargo. The lines east of Paris were not damaged as extensively as those in the west, and were put in operation rapidly. They were capable of moving much more than the railroads could bring to Paris. Red Ball trucks hauled about 4,000 tons per day to transfer points in the vicinity of Paris, where cargo was loaded on railcars and moved east.[47]

During this stage, every effort was made to turn over sections of the system to the SCNF. Military railway service troops released by SCNF operations were moved east to operate the expanding system. While the turnover of lines released railroad troops, their equipment did not always accompany them and SCNF officials did not always deliver locomotives and equipment or supply train services as requested by U.S. forces. Some 4,788 miles of track were under MRS operation by 1 October 1944.[48]


PHASE OPERATIONS, 2D MRS: 1 OCTOBER 1944
BRUSSELS
Aachen
Liége
Namur
Charleroi
Valenciennes
Cambrai
ENGLISH CHANNEL
St. Quentin
Hirson
Cherbourg
LUXEMBOURG
Laon
Soissons
Compiègne
Le Havre
Carentan
Reims
Verdun
Conflans
Metz
St. Lô
Lisieux
Seine R.
Vire
PARIS
Commercy
Nancy
ST.MALO
Argentan
Esternay
Dreux
Melun
Alençon
Chartres
Rennes
Le Mans
PHASE I: EXCLUSIVE MILITARY OPERATION OF THE RAILROAD.
PHASE II: MILITARY OPERATION WITH CIVILIAN ASSISTANCE.
PHASE III: RESPONSIBILITY FOR OPERATION ASSUMED BY CIVIL OFFICIALS.
0 50 100 MILES
0 50 100 KILOMETERS

Map 26

From October to December 1944, rehabilitation progressed well. Paris became an important transfer point from incoming rail lines to outgoing trucks and rail, while the railroads as a whole began to live up to their long haul promise. In October, 798 Army trainloads reached Paris from western ports, while 999 trainloads left for the north and east. By November 1944, a total of 23,000 tons of supplies per day were being moved by rail east of the Seine. Thereafter, more than half of the tonnage from rear areas moved by rail.[49]

This progress was achieved by untold blood, sweat, and tears by MRS, engineer, signal, other troops, and French railroaders. Intensive efforts were launched by Maj. Gen. Ross and his staff, as well as by other SHAEF staffs, to deliver to the Continent the troop units, equipment, and construction materials needed to do the job. By the end of 1944, 1,500 locomotives had been received from stocks in England, with an additional 800 captured engines that were repaired by U.S. and French mechanics. About 57,000 of all types of cars were put in service. Troops of the 740th Railway Operating Battalion of the 708th RGD operating in Belgium supported the U.S. First and Ninth Armies, running trains almost within sight of the enemy.[50]

In Southern France, the 1st Military Railway Service, which operated as an independent command under the MTOUSA commander, vigorously pushed its operations north. By mid-October, it was committed to moving 12,000 tons per day to forward railheads in the vicinity of Vesoul, supporting the Seventh U.S. and First French Armies on a 60/40 basis. By the end of the year, operations reached Sarreguemines, with an average of 557 rail cars a day received in army areas, while the SCNF was taking over sections of the operations as rapidly as possible. By then, the 1st MRS had about 4,000 miles of track under its jurisdiction, principally operating under Phase II conditions.[51]

Rail operations were highly responsive to requirements of the armies, but during the period of the German counteroffensive in December 1944 to January 1945, they suffered several setbacks. Extreme cold and heavy snows, excessive sickness among French employees, and shortages of coal created unacceptable backups of loaded cars. Strong controls over movement allocations, the initiation of the Green Diamond highway express route shown in Map 24, and better weather eventually brought the situation back to normal.

The German counteroffensive drastically slowed rail operations by disrupting movements in the forward areas. System tonnages were reduced from roughly 50,000 tons per day to 30,000. Approximately 35,000 cars were allowed to accumulate in forward areas to support contingencies for large-scale troop and supply evacuations. Unloadings were reduced by about 14,000 carloads due to

the German counteroffensive, and the effects on movement control and release of rolling stock in forward areas persisted through the end of hostilities.[52]

After the Allied repulse of the German counteroffensive, the armies prepared to cross the Rhine. In mid-February 1945, COMZ absorbed SOLOC (southern lines of communication), and SHAEF established the General Headquarters, (GHQ), Military Railway Service to direct the activities of the the 1st and 2d MRS. The GHQ was activated on 10 February 1945, with Brig. Gen. Carl R. Gray, Jr. commanding all MRS units. Gray was also responsible for planning, developing, and operating the railway system, as well as for stocking and distributing all U.S. rolling stock and other railway equipment. The appointment of Gray led to the attainment of the ongoing TC objective of making the rail system a true intersectional service. Railroad construction remained the responsibility of the Chief Engineer, COMZ.

The first major challenge facing the GHQ, its subordinate MRS organizations, and the engineers of the field army was to support the crossing of the Rhine. Then, GHQ had to provide for subsequent rail operations in support of the final campaign across Germany. Bridging the Rhine was one of the major engineering tasks of the war in Europe, on a par with the major rehabilitation of a large port. The task was thoroughly planned, and construction materials were carefully marshaled. Among the major engineer units staged for the operation was the 1056th Port Construction and Repair Group. On 8 April 1945, the 1056th completed the first rail bridge across the Rhine at Wesel after ten days of hard work. During April, other bridges were built at Mainz, Mannheim, and Karlsruhe. The 717th, 729th and 720th Railroad Operating Battalions were actively committed to assisting in bridge construction by transporting construction materials, laying connecting track, preparing adjoining yard facilities and turnouts for the bridge approaches, and the laying of rail on the bridges. By 18 April 1945, the railroads were hauling about 12,000 tons daily over the bridges, a tonnage equivalent to the theater highway hauls.[53]

As rail lines were pushed forward and railheads were established behind the advancing armies in Germany, serious car shortages developed. Field commanders insisted on using rail cars for mobile storage and only accepted selected cargo from cars which were unloaded. As railheads moved forward, thousands of loaded cars accumulated at railheads, draining France and Belgium of rolling stock and adversely affecting the civilian economy. Supreme Headquarters, Allied Expeditionary Force and subordinate headquarters issued warnings and directives to little avail. VE-Day solved what had become a severe problem for the MRS and COMZ sections, as well as Supreme Headquarters.[54]

From the Rhine crossing to the end of the war in Europe, rail was the principal hauler into Germany. Rail units handled 20-25,000 tons per day, which was three-quarters of the total forward tonnage. In addition to standard cargo hauls and personnel movements, the railroads operated scheduled express service runs, the most notable being the "Toot Sweet Express," which carried high priority freight and mail from Cherbourg via Paris to the forward areas.

The Chief of Transportation was also responsible for the operation and maintenance of hospital trains, which were built principally from British and French rolling stock. The quality of the coaches reflected the general standards of French railway equipment in the harsh wartime environment of 1944-1945. Lighting and heating were not adequate, and programs to provide more and better equipment were overtaken by the end of the war, by which time the 47 trains in operation were sufficient to meet evacuation requirements. The MRS also operated the popular "leave trains" that began in February of 1945 to transport soldiers to specified channel ports to be ferried to England for a week of sightseeing. Later, the program was expanded to the Riviera, Paris, and Brussels.[55]

At the end of the war, the GHQ and the 1st and 2d MRS had assigned or attached 7 Railway Grand Divisions; 24 Railway Operating Battalions; and 7 Railway Shop Battalions. In addition, there were assigned 8 battalions and 2 independent companies of military police; 2 base depot companies; and various small units, such as 10 hospital train maintenance detachments. These units made a major contribution to the success of the operations that ensured the victory in Europe.

INLAND WATERWAY OPERATIONS

In mid-1944, the COMZ Inland Waterways (IWW) Committee recommended river and canal barges be used to ease the burden on trucks and railroads. The IWW Division was formed in the Office of the Chief of Transportation and immediately coordinated closely with the engineers and civilian contractors who had begun reconstructing the waterways system. The division provided equipment for local bargemen and set up inland discharge points, principally on rivers and canals serving ports. By the end of 1944, most waterways in France were in limited use. The Oise and Seine Rivers were used the most to move urgently needed coal to Paris.

In Belgium, extensive barge operations were conducted on the Albert Canal from Antwerp to Liege. The canal remained active even when it froze, because improvised ice breakers were used to open the channel. From December 1944 through July 1945, about 1.2 million tons were moved by barge

in Belgium, and another 580,000 were moved in France. The Rhine River Branch of the IWW Division was established in April 1945, and the Danube River Branch at the end of May 1945. Both initiated action to recover and arrange for the repair of damaged barges, as well as the takeover of enemy river fleet equipment. Both branches also established operations that continued during the occupation through 1945, at which time the function reverted to civilian control.[56]

AIR TRANSPORT OPERATIONS

The Chief of Transportation had no direct control of air cargo and passenger operations which were under the purview of the Army Air Forces. For OVERLORD, as well as for subsequent operations on the Continent, SHAEF directed in April 1944 that the combined air transport operations room (CATOR) at Stanhope, England be designated as a special staff section of the AEAF, serving as the "regulating station" controlling all air-supply missions. The supreme commander determined allocations between emergency air supply and airborne operations, while SHAEF established procedures to submit bids for air movements.

Transportation planners and operators took advantage of airlift for emergency and other high priority requirements and used it as an adjunct to express services provided by truck and rail. Special shipping services were set up from Britain to move 600 tons of ammunition a day (GREENLIGHT) and 100 tons of any supplies by daily coaster to the Continent. In the first month following the assault, 40 supplemental ammunition shipments were made by air. Following the June 1944 storm that temporarily stopped port operations, 6,600 tons of supplies were flown from England in June and July. Army supply and transportation staffs interfaced with air staffs and bases to coordinate receipt and delivery of shipments in the COMZ and combat zone. The tonnage moved to the Continent clearly demonstrated the value of air shipments to meet emergencies and presaged their increased use. [57]

During the supply crisis that stemmed from the breakout, the extent to which airlift would be used for logistic and civilian support became a major issue. It escalated to SHAEF, army group, AEAF, and Allied airborne army levels. Those agencies made decisions on air support priorities, increased volume of airlift tonnage, took actions to refit bombers to be used as supply carriers, and provided additional base services to support airlift. United States and British air elements transported about 23,000 tons of supplies to Paris and the 12th and 21st Army Groups from 20 August to 16 September 1944.[58]

Airlift continued to be used extensively for emergency and priority support of operations east of the Rhine as troop carrier aircraft were committed to logistic airlift. Those shipments contributed strongly to the success of rapid advances such as Patton's push into Austria and Czechoslovakia, which severely extended Third Army's supply lines. Large quantities of POL, rations and critical supply classes II and IV items were supplied by air. Quantitatively, airlift did not approach the other modes, but the capability to meet emergencies was a service highly valued by the supported armies.

POL PIPELINE OPERATIONS

Engineer pipeline construction and operation had a major impact on the TC responsibility for the transport of POL by all modes and for development of movement programs. Combined Chiefs of Staff planners in England and the Chief of Engineers in the United States appreciated the immense volume of POL needed for operations on the Continent. Extensive plans were made for the construction of pipelines and priority was given to to the development of improved pipeline equipment to ensure bulk delivery of POL at the earliest possible time.

Other branches also had a direct interest in POL. The quartermaster was the responsible supply service for the commodity, while the Ordnance Corps was the designer of vehicles. The Army Air Forces consumed unimaginable quantities of aviation fuel. However, none of these agencies possessed the technical knowledge needed for supply requirements.

The G-4, ETOUSA established a POL Branch, staffed with officers who had served with big oil companies. Estimating requirements, they prepared detailed plans for operations through D plus 90, which centered on distributing bulk POL through a "minor" pipeline system serving the beaches and lodgement areas, and a "major" system, originating at Cherbourg and extending to the vicinity of Paris.[59]

After the assault, construction of the minor system went well and pipelines were extended to St. Lo and Carentan. By the end of July, the system was delivering about 12,000 barrels a day to QM depots, of which 9,500 were consumed by First Army. Construction of the major system was delayed by the late capture of Cherbourg; however, POL facilities outside the main port area were not damaged as badly as expected and rehabilitation and construction went well. But the system was not able to receive a product until six weeks behind the planned schedule. Reserves remained adequate because consumption was well below estimates. Pipelines were laid south within the lodgement area, but at the time of the breakout, bulk POL distribution was limited to the minor system.

Development of the major system proceeded apace, following the pursuing U.S. Armies. It linked up with the minor system at St. Lo and pushed vigorously ahead toward the Seine, with some 7,200 troops and 1,500 POW working on the lines and dispensing points. By mid-September, one line reached Dourdan, about 20 miles west of the Seine. Construction slowed because using scarce transportation resources to move pipeline materials had a much lower priority than hauling fuel and other supplies to the armies. When the crisis diminished, pipeline construction continued to follow the advancing armies, with the system west of the Rhine completed as shown on Map 27.[60]

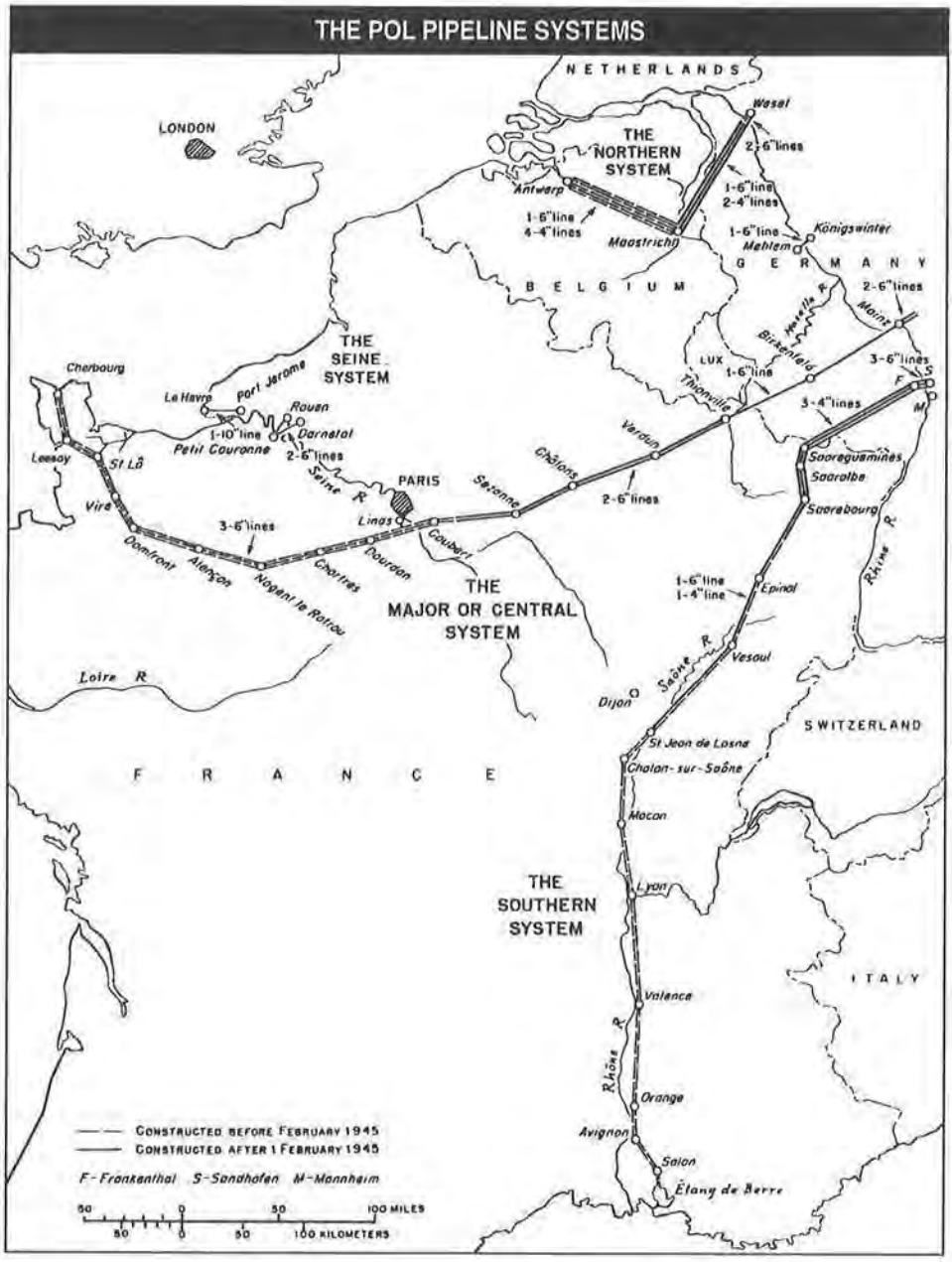
Without the pipelines, lift requirements for trucks and railroads would have been astronomical and probably could not have been met. Even with the pipelines and special POL express hauls, shortages were endemic in field armies for much of the war.

MOVEMENT CONTROL

United States movement control organization and procedures for operations BOLERO and OVERLORD were modeled on the British system. Movement policies and programs for the buildup were coordinated closely with British civilian and military officials to prevent disrupting their transportation system. The development and execution of movement programs were aided by the reliability of the British transportation network and traffic control system. Maj. Gen. Ross established in his Movements Division an Operational Branch that coordinated directly with British counterpart offices on movement control programs. Troop embarkation and planning, and transport of cargo to outloading ports in Britain were handled as separate functions.

The Chief of Transportation coordinated closely with the British to plan the combined assault, particularly in Northern France, Belgium, and Germany where the British 21st Army Group operated and controlled the areas in which many U.S. ports and depots were located. However, overall U.S. movement control on the Continent had to adjust to the absence of an American control system and a reliable transportation network. War damage to the Continental transportation infrastructure and the fluid tactical situation made it almost impossible to forecast capabilities accurately. A substitute plan had to be fashioned and emplaced for the destroyed or dispersed Continental movement and traffic control systems.

The Operational Branch addressed all aspects of movement control. It developed supply movement programs that identified total lift requirements and port throughput capabilities in Britain and on the Continent. It allocated the lift


THE POL PIPELINE SYSTEMS
NETHERLANDS
LONDON
Wesel
THE NORTHERN SYSTEM
2-6"lines
1-6"line 2-4"lines
Antwerp
1-6"line 4-4"lines
Maastricht
1-6"line Mehlem
Königswinter
GERMANY
BELGIUM
2-6"lines
Mainz
Moselle R.
Birkenfeld
LUX
1-6"line
Thionville
3-6"lines
3-4"lines
THE SEINE SYSTEM
Cherbourg
Le Havre
Port Jerome
Rouen
1-10"line
Petit Couronne
Darnetal
2-6"lines
Seine R.
Lessay
St Lô
Vire
PARIS
Sézanne
Chalons
Verdun
Sarreguemines
Sarralbe
Sarrebourg
Rhine R.
3-6"lines
Domfront
Alençon
Nogent le Rotrou
Chartres
Rouvray
Gaubert
Lisas
THE MAJOR OR CENTRAL SYSTEM
1-6"line 1-4"line
Epinal
Vesoul
Saône R.
Loire R.
Dijon
SWITZERLAND
St Jean de Losne
Chalon-sur-Saône
FRANCE
Mâcon
THE SOUTHERN SYSTEM
Lyon
ITALY
Valence
Rhône R.
Orange
Avignon
Salon
Etang de Berre
CONSTRUCTED BEFORE FEBRUARY 1945
CONSTRUCTED AFTER 1 FEBRUARY 1945
F-Frankenthal S-Sandhofen M-Mannheim
50 0 50 100 MILES
50 0 50 100 KILOMETERS

Map 27

by claimant/requestor for movements to and on the Continent and regulated traffic moving over LOC on the Continent.

The final OVERLORD programs for supply movements from Britain were in four phases. The first, from D-Day though D plus 8, involved the pre-stowage of balanced/mixed cargo with assault and follow-up units. The cargo was tactically loaded onto landing craft and Liberty ships fitted to handle vehicles, and onto coasters. In the second phase, from D plus 8 through D plus 21, sustaining stocks were moved in returning coasters, commodity loaded Liberties and other vessels. The third phase, from D plus 21 through D plus 41, involved movement of maintenance stocks in coasters and other craft from England, and others loaded in the United States, which were primarily prestowed or commodity loaded. Phase four, from D plus 41 through D plus 90, was the change over to primary support directly from the U.S. instead of cargo routed through or transshipped through the United Kingdom. In addition, the program included procedures for emergency shipments by express from Britain. The movement program established the baseline and framework on which movements from Britain were planned and adjusted. [61]

The Chief of Transportation planned to have his office develop and issue programs on the Continent, covering movements from the ports and depots to the field armies, and for large interdepot movements in the Communications Zone. However, the COMZ G-4 Section intervened by taking direct control of priorities, issuing movement orders, and delegating control to section commanders of all movements in their areas of responsibility. The CofT had "technical supervision" of the program, but in execution, that authority was defined in its narrowest sense. There was no effective coordination of movements in 1944 and as a result, many of the depots were swamped by shipments exceeding their receiving capabililty. In December of 1944, the G-4 and CofT agreed on the need for monthly movement programs developed by the TC and approved by the G-4.

The development of these monthly programs was supported by the success of the daily allocation programs developed to control use of Red Ball highway express lift. Later, the CofT was also given embargo authority to relieve congestion at depots. Unfortunately, the movement programs did not solve all the problems, particularly the accumulation of cars in the forward areas and other congestion that occurred in the closing days of the war. Nevertheless, the TC made great progress toward the objective of gaining complete control over military traffic. This experience was put to good use during the occupation and in the development of doctrine when the TC became a permanent branch.

TRAFFIC REGULATION

During planning, it was visualized that the Transportation Corps would be responsible for traffic regulation of movements in the COMZ after the field Army established a rear boundary. Control would first be exercised by the ADSEC Transportation Section. Then as elements of COMZ came in, and the army rear boundary was moved forward, sections would be added to command the additional territory with each transportation section controlling intrasectional movements. The COMZ Chief of Transportation would provide overall coordination and control intersectional movements.

Traffic was to be controlled by six traffic regulating groups assigned to sections, or the COMZ, depending on the nature of their employment. They were to establish control stations at railheads, truckheads, and other critical points on the lines of communications, operate classification and dispatch areas to ensure orderly movement, and prevent congestion. Another type of regulating station, not to be confused with traffic regulating units, also would be set up behind each field army area to control movements to and from the army area by setting priorities, and handling movement requests from combat units. Although doctrinally these stations were controlled by the theater commander, they were assigned to ADSEC.[62]

The execution of the traffic regulation function did not fully implement the above plan because of the extensive delegation of authority to section commanders. As an example, the Advance Section was assigned control of the entire Red Ball route, but in practice, delegated much of its responsibility to the rear section commanders.

The 24th and 25th regulating stations were assigned to ADSEC and operated behind the Third and First Armies respectively, controlling the flow of supplies throughout the war. During the long period of insufficient transportation, the units served more as expediting agencies to facilitate the movement of priority shipments. They also enforced priorities to prevent forward movement of unwanted shipments in an effort to reduce congestion.

The function of regulating highway traffic, which became critical because of the enormous numbers of vehicles on the roads, was fully exercised until about mid-August 1944 by U.S. First Army and ADSEC. After ADSEC moved east, the CofT Movements Division was given the responsibility for traffic regulation in areas behind ADSEC, including the issuance of movement instructions. This lasted for three months, then the new base sections, as they became fully staffed and trained, took over the function and traffic regulation

remained decentralized until VE-Day. Based on overall experience, decentralizing the regulation and control of highway traffic, with technical control by the Chief of Transportation, was considered the most efficient system for the operations on the Continent. [63]

TRANSPORTATION CORPS SUPPLY

Transportation items stored and issued on the Continent included marine and railroad items, with a backup depot in England. Resupply came from both the United States and England, which was also a source of local procurement. Equipment and stocks captured on the Continent were used to supplement other sources. Prior to the breakout, supplies were held in a dump behind Omaha Beach. Subsequently, eight depots were located to serve port and railroad customers, handling about 30,000 marine and 20,000 rail items. Stock control and requisitioning were managed by the COMZ CofT Supply Division. Substantial quantities of supplies and miscellaneous items, such as work clothing, were issued to Allied units and civilian agencies.

Transportation Corps Depot companies were plagued by shortages of technically experienced personnel, but learned by doing. For example, to support Rhine crossings, an emergency trucking service was established to support heavy rail and marine requirements. In the closing period of the war, depots were able to receive and store some 205,000 tons from April through June 1945. Following VE-Day, depots immediately became involved in redeploying materiel to the United States and the Pacific, as well as repositioning for operations during the occupation.

Supply operations were affected not only by a lack of trained troops, but also by the lack of standardized equipment. A worldwide shortage of repair parts, insufficient technical expertise and inadequate supply documentation to properly order and identify parts plagued the Transportation Corps throughout the war. Most of the problems were caused by the late entry of the TC into the supply business. The principal lesson learned was that the supply mission required clear definition and the allocation of sufficient resources to provide trained personnel and a fully developed supply management system.[64]

REDEPLOYMENT AND THE OCCUPATION OF GERMANY

After V-E Day, SHAEF directed the CofT to manage transportation activities in the U.S.-occupied areas of Germany. Part of the staff was shifted to Wiesbaden, then later to Frankfurt, while Maj. Gen. Ross divided his time

between Paris and Frankfurt. In addition to setting up the Army transportation system for Germany, General Ross' offices managed the redeployment of forces to the Pacific Theater, and coordinated closely with General Gross' staff in the Zone of the Interior on the retrograde movement of troops, units, supplies, equipment, and ammunition, and the transport of war brides back to the United States. Redeployment planning commenced during the last quarter of 1944. Following the German surrender on 7 May 1945, Redeployment Day (R-Day) was set as 12 May 1945. The most complex moves of unit personnel and equipment to the Pacific had priority, and usually required the unit to move on organic equipment to staging areas near ports to free rail equipment for the moves of troops deploying through or to the United States. The first troop ship sent directly from the ETO to the Pacific, the *Admiral C. F. Hughes,* sailed from Marseille on 16 June 1945, via the Panama Canal, with 4,832 service troops aboard, and arrived in Manila late in July. Direct redeployment ceased as soon as the Japanese surrendered. The redeployment fleet comprised about 400 ships ranging in size from converted Liberties to the *Queen Mary* and U.S. Navy combatant vessels, with a one-time lift capacity of about 575,000 troops. From R-Day through 27 October 1945, the theater outloaded 1,470,799 troops to the United States and about 117,000 to the Pacific. At the same time, almost half a million long tons of cargo were loaded for the Pacific, and about 850,000 long tons to the United States. General Ross said that his job in the ETO would not be finished until the bulk of the redeployment was accomplished. He attained that goal and on 26 February 1946, sailed for the U.S., closing a successful and colorful career as the Chief of Transportation, European Theater of Operations. He left capable subordinates to carry on the completion of redeployment, roll-up of equipment and supplies, movement of war brides to the United States and support of the occupying forces.[65]

CHAPTER IX

World War II Pacific Theater

"Difficulties of landing on beaches are serious, even when the invader has reached them; but difficulties of nourishing a lodgment when exposed to heavy attack by land, air, and sea are far greater."

Winston Churchill: Note to the Chiefs, 28 June 1940.

OVERVIEW

In the summer of 1941, as relations between the United States and Japan grew more tense, the War Department took steps to prepare for a possible war. In order to provide a single headquarters for the Pacific Area, it established U.S. Army Forces in the Far East (USAFFE) with its headquarters in Manila under the command of Lt. Gen.(later General of the Army) Douglas MacArthur. The efforts made to give the command real combat power were too little and too late. On 7 December 1941, Japanese carrier aircraft crippled the U.S. fleet in a surprise attack on Pearl Harbor and the Philippines, followed by landing on northern Luzon on 10 December. In a series of rapid thrusts, Japanese forces captured Malaya, Hong Kong, the Dutch East Indies, and most of New Guinea. The Philippines held out until May 1942. The Japanese also penetrated into the Indian Ocean and by the spring of 1942, it seemed that nothing could keep them from seizing Australia.

On orders from the War Department, General MacArthur left the Philippines on 17 March 1942 and flew to Australia. He set up headquarters in Melbourne, as Commander-in-Chief (CINC), Allied Forces in the Southwest Pacific Area (SWPA). The command took control of U.S. and Allied forces in Australia and New Zealand that were organizing for the defense of those nations, as well as U.S. and Allied forces fighting in the Philippines and New Guinea. A short time earlier, on 30 March 1942, Admiral Chester W. Nimitz was designated CINC, Allied Forces, Pacific Ocean Areas (POA) which included the North, Central, and South Pacific areas. There would be numerous changes in

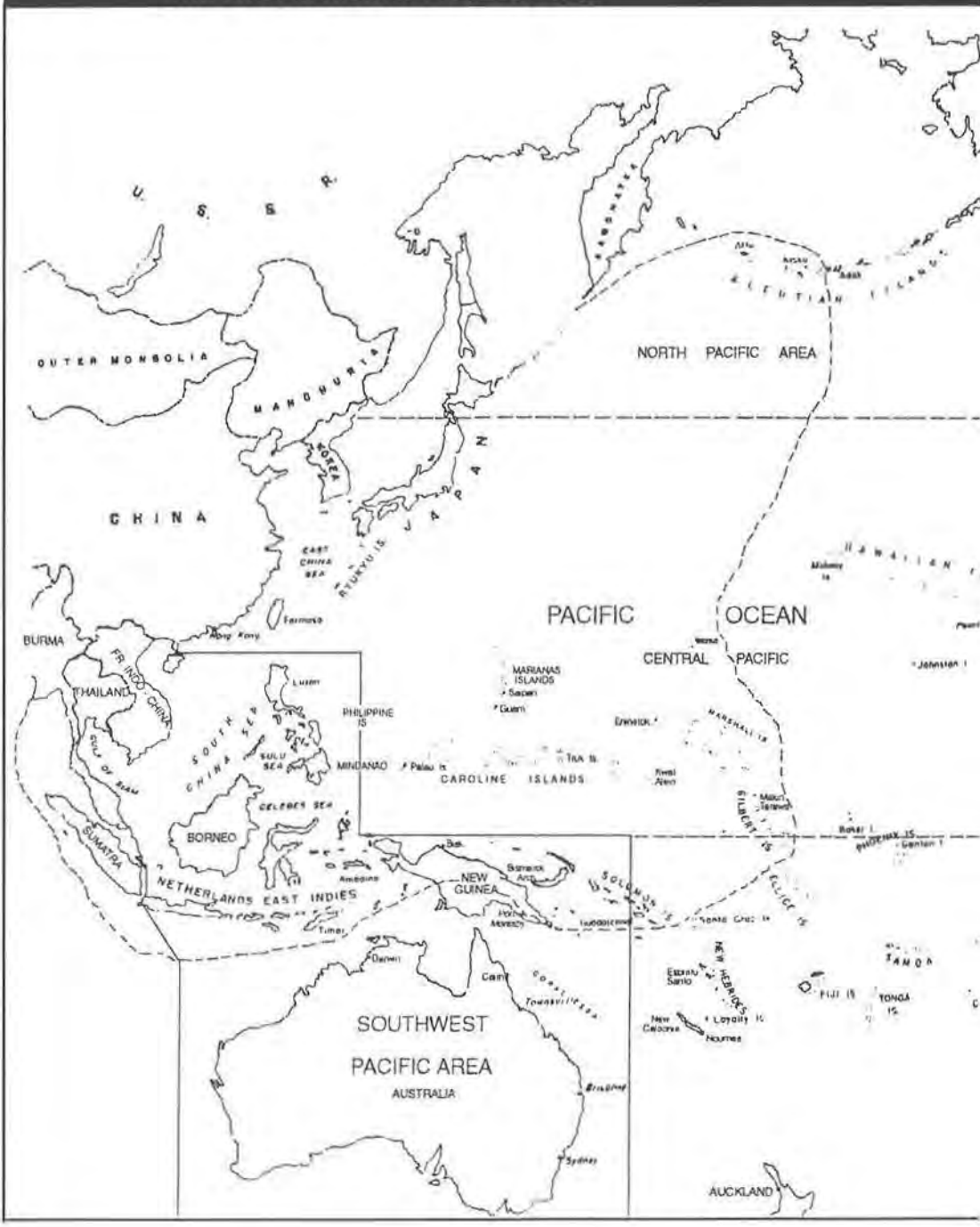
the internal structure of the two principal headquarters and temporary changes in boundaries to adjust to tactical operations, but the original commands remained basically unchanged until the theater reorganized for the final attack on the Japanese homeland, which was canceled when the Japanese surrendered. Map 28 shows the command boundaries and approximate limits of Japanese advance as of August 1942.[1]

In the Battle of the Coral Sea, south of the Solomon Islands, 4-8 May 1942, Japanese aggression in the South Pacific was temporarily checked by Allied naval and air forces, but it was not stopped. Japanese land forces captured and held bases in northern New Guinea and in adjacent islands suitable for land based air attacks on the U.S. supply line to Australia and Allied counteroffensives on New Guinea. In the Battle of Midway, 3-6 June 1942, U.S. Navy dive bombers sank four Japanese aircraft carriers, crippling the long range striking power of the Japanese fleet. The Japanese Navy would never again conduct operations away from the protection of land based airpower.[2]

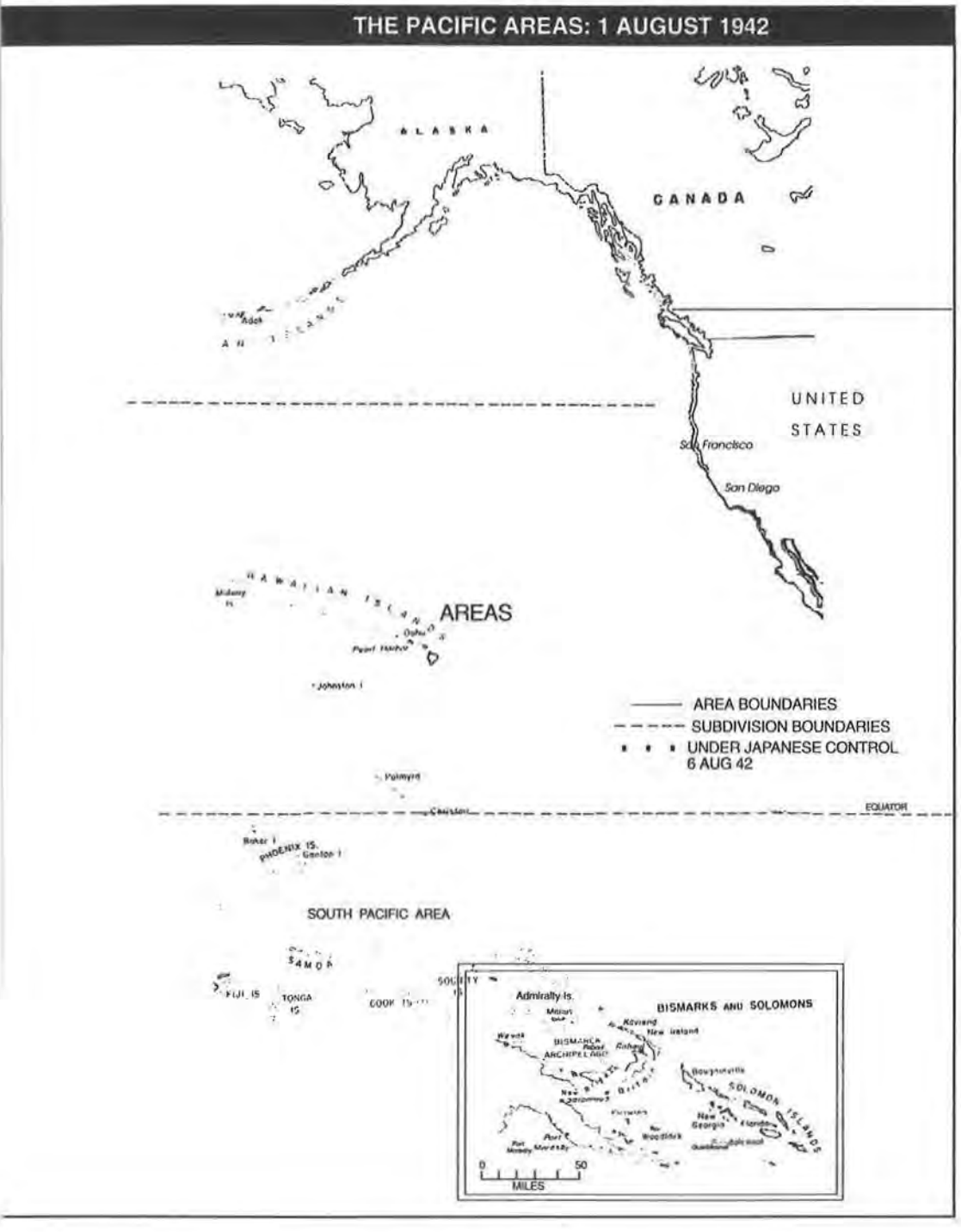
By August 1942, the Allies were ready to recapture territory from which the Japanese could directly threaten Allied territory and the LOC which supported that territory. The Allies first defeated the Japanese in a hard fought land-naval-air campaign for the island of Guadalcanal in the Solomons. A Marine/Army force operating under CINC POA invaded the island by amphibious assault on 7 August 1942, finally securing the island on 9 February 1943. From 28 September 1942 - 22 January 1943, MacArthur's forces took the offensive in New Guinea, ejecting the enemy from the area east of Salamaua and made amphibious landings on New Britain. Following the victory on Guadalcanal, Nimitz' forces captured the rest of the Solomon Islands by the end of December 1943.[3] These successes secured the LOC from the United States, protected Australia, and provided the bases for future operations in the Pacific.

Through 1944, both SWPA and POA forces attacked aggressively westward, while South Pacific Area (SPA) troops isolated and neutralized bypassed Japanese bases. In the SWPA, MacArthur's forces executed a series of amphibious landings along the northern coast of New Guinea and the Admiralties and by 15 September 1944, captured Morotai, off the eastern tip of the main island and on a direct line to Mindanao in the Philippines. In the POA, Nimitz' drive across the Pacific began in the Gilberts with costly assaults on Tarawa and Makin, seized the Marshalls by attacking Kwajelein and Enwietok in January and February 1944, bypassed the Carolines, and attacked the Marianas, including Saipan and Guam, and the Palaus from mid-June through mid-October 1944. On 19-20 June 1944, Admiral Nimitz' Fifth Fleet, under

THE PACIFIC AREAS: 1 AUGUST 1942



Map 28


THE PACIFIC AREAS: 1 AUGUST 1942
ALASKA
CANADA
UNITED
STATES
San Francisco
San Diego
HAWAIIAN ISLANDS
AREAS
Midway
Oahu
Pearl Harbor
Johnston I
Palmyra
Canton I
EQUATOR
Baker I
PHOENIX IS.
Gardner I
SOUTH PACIFIC AREA
SAMOA
FIJI IS
TONGA IS
COOK IS
SOCIETY IS
AREA BOUNDARIES
SUBDIVISION BOUNDARIES
UNDER JAPANESE CONTROL 6 AUG 42
Admiralty Is.
BISMARKS ANU SOLOMONS
Manus
Kavieng
New Ireland
Wewak
BISMARCK ARCHIPELAGO
Rabaul
Bougainville
SOLOMON ISLANDS
New Georgia
Port Moresby
New Hebrides
Guadalcanal
0
50
MILES

Map 28

Rear Admiral Raymond A. Spruance, defeated the Japanese fleet off Saipan in the battle of the Philipine Sea, eliminating it as a serious threat.[4]

By the summer of 1944, both commands were in position to assault alternative targets under consideration by the Joint Chiefs of Staff to support the final attack of the Japanese mainland. The alternatives were the Philippines and Formosa. The JCS chose the Philippines with Leyte as the site of the initial amphibious assault. Nimitz' XXIV Corps, enroute to an assault on Yap, was loaned to MacArthur, and Nimitz' fleets and China-based bombers provided naval surface and air support. At last, the two major commands were jointly attacking a common objective and in the process, the largest convoy yet assembled in the Pacific landed the Sixth Army on Leyte on 20 October 1944. It was during the early days of the campaign that the naval battle for Leyte Gulf (23-26 October 1944) destroyed much of the remaining enemy fleet. In desperation, the Japanese began using kamikaze tactics, which increased Allied ship and personnel losses considerably for the rest of the war.[5]

The successful capture of Leyte was followed by similar success in capturing Mindoro and Luzon to establish a base from which Sixth Army could be launched for the attack on Japan. Concurrently, offensive operations were mounted on Mindanao and other islands to clear them of Japanese. Australian elements continued to mop up bypassed pockets of Japanese in the New Guinea region and initiated full scale operations to reclaim Borneo.

From 1 April - 21 June 1945, the last major amphibious campaign in the Central Pacific was launched to seize Okinawa in the Ryukyu Islands. Okinawa cost U.S. forces about 49,000 casualties and the Japanese over 117,000. The United States had 36 ships sunk and 368 damaged as a result of roughly 1,900 kamikaze attacks. Okinawa provided Allied forces with a base only 350 miles from Kyushu, the southernmost Japanese island, an invaluable asset for the projected invasion.[6]

The remainder of the war was devoted to bringing the full weight of Allied naval and air power against the main Japanese islands. Japan was completely cut off from supply by sea. Industry was crippled and starvation was widespread. On 6 and 9 August 1945, atomic bombs were dropped on Hiroshima and Nagasaki as an alternative to a costly invasion of the Japanese home islands, which planners estimated would cost a million Allied casualties. Recognizing their situation as hopeless, the Japanese unconditionally surrendered on 2 September 1945.

COMMAND AND LOGISTICAL/TRANSPORTATION ORGANIZATIONS

THEATER JOINT COMMAND ARRANGEMENTS

Of all the theaters in World War II, the Pacific was the one in which US forces needed a workable joint logistical organization. Army ground and air forces, Marine and Navy forces constantly operated jointly in tactical operations where coordination was a prerequisite for mission success. However, fundamental differences in Army and Navy approaches precluded effective integration of logistical support and adversely affected the support structure of both Southwest Pacific Area, which was Army-oriented and the Pacific Ocean Areas, which was Navy-oriented. In April 1943, JCS directives required both commands to observe the principle of unity of command under which responsibilities for the entire command were the same as if the forces were all Army or all Navy. The joint force commander assigned missions to service or task force commands, and was not to act in the dual capacity as the commander of a service component without JCS approval. To guide the development of logistical organizations and systems, in March 1943, the Army and Navy jointly issued the Basic Logistical Plan for Command Areas Involving Joint Army and Navy Operations. Commonly known as the "Basic Logistical Plan," it allowed theater commanders to decide the best way to support their own joint forces. The plan was probably the best compromise that could be reached without major disruption of on-going operations.[7]

Admiral Nimitz, with JCS approval was CINC, Pacific Fleet as well as POA, which meant he could shift all Pacific fleet resources around (except Seventh Fleet) as he wished. There were two Army commanders in POA: Lt. Gen. Millard F. Harmon, Commanding General (CG), South Pacific (COMGENSOPAC); and Lt. Gen. Delos C. Emmons, CG, the Hawaiian Department, who was succeeded by Lt. Gen. Robert C. Richardson, CG, U.S. Army Forces in the Central Pacific Area (USAFICPA), which absorbed the Department. The Army commanders in POA were primarily administrative and responsible for training and logistical support.

In the SWPA, MacArthur had U.S. Marine Corps units and the U.S. Seventh Fleet under Admiral Thomas C. Kinkaid in his command. He also had substantially more Allied units than the POA. Initially, U.S. Army Forces in Australia (USAFIA) operated as the theater Army administrative headquarters, but in February 1943, U.S. Army Forces Far East (USAFFE) was reactivated. General MacArthur assumed command, but he did not have the control of Army

units Pacific-wide as Nimitz did for the Pacific Fleet naval units. Administratively, U.S. Army units operated under USAFFE, and Navy units operated under Seventh Fleet. In combat operations, all forces operated under the Allied component or a task force commander. There was little integration of logistics operations among the services.[8]

The burgeoning logistics system in the Pacific was forced to cope with a number of conditions unknown in other theaters. The command structure was complex. Support bases were scattered across a vast ocean which meant extreme variations in weather. In addition, there were frequent changes in tactical plans and objectives. It was evident to most logisticians that a unified supply and transportation system was highly desirable, but in practice it was difficult to combine two very different systems. The Army system was primarily for support of ground forces ashore and the Navy system was organized to support the fleet. Early in the war, the Army developed a centralized system to plan and control acquisition and distribution of supplies world-wide. They also depended on progressive development of land bases close behind the line of advance. The Navy system was decentralized with fleet service squadrons that were mobile logistical bases with the impetus of supply from the rear. For the Navy, the Pacific had first priority and that's where the majority of its units were located. The Army focused on Europe and gave lower priority to support of Pacific forces.[9]

LOGISTICS AND TRANSPORTATION ORGANIZATIONS [10]

General Headquarters, South West Pacific Area (GHQ, SWPA), an Allied geographical and organizational entity, was formed from units that were en route to the Philippines when the Japanese attacked. They were diverted to Australia, where they arrived on 23 December 1941. The embryonic command, which was redesignated USAFIA, immediately focused on getting support to troops in the Philippines, (in the final analysis a transportation task).[11]

Concurrently, the Allies established Australia as the main base to support Allied defensive operations against the expanding invasions of Pacific islands. Brig. Gen. Arthur R. Wilson and a small team arrived from the U.S. on 11 March 1942 to help the command cope with the formidable supply and transportation challenges and was assigned as Quartermaster, (later G-4), USAFIA. Initially, he managed both supply and transportation functions, but in April despite local opposition, he followed the precedent established in the office of the U.S Army Quartermaster General, and set up the U.S. Army Transportation Service (ATS). He also brought in several experienced American transportation executives, including Col. (later Brig. Gen.) Thomas B. Wilson,

who had experience in all modes and became the first theater Chief of Transportation (CofT) and Colonel Thomas G. Plant, a steamship line executive who was put in charge of the Water Branch of the ATS, and later also became theater CofT. They quickly instituted more effective procedures. When MacArthur established GHQ SWPA in April 1942, USFIA became one of its subordinate commands. In July 1942, it became the U.S. Army Services of Supply (USASOS) and supported SWPA operations all the way to the Philippines. The USASOS relocated several times to Hollandia, Leyte, and Manila. Brig. Gen. (later Maj. Gen.) James L. Frink took over command of the USASOS in September 1943 and remained its commander until 30 May 1945.[12] While USASOS remained basically the same through the war, MacArthur's command organizations were highly complex and underwent numerous structural and name changes to reflect his personal role. First, he was the Allied commander; then commander of all U.S. Forces in SWPA; commander of USAFFE, which was interposed between GHQ, SWPA, and USASOS; and eventually in the Spring of 1945, preparatory to the invasion of Japan, commander of all U.S. Army Forces, Pacific (AFPAC). The changes in MacArthur's command structure complicated the mission of the already complex ATS. The ATS was redesignated the Transportation Corps and expanded to cope with increasing responsibililties, and in December 1944, was organized as shown in Chart 12.[13]

For the first six months of the war while the Japanese were still on the offensive, Army and Navy transportation operations in the Central Pacific Area (CPA) were handled separately. Coordination between the two services was informal with only a limited degree of operational cooperation. Army operations, within Nimitz' Allied joint command, were under the Hawaiian Department. The Army Transport Service (ATS), assigned to the Quartermaster at the time of Pearl Harbor, was made a separate division of the Department on 9 March 1942.[14] As time to assume the offensive grew near, the structure for supporting Army forces was reviewed. In August 1943, USAFICPA absorbed the functions of the Hawaiian Department. Lt. Gen. Richardson replaced the Service Forces element responsible for the movements of troops and supplies by establishing the Army Port and Service Command (AP&SC), under the command of Col. (later Brig. Gen.) Roy E. Blount, a Cavalry officer, who was also the USAFICPA Special Staff Transportation Officer. Port and other water transportation activities were assigned to the ATS; motor and rail operations were assigned to a Port Transportation Section. The command also had major post, camp, and station administrative responsibilities including specified

ORGANIZATION OF HEADQUARTERS, TRANSPORTATION CORPS, USASOS, SWPA: December 1944

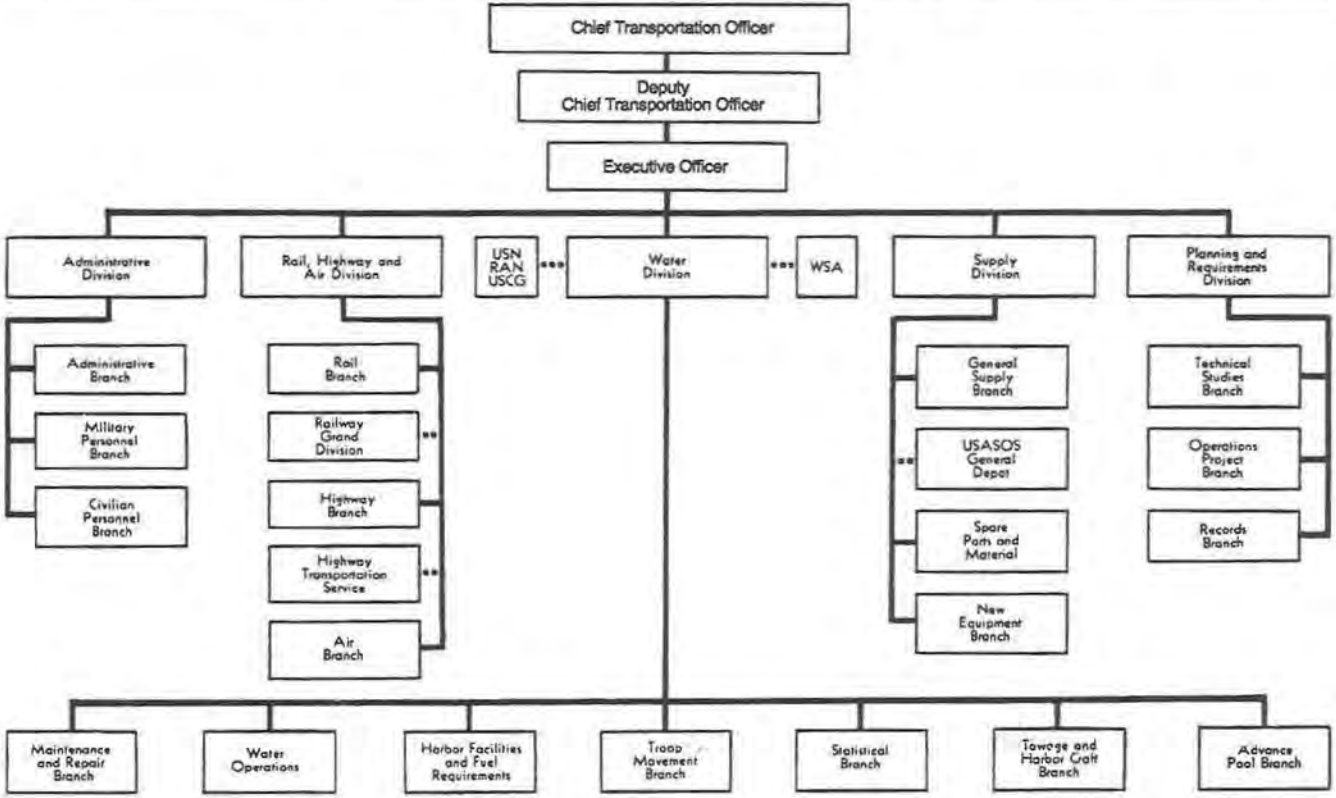


Chart 12

replacement centers, staging and billeting areas, and recreational facilities, but its main effort was the support of Central Pacific task force operations within resources available in the command. The Western Pacific Base Command (WPBC) took over most functions in the final phases of the war.[15]

Protecting the U.S. lines of communications to Australia was critical, and by July 1942, some 50,000 ground and air troops of all services had been deployed to South Pacific islands not yet occupied by the Japanese, for that purpose. Support was provided from Hawaii and the U.S., distributed under a number of makeshift arrangements with much of the ship discharge and local distribution accomplished by combat arms units and engineers. In June 1942, Vice Adm. Robert L. Ghormley, who was succeeded by Admiral William F. Halsey Jr. in October, took command of the South Pacific Area, a sub-command of POA, to prepare the counteroffensive in the southern Solomons. The Army component was the U.S. Army Forces in the South Pacific Area (USAFISPA), first located in Auckland, New Zealand. It was responsible for the administration and training of Army ground and air forces, logistical support of all forces at bases commanded by the Army, and supply of all Army units. The Navy had similar responsibilities, and also provided POL to all services, and controlled all ships and shipping space. The USAFISPA Service Command, commanded by Brig. Gen. Robert G. Breene, was activated to support the command and moved to Noumea, New Caledonia in November 1942, where it was redesignated SOS, South Pacific Area, with widened responsibilities for water transport, port operation, and motor transport. The Transportation Section was headed by Maj. (later Col.) Jack A. Fraser, who had civilian experience in water transportation. For additional control, subordinate Army Service Commands (ASC) were established at key points.[16]

With no integration of support for joint operations, it became increasingly evident that some action was needed. Both commands increased joint staff authority and established coordination committees to solve their problems and cope with the control of shipping, the most pervasive transportation problem.

CONTROL OF SHIPPING IN THE PACIFIC

In the SWPA, under U.S. Forces in Australia, and later the Services of Supply, the Transportation Service was responsible for liaison with Australian transport services and Allied committees controlling transportation allocations. The G-3 and G-4 established priorities among Army requirements. Even though the SOS transportation organization served all U.S. Services and Allies, the assignment of priorities for scarce resources eventually required the appointment

of a SWPA theater-wide Chief Regulating Office (CREGO) with Col. Charles P. Unger in charge. The CREGO was chartered to use priorities and a booking system to control movements of personnel and cargo by water, rail, and air, to, within, and from the theater. Their operations expanded from modest beginnings into a huge centralized agency directly under the Deputy Chief of Staff, GHQ, and included field regulating stations and liaison officers at United States and Pacific ports and airfields. Its efforts to control shipping congestion and shortages were not fully successful and despite efforts to the contrary, created resentment in other transportation management agencies, who took every opportunity to bypass it.[17]

In the POA unified command, Nimitz set up a joint staff to facilitate integration of logistics support and shipping control operations. He appointed Brig. Gen. (later Maj. Gen.) Edmond H. Leavey as the J-4, Logistics, in November 1943. Leavey, who became the second U.S. Army Chief of Transportation, took over all the joint logistical and working boards along with the usual functions of a theater G-4, including all facets of the supply of existing bases and new ones as they were captured. Once operations passed from the assault to the garrison phase, the J-4 controlled the employment of all support shipping into forward areas regardless of service. A centralized cargo-priority and shipping-control system evolved, performing the same functions as MacArthur's CREGO. The system was equally distasteful to other transportation agencies because it limited their role in managing water transportation to support Central Pacific Army operations. However, it was a natural concomitant to unity of command, and on the whole was probably the best arrangement since it operated within the standard staff structure, manned by personnel of all the services and accepted all requests on their merits.[18]

ARMY TRANSPORTATION OPERATIONS

Operating in the broad expanse of the Pacific created significant transportation challenges. The distances were vast. It was over 2,000 nautical miles from San Francisco to Hawaii and another 4,500 from Hawaii to Australia. From Sydney, Australia, it was over 4,000 nautical miles to Manila and from Manila, another 1,700 to Toyko. The land upon which most of the fighting was done consisted of coral atolls or narrow coastal plains, thus the requirement for land transportation was minimal. Ocean shipping, port, and over-the-shore operations were the main transportation requirements.

Facilities on most islands were nonexistent and those that did exist were usually damaged from U.S. bombing or shore bombardment. In the islands, most

native cultures were unfamiliar with western style labor and could not be counted on for extensive work. Australian labor was highly unionized and not cooperative. The climate on most islands was hot and humid, and tropical diseases were endemic. In some islands, water was scarce and on top of all the other problems, shipping was in short supply.[19]

Procedures for opening new bases developed a general pattern over a period of time which was generally followed by all commands in the Pacific. The AP&SC, the SOS, USAFISPA, and USASOS performed all the transportation functions necessary to train, prepare, and stage Army invasion force elements provided by the command. They did not control task force elements staged from the United States or other Pacific commands. The Marines and Allied units were staged by their own support agencies. Shipping to move the assault force and provide initial resupply was controlled by Allied Naval Forces until the support agency took over the task by mutual agreement. In the objective area, service and supply functions and control of all service forces were initially the responsibility of the ground task force commander. As the area was secured, the support agency established an advance base command element, which assumed control of troop and material resources left by the ground task force. The base command then brought in additional service forces to perform its mission. The base commander had his own transportation staff, which was not subordinate to the support command's staff transportation officer when it came to internal base operations. The base requested shipping allocations from the command regulating agency such as CREGO in SWPA, or the J-4, POA. This pattern was a logical outgrowth of the isolation and wide separation of bases established under the leapfrogging concept that bypassed enemy forces and left them to "die on the vine" or be mopped up at leisure. In most cases, it markedly limited the role of the support command staff transportation officer.[20]

SUPPORT COMMAND TRANSPORTATION OPERATIONS

Following Pearl Harbor, transportation agencies in Hawaii and Australia were faced with the task of supporting forces in contact with the enemy, deploying Army forces to existing bases and other islands to halt the Japanese aggression, and securing the LOC while providing bases for future Allied offensives. At the same time, they had to establish a viable transportation organization, then staff and equip it while nearly everyone else had a higher priority for personnel and equipment than they did.

From Hawaii, port detachments were established on the outer islands. Army units were shipped to Fiji, Samoa, New Zealand, New Caledonia and

"nearby" islands such as Palmyra, Christmas, and Canton. Civilians were evacuated from Hawaii while large numbers of troops and quantities of supplies were received to build up the island's defenses and stock it as a forward base. In Australia, the most pressing issues were the support of the Philippines and defense of Australia as a base for future operations. Thereafter, U.S. transporters coordinated with the Australians to share in-country resources because it was U.S. policy to deploy minimal transportation troops to Australia. They surveyed the requirements and assembled resources for future operations, particularly for the establishment of an Army support base in Port Moresby, New Guinea, to prepare for further offensive operations.

After the first few months of war, U.S. forces in Australia used the ports of Cairns, Townsville, and Brisbane in Queensland, and Sydney, primarily because of their relative proximity to the U.S. and New Guinea. Australian labor was averse to troop involvement in transportation operations, and TC units usually staged and trained in Australia then moved to New Guinea as soon as possible. Australian ports were well developed and met U.S. requirements, though not always as promptly as desired; however, the railroads were militarily inadequate. They were generally located on the coasts, with different gauges in different states, and many sections had limited capacity. The Australian rail network suffered the same shortcomings as those in Britain and Europe in that the size and carrying capacity of most rolling stock was considerably smaller than U.S. versions. Australian trainloads averaged 300 tons versus nearly 10,000 tons on American rail lines. Only by judicious movement control and exploitation of water movement were the capacities of the Australian railroads judged able to meet U.S. needs without augmentation.

Truck transportation in Australia was provided by organic unit vehicles and the civilian motor transport system. One notable exception was Motor Transport Command No. 1, which was established in the spring of 1942 to bridge the gap between the terminus of the rail system and Darwin, the principal city on the north coast of Australia. Darwin was threatened by the Japanese, was hazardous to reach by sea and required reinforcement. The command operated a 687 mile stretch of road from Mt. Isa in western Queensland, to Darwin, through some of the "grimmest, hardest country in the world."[21] The main units were the 48th and 29th QM Truck Regiments with associated maintenance, POL, and cargo handling units and the 17th Station Hospital. The command comprised about 5,000 men, of whom 3,500 were Negro drivers in the truck units. Operations were under the direct control of the Chief of Transportation Service, USAFIA. When the operation began, few facilities were available at the three intermediate

night camps, but were developed as fast as possible. Temperatures reached as high as 130 degrees at noon and there were serious ocular and respiratory problems from the talc-fine red "bush dust" and bush flies. Equipment maintenance costs and efforts mounted steadily. From 28 June-29 October 1942, trucks logged 9.5 million miles in convoy, with an almost zero AWOL rate and low sick rate considering the conditions. As the threat of Japanese invasion subsided, the U.S. operation was phased down and the Australians took over the reduced requirement.[22]

In general, transportation provided through the Australian civilian system was sufficient to support U.S. operations and deferred the need to deploy thousands of service troops prior to launching the Allied offensive.

PACIFIC CAMPAIGNS

GUADALCANAL

On 2 July 1942, the JCS ordered Operation "Watchtower", a limited offensive, the objective of which was to seize and occupy the New Britain - New Guinea area. Two days later, an Allied reconnaissance plane discovered the Japanese building an airfield on Guadalcanal in the Solomons. Since Japanese planes in the Solomons were a direct threat to U.S. lines of communication, the initial objective for Watchtower was changed to include Guadalcanal, as well as Tulagi, one of the first "Watchtower" objectives. On 7 August 1942, U.S. Marine Corps forces from the South Pacific Area assaulted both islands in the first Allied offensive actions in the Pacific. As the campaign progressed, Army elements were also deployed. Transportation support was initially provided by the Navy and Marines.

Army elements were deployed to establish supporting bases in the Fiji Islands, New Zealand, the town of Noumea, New Caledonia, and other smaller islands. New Zealand was too distant, and bases in the Fijis were committed to other missions, so Noumea became the principal SPA administrative and supply center for support of the Solomons. Its mission was to receive cargo and personnel for local forces, establish reserve stocks, and tranship troops and materials for all services. The principal delivery area was Guadalcanal. Support came from Hawaii, the United States, Australia, and the Joint Purchasing Board in New Zealand, which controlled local procurement in the SPA. Army port operations were under the New Caledonia Army Service Command (ASC), commanded by Col. (later Brig. Gen.) Raymond E.S. Williamson, who had a seven officer Transportation Section, a few harbor craft and barges, three deep water berths, a work force of a small provisional port company, some U.S. Navy

Bridge near Noumea, New Caledonia city limits. Railroad was run by the 790th Railway Operating Company, 28 December 1943

Construction Battalions (Seabees), casuals, about 500 local laborers, and details of combat troops. The ASC also used three Quartermaster truck companies with 69 serviceable trucks, even though they were not assigned to it. The scarcity of trained port management, labor, and other resources resulted in woefully slow ship discharge rates. Shipping backed up at Noumea and other bases to the point that the success of the Guadalcanal operation was threatened. At the same time, the U.S. 43rd Infantry Division and 3rd New Zealand Division arrived for assignment in New Caledonia, and the U.S. Americal Division left for Gaudalcanal.

In November 1942, Brig. Gen. Breene and the SOS USAFISPA Headquarters arrived in Noumea. Major Jack A. Fraser (later Col.), the SOS Transportation Officer, focused on improving shipping and port operational support actions such as expediting receipt of ship manifests and controlling the arrival of vessels. Admiral Halsey, who relieved Admiral Ghormley on 18 October 1942, asked the Army to take over all port operations in Noumea as of 20 November 1942, and gave the SOS and Army Service Command (ASC) operational control of Navy port assets. The 25th Infantry Division, enroute from Hawaii, was diverted directly to Guadalcanal instead of transshipping through Noumea. Most of the 1st Port was transferred from Auckland, and priority efforts were made to obtain equipment, experienced technicians, and labor. A newly assigned Navy construction battalion began improving facilities, and corrective actions resulted in a rewarding increase in cargo loaded and discharged. The totals rose from 54,000 short tons in November 1942, to 155,000 in December, and 240,000 in January 1943.[23]

The backup in shipping began to decline and the pressure on Noumea eased when Guadalcanal was secured in February 1943. The respite was only temporary because the supplies stockpiled in New Caldonia had to be shipped forward to support SPA operations in the northern Solomons and the Bismarck Archipelago, a task requiring all available port capacity.

In April 1942, Army engineers took over, repaired and operated a 20-mile meter-gauge rail line in New Caledonia using French and Javanese employees. This unique operation took some of the burden of clearing the port from sparse truck resources. The 790th TC Railway Operating Company (ROC) was activated in July 1943 to take over the line from the engineer detachment. On 1 February 1944, the line was discontinued, ending Army rail operations on Pacific islands until Luzon.[24]

ARMY TRANSPORTATION OPERATIONS ON GUADALCANAL

Transportation operations during the entire Guadalcanal Campaign were conducted almost entirely by combat troops. There were few service troops on the island, and local labor was used wherever possible. The Army XIV Corps, along with the Americal, 25th Infantry, and 43rd Infantry Divisions, began reinforcing and later relieving some Marine units starting in mid-October 1942. The campaign officially ended on 21 February 1943. During both Marine and Army combat operations all ship discharge was over the beaches. Initially, landing craft were unloaded by hand and supplies carried to beach dumps. Units were stripped of their vehicles, and were always in short supply. During some phases of operations, supply ships unloaded during the day and weighed anchor

at night to maneuver to avoid the nightly Japanese surface and air attacks. While this enhanced ship security, it lengthened discharge time. The engineers constructed roads, which became mudholes during the frequent rains, but they allowed 2 1/2-ton trucks to move supplies to dispersed dumps at road ends. Dumps were kept small to minimize losses from enemy action. Front line troops used jeeps and porterage to carry supplies along the narrow jungle roads and trails, which were impassable to large trucks. Boats and cableways were used to some extent, and the Army 97th Field Artillery Battalion (75-mm Pack Howitzer) had mules. The Army again learned the lesson that a mule consumes 8 pounds of oats and 14 pounds of hay per day, for a daily total of 4,100 pounds of forage to support the three four-gun batteries of the 97th. Nor were the mules well suited to the jungle trails and boggy ground characteristic of the operating area. The experiment was unsuccessful, in contrast to the successful use of animals in Sicily and Italy where hiring of civilian handlers and local procurement were feasible.[25]

As soon as Guadalcanal was secured, it became the main base for further amphibious operations even though it was not as well equipped to handle the task as Noumea. Discharge was restricted to beaches and a few barge piers. Even though the ASC employed about 1,000 local laborers, it was seriously short of service troops. Combat troops were used in large numbers to work the ships and beaches. These were tasks they deplored and Maj. Gen. Alexander M. Patch, Commanding General of XIV Corps wrote, they were "apathetic about labor."[26] Ship congestion increased in the area and backlogs of ships built up in Pacific ports awaiting convoy to Guadalcanal. In Noumea, Brig. Gen. Breene made a major effort to embargo shipments to Guadalcanal and divert ships with cargo non-essential to forthcoming offensive operations, but this did not have a significant impact on the situation.

Meanwhile, the buildup on Guadalcanal progressed. The 481st Port Battalion arrived and combat units were assigned to beach operations. Construction units built large storage areas and a Liberty pier, and both the Army and Navy brought in materials handling equipment ranging from pallets to floating and mobile cranes. The 451st Amphibian Truck Co with DUKW's arrived in May 1943, and immediately earned its keep after a heavy storm wrecked quays and floating equipment. In spite of combat successes, the island was still vulnerable to attack by Japanese aircraft from Munda airfield in New Georgia, and ships worked only in daylight, moving out to sea at night, which precluded 24 hour operations. Even though the port could not meet the workload needed to support the New Georgia campaign, its capacity increased steadily. During a period of a concurrent heavy discharge workload, outloadings increased from about 25,500 short tons in July 1943 to 75,000 short tons in October 1943.[27]

The landings by Army and Marine units on Bougainville in November 1943 increased the amount of cargo Guadalcanal had to store and transship, so the Army assigned two additional port battalions to the island. In March and again in May 1944, Guadalcanal discharged and loaded record totals of over 180,000 short tons. When the enemy was defeated in the Solomons, Guadalcanal's port workload declined, and the focus of tactical operations shifted from the South Pacific Area to the Southwest Pacific Area offensive in New Guinea. At the same time, operations in the Central Pacific targeted the Marshalls, Gilberts, and Marianas. By 1 April 1944, SPA theater and base transportation sections were well staffed and experienced, and Army service commands conducted port operations in close coordination with Navy and Marine authorities. Substantial skilled resources were available in the form of six port battalion headquarters, 26 port companies, six DUKW companies, numerous harbor craft, and naval port construction resources. Bypassed Japanese forces were left cut off from all resources, except their own.

NEW GUINEA

The principal transportation task in SWPA was to operate the ports on New Guinea and the adjacent islands. With no rail facilities to speak of, motor transport was used for port clearance and short onward movements. Vehicle operations were routinely supervised by the Transportation Section of the Base Section Command. Motor vehicle assets were sparse, and the Army made maximum use of every unit's organic vehicles.

The SWPA established several small ports to support the Papua Campaign in eastern New Guinea, and later along the north coast of New Guinea and western New Britain and the Admiralties. The latter operations were in conjuction with SPA actions in the Solomons to eliminate the Japanese base at Rabaul in New Britain. The lack of roads put a premium on the use of shipping for coastwise movements and increased the workload and utility of ports all along the coast. Existing port facilities were primitive docks totally unsuitable for military traffic, so that an extensive engineer effort was required to provide pier space to replace the constant use of lighterage. Facilities had to be hewn from the jungle with dredges, bulldozers, tractors, and portable sawmills. Even with these efforts, the improvements only met immediate needs and conditions were primitive. During operations in northeastern New Guinea, ports were opened or reopened at Milne Bay, Oro Bay, Lae, and other invasion sites. Milne Bay, located at the extreme east end of the island, was the largest port in New Guinea, and was jointly operated with the Australians. The 608th Port Company,

a Negro unit of the 394th Port Battalion that operated at Port Moresby in southeastern New Guinea, operated Milne Bay from July 1942 until April 1943, discharging as much as 202,000 tons a month.[28]

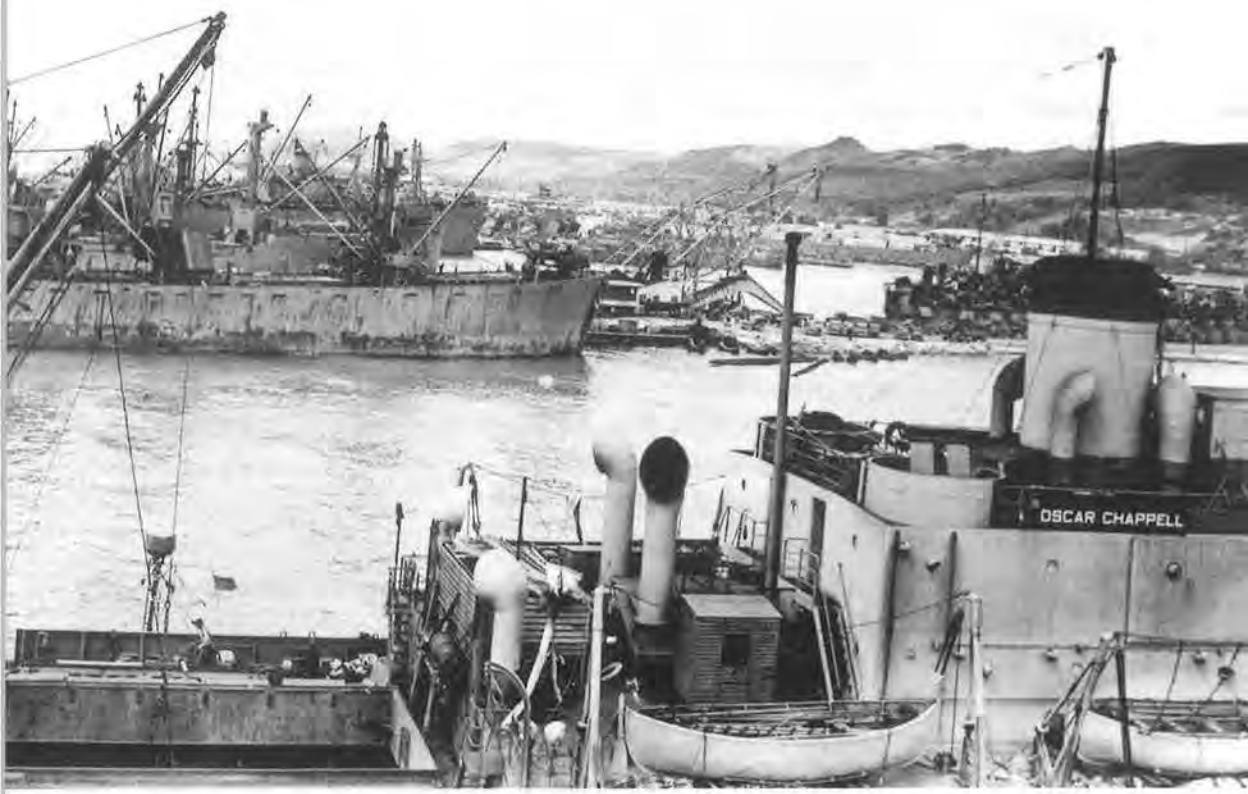
Hollandia, located on the rugged northern coast of New Guinea, was the next objective because Humboldt Bay had protected anchorages. Tanamerah Bay, 35 miles west of Humboldt, where the 24th Infantry Division landed, had good tanker anchorages to support Sentani Airfield, one of the main objectives of the landing. The area was also considered suitable as the main base for the invasion of the Philippines. A TC detachment of the 2d Port, headed by Lt. Col. Reeford P. Shea, was attached to I Corps and became the first TC element to accompany combat troops in a landing in the SWPA.[29] The 532d and 542d Engineer Boat and Shore Regiments, using Navy craft along with their own, conducted the landing alongside Navy units and began to discharge cargo. The first TC port troops at Hollandia were from the 244th, 296th, and 609th Port Companies. Port clearance was hampered by tortuous roads from the port area to the supply dumps, continuous mud, and a shortage of labor. Additional port companies were brought in, and Col. Shea became the Base Port Commander. By the end of 1944, the port had the 394th Port Battalion, 11 port companies, berths for eight deep-draft vessels at one time and numerous jetties, ramps and a considerable number of landing/harbor craft. The *William F. Fitch* and the *James M. Davis,* the first TC marine repair ships in SWPA, arrived in August 1944 and were subsequently sent to the Philippines. In the fall of 1944, the waters around Hollandia were crowded with ships awaiting a call to go forward to the Philippines. A large quantity of accumulated supplies and harbor craft were moved to the Philippines in an impressive series of TC towing operations under Lt. Col. (later Col.) Leon J. Lancaster, and the 350th Harbor Craft Company, which maintained the pool of vessels. Hundreds of harbor craft and barges, many loaded with supplies, were towed to Leyte and later directly to Luzon. From Luzon, they were moved on to Okinawa and eventually to Japan. As supplies were moved out, activity at Hollandia declined and the base was inactivated in January 1946. A major landing was made at Biak Island off the northwest coast of New Guinea on 27 May 1944. The 296th Port Company was attached to the task force and unloaded LSTs while under air attack. Bitter fighting on Biak continued through 1944, but by August 1944, sufficient control was gained to establish a command designated as SOS Base H. The base was developed rapidly. The port included five Liberty docks and other facilities. Biak was a subsidiary base of Hollandia and assisted in stockpiling supplies and sheltering troops for the invasion of the Philippines.[30]

THE GILBERTS, MARSHALLS, MARIANAS AND WESTERN CAROLINES

The capture of the island chains in the Central Pacific Area provided the northern envelopment leading to the Philippines, and established bases for final operations against Formosa or the Ryukyus, either of which would be the last step before the invasion of Japan.[31] The U.S. Marine Corps controlled most of the tactical operations in the area, but Marine units were supplemented by Army divisions, notably those of the XXIV Corps. Under overall Marine Corps control, Army TC units frequently were assigned to assault operations and they remained as components of the Army garrison forces that followed up the assaults. Those garrisons provided support for Army units staging through the bases as well as those stationed there. This was in keeping with the principle that each service supported its own.

Much of the Army support for these CPA operations came from Hawaii, where the Army Port and Service Command provided embarkation and debarkation training, staged units, outloaded follow-up support, and assisted Navy and Marine unit outloading from Hawaii. The Army expedited supply support over the beaches for amphibious assaults by palletizing supplies on toboggan or sled-like platforms so they could be pulled across beaches by vehicles rather than hand carried. The 7th Infantry Division first used pallets in the Aleutians. The 27th Infantry Division used them in their assault on Makin in the Gilberts, and they were so successful they became standard in the Central Pacific. (Map 28) Company D of the 376th Port Battalion accompanied the Army garrison force to Makin and took over port and depot activities there.

In the Marshalls, the 7th Infantry Division captured Kwajalein Island in early February 1944, and then captured Eniwetok jointly with the Marines. Company B of the 376th Port Battalion was attached to the 4th Army Defense Battalion, the garrison force for Kwajelein, where it discharged ships starting on D-Day. The first Army DUKW operation in the Central Pacific Area was in the Kwajalein assault. Unlike the SWPA, where DUKW's were used principally for ship discharge during the post-assault phase, in the CPA they were used in the assault to carry field artillery weapons and ammunition. While no Transportation Corps DUKW companies were available for the Marshalls Campaign, 7th Infantry Division Artillery drivers were hurriedly trained on DUKW operations. Subsequently, they landed 105-mm howitzers and their ammunition on an adjacent island in time to fire direct preparatory fire on Kwajalein in support of the assault and were highly effective in assisting the discharge of LST's and movement of cargo to dumps. The joint force commander reported that



Troop Port Command Operations, Saipan, 1945

DUKW's were invaluable for the rapid transfer of supplies urgently needed.[32] As elsewhere in the world, DUKWs were considered indispensable, and the first three TC amphibian truck companies, assigned to AP&SC in February 1944, immediately began training for assault operations.

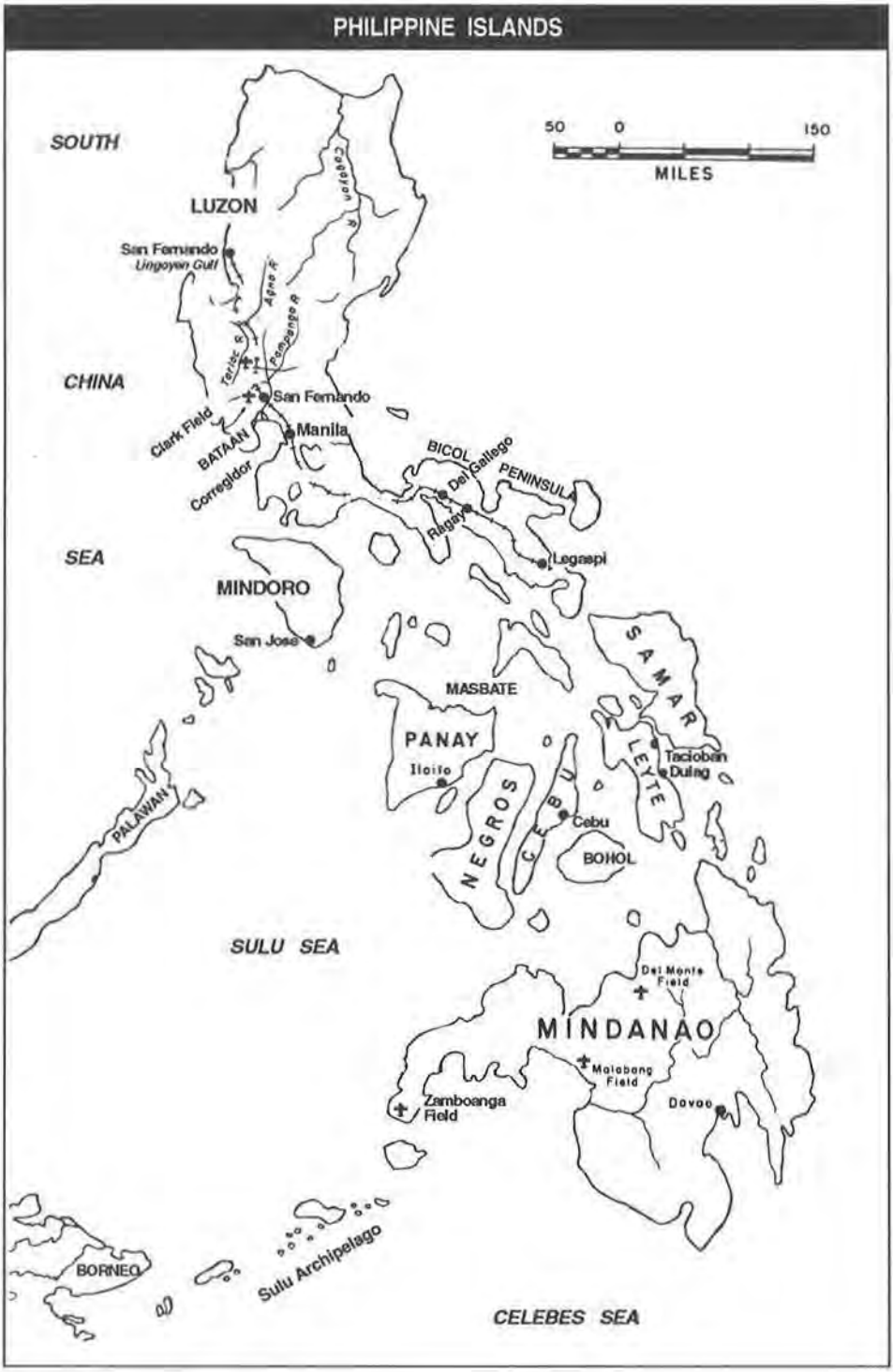
The Marianas assault forces comprised the Marine III and V Amphibious Corps which included the 27th and 77th Infantry Divisions. Those units staged through Eniwetok and Kwajalein in May and June 1944 for the assaults on Saipan and Guam. The latter assault was a Marine operation in which no TC units were involved. The 376th Port Battalion Headquarters, with five port companies that had been assigned to garrison port operations in Honolulu, and the 477th Amphibian Truck Company were assigned to the provisional Troop Port Command (TPC) of the Army Garrison Force for Saipan. In keeping with policies in the CPA, some units were attached to Marine and Army assault

forces according to need. The TPC and the 311th and 539th Port Companies were attached to the 4th Marine Division for movement to the area, with other port elements in subsequent echelons. The port units had only one week of training on assault cargo handling techniques. The 477th Amphibian Truck Company, also attached to the 4th Marine Division for movement in the assault echelon, was activated in Hawaii using selected but inexperienced Negro troops from disbanded air base security units. They were given intensive training by AP&SC at the CPA amphibious training center and landed with assault forces on Saipan on 15 June 1944. During the assault on Saipan, all TC units performed with distinction. The performance of the 477th was particularly notable. It operated throughout the entire operation under control of the G-4, XXIV Corps Artillery, hauling ammunition from ships to the guns while under enemy fire. The beaches were turned over to the Army Garrison Force on 29 June 1944, and when Saipan was secured on 9 July 1944, the TPC thereafter supervised the discharge of all cargo for all the services. Labor was provided from combat units and Navy base units to supplement Army port resources. Saipan port was developed and improved by dredging and much construction, and the island became a primary base for B-29 operations and for staging units. The APC worked closely with the Navy and coordinated the use of Navy personnel and resources. The result was that by the end of March 1945, the port had 13 berths and handled over 387,000 measurement tons per month.

The last CPA operation prior to the Philippine invasion was in the Carolines, where Army and Marine forces secured the islands of Peleliu, Angaur, and Ulithi Atoll, in the Palau Islands (see Map 28). The 290th Port Company and the 481st Amphibian Truck Company supported the 81st Infantry Division in the capture of Angaur on 17 September 1944, with the DUKW unit carrying artillery pieces ashore and then providing ammunition resupply. The 454th and 456th DUKW Companies accompanied the 1st Marine Division from the SPA, participated in the assault of Peleliu and then came under the garrison command and worked cargo discharge. As the war went on, it was evident that joint operational techniques were improving, at least in the CPA.[33]

THE PHILIPPINES

The Philippine Archipelago, with over 7,000 islands covering almost 800,000 square miles, was heavily dependent on ocean transport. Port facilities were fairly well developed on the larger islands, of which only eleven had an


PHILIPPINE ISLANDS
50 0 150
MILES
SOUTH
CHINA
SEA
LUZON
Cagayan R.
San Fernando
Lingayen Gulf
Agno R.
Tarlac R.
Pampanga R.
San Fernando
Clark Field
BATAAN
Manila
Corregidor
BICOL
PENINSULA
Del Gallego
Ragay
Legaspi
MINDORO
San Jose
MASBATE
PANAY
Iloilo
SAMAR
LEYTE
Tacloban
Dulag
NEGROS
CEBU
Cebu
BOHOL
PALAWAN
SULU SEA
Del Monte Field
MINDANAO
Malabang Field
Zamboanga Field
Davao
BORNEO
Sulu Archipelago
CELEBES SEA

Map 29

area greater than 1,000 square miles. As shown in Map 29, only on Luzon were highway and rail operations important.[34]

As the invasion progressed, the Americans opened and operated a number of ports. The first one was Tacloban on Leyte. On Luzon, there was Manila on the west, San Fernando on the Lingayen Gulf, and Batangas on the southern coast. Cebu City was opened on the island of Cebu. In addition, the 533d and 543d Boat and Shore Regiments at Zamboanga as well as other locations, operated temporary ports and beaches to support Eighth Army combat operations to recover Mindanao. Temporary ports and beaches were also used on other islands.[35]

PORT COMMAND, BASE K - TACLOBAN, LEYTE

The ports and beaches on San Pedro Bay which opened on the south into Leyte Gulf were operated by Base K. They were the landing points for the divisions of Sixth Army in the 20 October 1944 assault. The area stretched some 50 miles from Tacloban in the north to Abuyog beach in the south, with the bay paralleled by a narrow coastal road. Behind the sand and coral beaches were heavy woods and dense jungles. The bay provided anchorage for about 75 vessels, but was shallow and not protected from heavy swells. Navigation was impeded by shoals, reefs and wrecks. Tacloban, the only existing port on 20 October, had only 19 feet of water at the four berth concrete wharf that was reached through a four mile channel 27-feet deep, so Liberty ships had to be lightened to 18 feet to moor at the wharf. Even after February 1945 when the area was dredged, maximum draft was 20 feet. Liberty ships with 25-foot drafts could approach within half a mile of northern beaches, and only at Dulag could LSTs approach as close as 50 feet to the shoreline. Lighterage and intrabeach movements were by DUKW, LCT, LCM, and LCVP. These craft also performed resupply missions around the island's circumference as combat operations progressed, because the coastal waters were too shallow for deeper draft vessels.[36]

Transportation units were particularly active in the assault on Leyte. In the southern half of the landing area, XXIV Corps from the Central Pacific made the assault. The 291st, 292d, and 293d Port Companies were attached to the assault divisions. They served first as ship working parties, and then to augment shore parties. The 504th Port Battalion took over operation of the small port of Dulag, the only one in the southern sector. Amphibian Truck Companies from Hawaii participated in the assault on 20 October 1944 as well. The 828th moved with and supported XXIV Corps Troops, the 472d and 480th supported the 7th Infantry Division, and the 823d and 827th supported the 96th Infantry Division.

They moved artillery, ammunition, and casualties and were used on land to offset the shortage of standard trucks, even though in the rough terrain the DUKW'S deteriorated rapidly. Near the end of the campaign, the units were relieved from XXIV Corps and worked under Base K.

When Base K took over the operation of Tacloban and beaches to the south from Sixth Army on 22 October 1944, the enemy mounted 56 air raids in four days, since naval air cover was withdrawn during the Battle of Leyte Gulf. A total of 203 air alerts in the first 42 days significantly hampered operations. The weather also failed to cooperate. Three typhoons deposited 33 inches of rain in the first three months and interfered not only with ship discharge, but backed up port clearance by bogging down land transportation and crowding grounded air assets in and around Tacloban Airfield. Despite climatic and natural obstacles that required long turnaround times to dumps, the ports and beaches continued to operate and improve. At peak operations in December 1944, about 240,000 short tons of Army cargo were loaded and discharged. As the only Army discharge facility north of Biak, Base K continued operations at capacity until ports in Luzon were opened and shipping could go directly to the main thrust of combat operations.[37]

LINGAYEN GULF AND BASE M - LUZON

As in the assault on Leyte, TC units were early participants. Two port battalions, 10 port companies and six DUKW units were integrated with engineer boat and shore regiment shore party operations. They were attached to and landed with Sixth Army's I and XIV Corps on beaches at the head of Lingayen Gulf on 9 January 1945. The TC units scheduled to arrive during the initial phase were assigned to the Sixth Army's Service Command (ASCOM) when it took over from assault elements, and later delegated to Base M, a subordinate command of ASCOM. At the same time, engineer boat and shore regiments were assigned to the 4th Engineer Special Brigade, and LCT's were made available by the Navy to assist in lighterage and other port and beach tasks, including operation of beaches to support further tactical operations. Elements of the Port Command, Base M, arrived ashore on the second day after the landing (S+2) and worked with beach units. The transfer of responsibility to ASCOM was delayed until S+10, at which time the port command took control of TC units and operated Gulf ports and beaches with assistance from boat and shore units. During the following weeks, other ports and beaches were opened and ASCOM transferred logistics responsibility to USASOS on 13 February 1945. As other port facilities opened in locations to better support tactical

A jeep, adapted to rails, hauls a three freight car train, loaded with gasoline, carrying a AAA priority, to a combat area on Luzon Island, 1945.

operations, elements of Lingayen Gulf facilities were relocated to the new operations, but the Gulf continued for some time to be a prime source of support to Manila.

The Manila port area was severely damaged by sabotage as well as U.S. bombing and shelling during a last ditch stand by the Japanese to defend the city. The Japanese sank about 500 ships ranging in size from a coastal freighter to an 18,000-ton passenger liner in the harbor to block the entrance and access to pier space. In the midst of the sunken ships, they planted mines. The buildings adjacent to the harbor were totally destroyed and the rubble and craters were

booby trapped. The port machinery was destroyed or dismantled. Rehabilitation challenges for Manila were equal to those of Naples, Marseille, or Cherbourg. When the port command arrived on 13 February 1945, fighting was still going on and the Japanese held much of the city. Navy and Army engineers worked valiantly to rehabilitate the port and on 1 and 2 March 1945, thirteen cargo vessels entered the harbor to commence discharge by lighterage. Operations were controlled by the 4th Engineer Special Brigade, and the bulk of the troops and equipment were initially provided by the engineers. At the end of April 1945, the 54th Transportation Group controlled the port and the nearly 5,000 TC port troops and 7,500 local nationals to run it. The group was assisted by about 5,000 engineer troops. The amount of cargo handled increased daily until it reached a total of roughly 275,000 long tons in April 1945. Nevertheless, the port of Manila suffered from a situation common to most large Pacific ports. In Europe, formally organized port command units were trained to rehabilitate and operate under wartime conditions and take control of captured ports with proven plans and policies. However, Pacific port commands were frequently improvised ad hoc organizations that lacked the stature, organization, and experience of their European counterparts. Qualified observers commented unfavorably on the port's organization and operations. When Maj. Gen. Wilhelm D. Styer, Commanding General, WESTPAC replaced the USASOS, he initiated actions that greatly improved operations. He also increased port staffing to 13,800 troops and over 28,000 civilians and stepped up the pace of rehabilitation of facilities. The sudden capitulation of Japan partially immobilized the port, as ship discharge was temporarily halted and shipments of cargo, units, and individual personnel were rushed to Japan. Many ships were diverted, and both plans and operations required major adjustment. During winter-spring 1945-46, the largest port in the SWPA gradually reverted to peacetime status and the Philippine government began to take over the port. In August 1946, the U.S. still retained five piers for Army use, but supported forces had dwindled to a fraction of former levels.[38]

RAIL OPERATIONS

Luzon was the only island on which rail had any real importance to military operations in the Southwest Pacific Area. While railroads contributed substantially to U.S. Army operations in New Zealand and Australia, those lines were operated by local nationals who made shipments on a commercial basis. Transportation Corps railway troops began taking over rail operations in the Lingayen Gulf area in early January 1945, when the 790th Railway Operating

Company (ROC) landed and began rehabilitating locally available equipment and track which had been severely damaged by the Japanese. The 5202d Engineers provided construction and bridge repair. Lacking coal, the rail unit used driftwood, green wood, and coconut husks for fuel and made a 30 mile run inland on 24 January. Shipments of rail equipment began arriving in mid-February, by which time more than 1,300 civilians were being used for rail work. Operations were extended southward, and by mid-March the first train traveled the 150 miles from the Gulf to Manila. By the end of March, eight trains a day were arriving and departing Manila.

The 790th Railway Operating Company was activated provisionally in Noumea and had few if any experienced rail troops. It was augmented in Luzon by a levy that produced 65 experienced railroaders from troops on the the island. Despite its lack of experience, the unit performed highly valuable services to the invasion. On 13 February 1945, major reinforcements from elements of the 775th Railway Grand Division (RGD) arrived under the command of Lt. Col. Henry G. Balch. During March, three service detachment workshops, a depot company, and the 737th and 749th Railway Operating Battalions arrived and expanded rail service throughout Luzon as area was reclaimed and equipment was received from the United States. At the peak of operations in October 45, 126 officers, 3,074 enlisted personnel, and 6,000 civilians were engaged in operating what was known as the Luzon Military Railway. When hostilities ended, the system was returned to civilian management as soon as practicable, and units were inactivated or prepared for shipment to Japan and Korea.[39]

MOTOR TRANSPORT OPERATIONS

Luzon was the only island in the Philippines where there was a roadnet large enough to set up line haul trucking operations. Fortunately for the Americans, the highways survived the Japanese occupation with less damage than might have been expected. On 13 February 1945, a Provisional Highway Transportation Division was activated under the command of Lt. Col. Ralph H Sievers, and assigned to Luzon Base Section, USASOS. Nine Quartermaster truck companies were placed under the division's operational control and started operations between Base M on the Gulf and Manila. Equipment from the truck units was worn out from two prior campaigns, and the provisional division had to pool all its truck and maintenance resources and operate them as a single fleet so it could function 24 hours a day. On 1 March 1945, the division was augmented by four Coast Artillery (CA) battalions, organized as four provisional Quartermaster truck battalions, each with four heavy companies. By April, the

division had 454 2 1/2 ton trucks operating in 5-10 truck convoys on 12-hour shifts. Later, additional trucks, tractors, and trailers augmented the division's capability to support Sixth Army's main missions on the narrow mountain roads of northern Luzon. Units were transferred between base commands and the division to meet mission needs. The provisional division was redesignated the 100th TC Highway Transport Service on 17 July 1945, and the former CA battalions became the 505th through 508th Quartermaster Battalions (MED). The 100th, with 23 assigned truck companies, was the first of its type seen in the SWPA area, though it was similar to Motor Transport Command No. 1 that operated in Australia in 1942. When the Japanese forces surrendered, highway missions changed from sustainment cargo to large personnel moves of POW and redeploying American units and individuals. The 100th was inactivated on 31 May 1946.[40]

IWO JIMA AND THE RYUKYUS

Although the assault on Iwo Jima was primarily a Marine operation, some Army port and DUKW units were attached to the Marines' landing force and others arrived with the Army garrison. On D-Day, 19 February 1945, the 471st, 473d and 476th Amphibious Truck Companies, along with the 4th and 5th Marine Divisions, landed artillery pieces and ammunition under heavy enemy fire. At the insistence of combat commanders, some DUKWs were overloaded and 133 were lost in early operations. The 592d Port Company landed with the 5th Marine Division in the fourth assault wave and worked with the beach party. The 442d Port Company landed on 2 March 1945. On 14 March 1945, the Transportation Section of the garrison command organized itself as a port group headquarters and took over cargo discharge and beach operations, controlling port, DUKW and truck companies and a naval construction battalion. The port group operated over the beach because port construction was restricted by the steep gradients, heavy surf, and high winds. From mid-March to mid-May the group handled about 270,000 measurement tons of cargo and 16,000 passengers. Traffic gradually declined until operations were phased out by the end of hostilities.[41]

Between April and July 1945, the seizure of Okinawa and other Ryukyus islands by Army and Marine forces of the Tenth Army was the climax of operations in the Pacific. In size and complexity, it dwarfed the transportation tasks of all prior operations, because it was mounted from all over the Pacific and the west coast of the United States. The assault element consisted of 183,000 troops in 430 assault transports and landing ships, and eventually comprised 270,000 troops as the garrison force was augmented. A substantial number of TC units participated in the assault echelon as shown in Chart 13. For the first

time in the Central Pacific, the 53d Medium Port, HQ & HQ Company, organized and trained on Oahu by the AP&SC, was assigned to operate the port of Naha when it was secured. The 53d sailed for Okinawa on 27 March 1945, while its operating port, truck, and service units sailed with support echelons.

The TC units attached to combat units performed tasks as they did in other Central Pacific operations such as at Iwo Jima and Kwajalein. DUKW operations were hampered by the perennial problem of long distances to anchorage areas and shortage of trucks at transfer points. The 53d Medium Port arrived on 3 May 1945, and worked under the 1st Engineer Special Brigade until 31 May, when the port, with its assigned TC and Quartermaster units, was attached to the Navy Joint Freight Handling Facilities. On 7 June 1945, Naha was finally cleared of the enemy and port activities began with lightering operations. Organized resistance ceased on 20 June 1945, and base development proceeded rapidly with over a million measurement tons discharged in July. Responsibility for the Ryukyus passed from Admiral Nimitz to General MacArthur on 31 July 1945. The theater devoted all energies to the general reorganization of Pacific forces and preparation for the landings in Japan.[43]

Preparations for the invasion of Japan were abruptly halted by the end of hostilities on 14 August 1945. From a transportation perspective, operations took a 180 degree turn with ships diverted to the U.S. or to regulating points, held for further orders. Demobilization began almost immediately with all available

TRANSPORTATION UNITS PARTICIPATING IN THE RYUKYUS ASSAULT

UNIT	ATTACHED TO
Hq. and Hq. Det., 504th Port Battalion	XXIV Corps
200th, 291st Port Companies	7th Infantry Division
472d, 481st Amphibian Truck Companies	7th Infantry Division
204th, 293d Port Companies	96th Infantry Division
474th, 827th Amphibian Truck Companies	96th Infantry Division
292d, 203d, Port Companies	77th Infantry Division
477th, 828th Amphibian Truck Companies	77th Infantry Division
456th Amphibian Truck Company	III Amphibious Corps
454th Amphibian Truck Company	1st Marine Division
814th Amphibian Truck Company	6th Marine Division

Chart 13

types of vessels used to bring the troops home to the United States. For example, Lt. Col. Cecil H. Davidson, Operations Officer of the 2d Port in Manila, took the lead in converting Liberty cargo ships to troopships by installing bunks, a sickbay, sanitary and messing facilities, and any other amenities that could be improvised. By the end of November, 30 Liberty and two Victory ships were converted in the Philippines and put into redeployment service. Other shipping was diverted to the Pacific theater, and by the end of February 1946, almost 700,000 troops had been redeployed by ship, and about 17,000 by air.[44] Demobilization continued well into 1946, but the trend was steadily downward. In addition to redeployment, the Corps kept fully occupied well into the post-war period with the movement of Australian war brides to the U.S. and the roll-up of equipment and supplies at inactive bases, as well as the support of occupation forces.

The success of campaigns in the Pacific was highly dependent on the management of scarce transportation resources. Army Transportation staffs and units contributed notably to the support of both assault and logistics operations in all theater operational areas.

CHAPTER X

The Post World War II Era

"It was a history making maneuver saved Pusan."

General Walker, Commanding General, 8th Army, 1950

THE BERLIN AIRLIFT

The Teheran Conference of 28 November 1943 was the first of four major conferences between the United States, the Soviet Union, and Great Britain. While most of the emphasis of the conference focused on military arrangements for continuing the war, the participants discussed the fate of postwar Germany. President Roosevelt wanted the United States to occupy Northwestern Germany and control the ports of Bremen and Bremerhaven. His concept included British occupation of Southern Germany and Soviet occupation of a smaller zone in Eastern Germany.

The Allies met at Yalta in February 1945 and finalized the future zones of occupation, which included France as an occupying power. One of the issues left unresolved was the occupation of Berlin. At the Potsdam Conference in July 1945, President Truman found himself in the middle of a dispute between Stalin, who wanted to expand the holdings of the USSR, and Churchill, who wanted to limit them and halt the westward expansion of Soviet power. Despite the disagreements, the division of Berlin was finalized with the Soviets having 8 boroughs, the United States 6, the British 4, and the French 2.[1] No longer fueled by the common danger of Nazism, the Potsdam Conference effectively signaled an end to the wartime cooperation between the east and west. The period of mutual distrust known as the "Cold War" had begun.

During the next several months, the four nation government of Berlin ran fairly smoothly and, on 30 Nov 1945, the Allied Control Council officially approved an "air corridor agreement," which clearly spelled out the rights of the Western Allies in the air corridor between Berlin and the western zones. This agreement was the only written accord ever concluded with the Soviet Union in which the rights of Allied access to Berlin were clearly defined.[2]

In late 1945, the Transportation Corps established the Berlin Duty Train. Commanded by a Transportation Corps lieutenant, the train provided a safe and reliable means for transporting soldiers and their family members in and out of the Western Sector of Berlin. This 110 mile journey transited the East German corridor connecting both Frankfurt and Bremerhaven, West Germany nightly with West Berlin.

In early 1946, after months of communist propaganda, Berlin held its first free election since 1933, and the Social Democratic Party (SDP) overwhelmingly defeated the Soviet controlled Socialist Unity Party. This victory for democracy marked the beginning of the deterioration of East-West cooperation in Berlin.

By late 1946, the Soviets' actions made it evident that they did not intend to cooperate in a multinational government of Germany. Poland, Hungary, Rumania, Bulgaria, Yugoslavia and Albania fell under communist control. Communist supported civil strife threatened the independence of Greece, while the Soviet Union sought to intimidate Turkey.

Once Soviet intentions were clear, President Truman realized that accommodation of the Soviet Union in Europe would surrender the continent to Soviet domination.[3] In March 1947, President Truman established what became known as the "Truman Doctrine," extending military and economic assistance to Greece and Turkey. That policy would eventually encompass all of Europe under a broader recovery program known as the Marshall Plan, after Secretary of State George Marshall.

The Soviets placed increasingly restrictive controls on transport into and out of Berlin. Even U.S. military trains were stopped and passengers checked for proper identification. In April 1948, the Soviets closed the civilian freight lines into Berlin from Hamburg and Nuremberg. Only one line remained, the route of the Berlin Duty Train, which ran from Helmstedt to Berlin and anyone traveling the route needed an individual clearance from Soviet military authorities.

On 24 June 1948, the crisis reached a climax. All traffic to and from the western part of Berlin occupied by the Allies was stopped, isolating it from the western occupation zone of Germany. The Soviet blockade was a direct challenge to the Allies' position in Berlin. The first few days of the blockade were uncertain ones for the Berliners, but the constant sound of aircraft flying into the city assured them of United States and Allied support. On the first day of emergency airlift, "Operation Vittles," sixty four aircraft carried 156 tons of supplies into Berlin. This was an impressive start, especially since the Air Force's primary cargo aircraft, the C-47, had a maximum lift capability of 2 to 3

Berlin motor pool in support of Operation Vittles

tons. It also demonstrated the Army's quick reaction to the emergency. Prior to the airlift, Berlin over a 72 hour time frame had received only 5.8 tons of cargo flown in by three aircraft.[4]

The newly formed Transportation Corps played a significant role in this successful operation. At Rhein-Main Air Base, the Transportation Corps' aerial port of embarkation (APOE), was established to support the airlift. The APOE controlled the arrival of cargo at the airfield, and ensured the loading operations on the field proceeded smoothly. Major Andrew P. Flannigan, a Transportation Corps officer from European Command (EUCOM), Chief of Transportation, was briefed on the Soviet blockade and his personnel immediately began calling cargo forward from the European Quartermaster Supply Depot at Giessen. Lieutenant Colonel H. J. Kelleher, Commander, 6th Transportation Truck Battalion, mobilized the 67th Heavy Transportation Truck Company and began moving supplies. On that first Sunday of the blockade, the 67th Transportation Company moved over 200 tons of cargo to the APOE. (see Map 30).

On 29 June, when the Soviets refused passage to a U.S. train loaded with supplies for the civilian population of Berlin, the Allies realized that the airlift would have to expand. The Transportation Corps then established a second traffic control point (TCP) at Wiesbaden Air Base with the same responsibilities as


FEDERAL REPUBLIC OF GERMANY
DENMARK
Baltic Sea
North Sea
N
0 50 Miles
0 50 Kilometers
Kiel
Mecklenburger Bucht
Schleswig-Holstein
Hamburg
Hamburg
Bremen
Bremen
NETHERLANDS
Lower Saxony
POLAND
GERMAN
Berlin
Potsdam
DEMOCRATIC
Hanover
Helmstedt
REPUBLIC
North Rhine-Westphalia
Dusseldorf
Bonn
Hesse
BELGIUM
Frankfurt (Rhein Main)
Prague
Rhineland Palatinate
Wiesbaden
Mainz
LUXEMBOURG
CZECHOSLOVAKIA
Saarland
Saarbrücken
Bavaria
Stuttgart
Strasbourg
FRANCE
Baden-Württemberg
Munich
Salzburg
AUSTRIA
Zurich
SWITZERLAND
International boundary
Länder boundary
National capital
Land capital

Map 30

Cargo handlers moving subsistence in support of Operation Vittles

those of Rhein-Main. Within three hours of the alert notification, Capt. R. A. Brausch had the TCP operational.

Soon after the two APOEs began operations, the amount of cargo shipped to Berlin rose to over 4,000 tons per day. With the increased level of activity, vehicle maintenance and driver fatigue became significant problems. Additional truck units, including the 122d Transportation Truck Battalion and the 76th Heavy Transportation Company were assigned to maintain the constant flow of cargo for the airlift.[5]

The truck companies were placed under control of the 24th Transportation Truck Battalion, commanded by Lt. Col. H. Y. Chase. Chase established a

rotation system which allowed truck support to proceed smoothly. The truck companies were relieved for 10 days after 30 continuous days of support operations. The relief period allowed for maintenance of the trucks and rest for the drivers.

During the airlift, almost all air cargo was shipped breakbulk, which increased the handling requirements, exposure to breakage, and the possibility of pilferage. A U.S. Navy study released in 1951 revealed that breakbulk cargo on the average was being handled 14 times between supplier and consumer. Though the study analyzed ship operations, the handling requirements of breakbulk cargo for air transport proved to be basically the same.

During the Berlin Airlift, a 10 ton trailer would be backed up to the cargo door of the aircraft, and the team would manually load the cargo. An experienced load team could load nine tons of cargo aboard a C-54 cargo aircraft in 25 to 30 minutes. These experiences of handling material accelerated the move to palletization of military cargo. Palletizing significantly reduced manpower requirements for aircraft loading, eventually revolutionizing the capability of military air transport.[6]

In Berlin, Col. L. D. Bunting, the Post Transportation Officer, assumed responsibility for receiving the supplies and clearing the aerial port of debarkation (APOD), Tempelhof Airport. Colonel Bunting used his transportation staff to ensure that incoming aircraft were rapidly unloaded so incoming cargo did not clog the APOD.

Additionally, the Transportation Corps managed the assets that delivered aviation fuel into Germany for the airlift. Over 1,500 rail tank cars and three ocean-going vessels a month were used to ensure that the U.S. Air Force had the fuel to continue the massive airlift into Berlin. By the end of April 1949, 15.6 million gallons of fuel were being consumed monthly to support the operation.[7]

Through the winter of 1948, the Transportation Corps supported the movement of food, clothing, coal, raw materials and medicines to sustain the 2.5 million West Berliners. By early 1949, aircraft were flying over 8,000 tons of cargo daily to support West Berlin. In total, the Transportation Corps at peak operations had at work 55 officers, 295 enlisted men, 3,000 German laborers, and several truck companies.[8] On 4 May 1949, the Western Allies arrived at an agreement with the Soviets for lifting the blockade; and, on 12 May 1949, all transport, trade and communication services between eastern and western Germany were restored. After continuing the airlift for three more months to build reserve stockage in West Berlin, the historic last flight left Rhein-Main en route to Tempelhof on 30 September 1949.[9]

From a political standpoint, the airlift proved the Western Allies' resolve to stay in Berlin and defend the postwar agreement for the occupation of Germany. From a logistical standpoint, the Berlin Airlift validated the ability of the Allies to logistically support a massive operation by air.

Until the Berlin Airlift, air transportation was considered a limited means of supporting a ground force for a short period of time. Planning the support of a large combat force using only aircraft had been considered to be militarily unfeasible. With the unprecedented success of supporting 2.5 million Berliners over air lines of communication (ALOC), the age of rapid strategic mobility and force projection had begun.

ARCTIC AND ANTARCTIC OPERATIONS

In the 1950s and 1960s, the Transportation Corps was actively involved in tests and operations both in the Arctic and in Antarctica. At Churchill in Manitoba, Canada, Transportation units under the direction of the Transportation Corps Board examined equipment under cold weather conditions in testing that had begun in World War II. At the same time, other Transportation units supported the establishment and operation of the U.S. and Canada Distant Early Warning (DEW) Line (code named Project 572). Transportation Corps detachments also supported the National Science Foundation in preparing for its experiments in the Antarctic during the International Geophysical Year (IGY) which began 1 July 1957. The operation was aptly named Project Deep Freeze.

COLD WEATHER RESEARCH AND DEVELOPMENT

During the winters of 1947-1949 the 1st Arctic Test Detachment tested transportation equipment in Arctic operations at churchill, where Transportation Corps terminal units had supported construction of arctic weather stations and emergency landing fields in World War II.[10] The Transportation Arctic Group (TRARG) which was established in the early 1950s, continued to test transportation equipment as well as observe tests undertaken by other agencies in the Arctic. TRARG tested rail equipment and operations, as well as motor vehicles for both highway and cross country operations. Many of the tests included unique vehicles such as low ground pressure tractor and sled snow trains, the commercial bag-wheeled "Rolligon" and rubber rolling fluid transporters. TRARG also tested the maintenance of equipment under arctic conditions. Cold weather operations were only one of many interests of the Transportation Corps Board, first established at Fort Monroe, Virginia in

Two LSTs support Operation DEW Line along the northern coast of Alaska and Canada above the Arctic Circle

December 1944 under the Chief of Transportation (CofT). After a brief discontinuance in April 1950, the board was reestablished on 10 August 1950 at Fort Eustis as the Transportation Board and served as the senior advisory group to the CofT on combat development matters. The Board's operational test agency, the Transportation Research and Development Station (TRADS) at Fort Eustis developed and tested innovative equipment and concepts such as the aerial tramway for ship to shore discharge, the CONEX transporter, overland conveyor systems, numerous barge configurations including a collapsible air transportable model, the 60 Ton BARC and various prototype barges and lighters.

In 1952, the board was also experimenting off the coast of France with discharging ships while anchored offshore. This was the seed for the current logistics-over-the-shore (LOTS) operations. That capability would allow U.S. Forces to deploy or be sustained offshore when port facilities were destroyed or nonexistent. In August 1962, the board and TRADS were transferred to the Army Materiel Command's Test and Evaluation Command when the technical services were divested of their operational responsibilities.[11]

THE ARCTIC

The largest and longest lasting arctic program was Project 572, which supported the U.S. Air Force Northeast Air Command's (NEAC) huge air base at Thule, Greenland, and the DEW Line sites across the top of the continent. Resources for the projects were unprogrammed, so troops had to be drawn from the Transportation Corps and sources outside the Corps without depleting strategic reserves. At Fort Eustis, engineer, chemical and quartermaster organizations supplemented by transportation units were formed into "fixed" or "mobile" port units and cross trained in terminal service skills by the 4th Transportation Terminal Command. They were then sent to the departure ports for deployment. In addition to adverse weather conditions, the program was marked by the lack of timely planning information, fluctuations in mission requirements, and extremely complex command and control arrangements because of the multitude of government and civilian contractor agencies involved. Nevertheless, each year the required units were assembled, trained, and deployed, executing their assigned missions in an outstanding manner.[12]

Units and cargo shipments were marshaled principally in the New York and Seattle POE. During the summer months, Navy convoys shipped units and cargo to the ports and beaches supporting NEAC operations and the off-loading points accessible to DEW Line sites. There they were off-loaded by Transportation Corps units.

The 373d Transportation Port Command, later redesignated the 7278th Transportation Terminal Command, supported operations in the eastern sector, which included Greenland, Newfoundland, Labrador, and Baffin Island. The first commander of the 373d was Brigadier General Richard Whitcomb, who was succeeded by Colonel (later Brigadier General) Charles F. Tank, and Colonel Cornelius J. Rinker. Units of the 373d lived aboard their vessels. Moving from place to place, they were augmented by landing and harbor craft and land transportation. At the sites, they rendezvoused with freighters and discharged cargo using LCMs and LCUs across partially ice-bound unimproved

beaches. When required, they moved the cargo by truck to dumps or depots. In some terrain, transporters fabricated sledges, nicknamed "Stoneboats" which were pulled by tractors to move cargo inland. The Transportation Arctic Group actively performed some of its tests by hauling cargo 120 miles across the ice cap in support of the Corps of Engineers and other Department of Defense agencies. In 1951, Operation Blue Jay was the first over-the-beach operation in the Arctic. Transportation Corps troops unloaded over a half-million tons of cargo in eastern Canada and Greenland prior to the development of port facilities.

The Seattle POE and the Commanding General, US Army Alaska (USARAL) controlled operations in the western sector. In 1956, there were twelve terminal service companies, but no transportation command like the 373d was required because the Seattle POE and USARAL provided the command and control. The terminal service troops were trained and deployed as they were elsewhere. The Transportation Corps continued to provided support through the early 1960s, under the acronym SUNEC - Support of Northeast Command, with improvements in facilities and equipment each year and a decrease in tonnage as construction was completed. Military terminal service support was gradually phased out and replaced by contractor operations.[13]

ANTARCTIC OPERATIONS

The Transportation Corps made small but important contributions to the support of National Science Foundation Antarctic operations by Navy Task Force 43 before, during and after the 1957 International Geophysical Year. Transportation Corps units established "safe" trails across unexplored Antarctic territory filled with deadly crevasses, and provided a team with UH-1B Iroquois helicopters to back up the mission of the U.S. Geological Survey (USGS) annually from 1961-1969. Transportation Corps individuals and teams built trails and led teams across the ice cap from 1956 through 1961 from Little America to inland sites, including the South Pole with great distinction.[14]

EXPLORERS OF THE TRANSPORTATION CORPS

Lieutenant Colonel Merle R. Dawson, Maj. Palle Mogenson, Maj. Antero Havola, and CWO George Fowler each made Antarctic history by leading or navigating Army and Navy teams to establish trails, some of which were used for many seasons. They led similar teams across the ice cap on traverses as long as 800 miles. Indeed if not fame, their names rank with explorers such as

Amundsen and Scott. Jointly they contributed to developing techniques for navigation, location and filling of crevasses, and trail maintenance.

In Greenland, CWO Fowler and S.Sgt. B. M. Win developed the Fowler-Win Method of High Latitude Navigation, which could fix a position within 100 feet. Several had their names given to newly discovered geographical features. Fowler Canyon in Greenland was named for CWO Fowler and Mount Dawson, a 14,000 foot peak in Antarctica, was named for Lt. Col. Dawson.

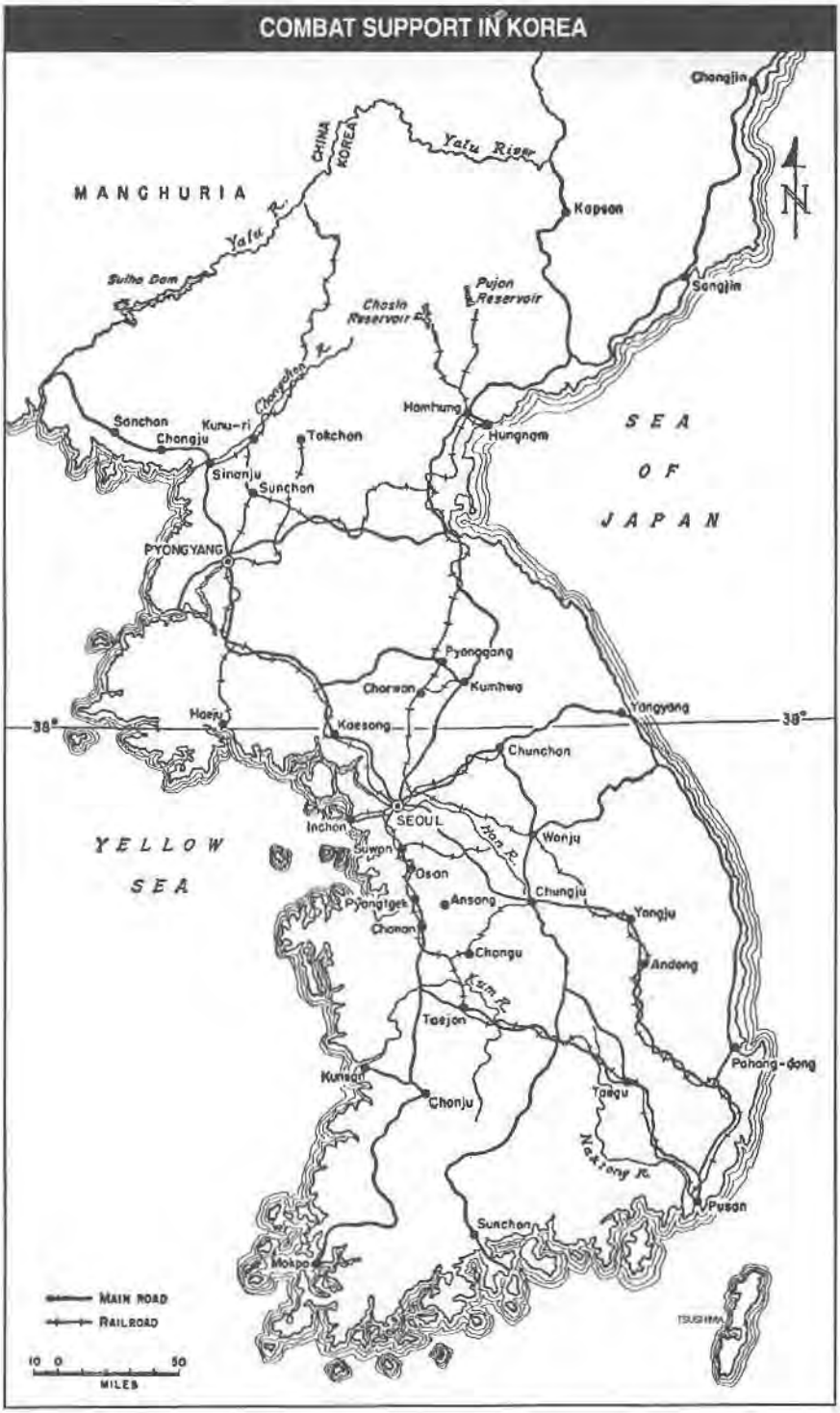
In 1961, a detachment of ten Transportation Corps officers and men led by Lt. John A. Greene was sent to the Antarctic with two Iroquois turbo-driven helicopters to support the USGS by gauging the exact altitude of mountains by telurometer equipment. At the same time, they tested and reported on operating and maintaining helicopters under extreme cold conditions. Similar detachments, with three helicopters were sent annually through 1969. Successor models of Iroquois, some modified with extra tanks to increase range, were assigned to cold weather operations. Specially developed support equipment was tested to improve operations. One such item was a 10,000 gallon fuel bladder that reduced fuel handling and improved fuel cleanliness.[15]

KOREA

Pre-1945 Korea was a country about the size of Kansas, covering some 85,246 square miles. When the country was divided after World War II, the South Korean portion covered 38,175 square miles and the North Korean 47,701. Bordering China and controlling the entrance to the Sea of Japan, Korea had been a strategic prize for China, Russia, and Japan during the last 500 years.[16] Traditionally isolationist, Korea was dominated by Russian and Japanese military politics throughout the late 19th and early 20th centuries (see Map 31).

In the late 19th century, Japan, beginning its period of expansionism, launched a military expedition to Korea, "to establish a treaty of friendship and commerce". After limited resistance, the Koreans signed an agreement with the Japanese to open their ports and provide Japanese citizens extra-territorial rights.[17]

Korea, concerned about Japan's intentions, consulted China, who advised them to find an ally in the West and form an alliance. In May 1882, Korea and the United States signed a treaty of "amity and commerce". By 1893, the Koreans had trade treaties with nearly every European power, but Japan was determined to make Korea part of its empire.[18] Over the next ten years, China, Japan, and Russia vied for control of the Korean peninsula. After defeating the Russians in the Russo-Japanese War, the Japanese established their own military


COMBAT SUPPORT IN KOREA
Chongjin
CHINA
KOREA
Yalu River
MANCHURIA
Yalu R.
Kapsan
N
Suiho Dam
Pujon Reservoir
Chosin Reservoir
Songjin
Chosan R.
Hamhung
Sanchon
Kuru-ri
Chongju
Tokchon
Hungnam
SEA
OF
JAPAN
Sinanju
Sunchon
PYONGYANG
Pyonggang
Chorwon
Kumhwa
Yangyang
38°
Haeju
Kaesong
38°
Chunchon
Inchon
SEOUL
Han R.
Wonju
YELLOW
SEA
Suwon
Osan
Chungju
Pyongtaek
Ansong
Yangju
Chonan
Chongu
Andong
Kum R.
Taejon
Pohang-dong
Kunsan
Taegu
Chonju
Nakdong R.
Pusan
Sunchon
Mokpo
MAIN ROAD
RAILROAD
10 0 50
MILES
TSUSHIMA

Map 31

government and ruled the Korean people ruthlessly until the fall of the Japanese empire at the end of World War II.

"To the victors go the spoils of war" was the Soviet attitude toward occupied areas during World War II. The Soviet Union as an ally of the Western Powers against Japan and Germany claimed territory it occupied or created client states in its "area of influence". Korea was not an issue in any of the major conferences and became a Soviet target.

In April 1945, the Red Army defeated Japanese forces occupying Manchuria, and were poised to enter Korea. The possible spread of Russian influence into Korea led the United States to consider deploying troops to Korea, in order to keep the Soviets from controlling the entire Korean peninsula.

Late on the night of 10 August 1945, barely 24 hours after dropping the atomic bomb on Nagasaki, the State-War-Navy Coordinating Committee hastily determined that the United States should participate in the occupation of Korea. "Two officers from the committee looked over a map of the Far East and decided that the 38th Parallel ran across the middle of the country." The ensuing proposal for the United States-Soviet division of Korean areas of influence was an important test of Soviet intentions in the Far East. Dean Rusk, future Secretary of State said, "if the Soviets reject our offer they could overrun Korea before the first GI could be landed at Inchon".[19] Much to the relief of Washington, the Soviets quickly accepted the proposal and, a month later Soviet troops occupied the upper Korean Peninsula.

UNITED STATES OCCUPIES KOREA (1945-1949)

The United States involvement in Korea began in early September 1945, when U.S. soldiers from the XXIV Corps began arriving in Inchon. In the weeks to follow, major units disembarked at Inchon and moved by truck and train to take positions between Pusan and the 38th Parallel.[20]

Over the next three years the United States was one of nine nations to occupy South Korea as part of the United Nations Temporary Commission on Korea (UNCOK), an agency designed to help reunite the country and end the division.

In May 1948, South Korea held an election under the auspices of the United Nations. Syngman Rhee was elected chairman of the Korean National Assembly, which adopted the Constitution of the Republic of Korea two years later. On 15 August 1948, the government of the Republic of Korea was formally inaugurated and the U.S. military government in Korea was terminated. Kim II Sung was elected premier of the Democratic Peoples Republic of Korea

and took office on 10 September 1948, declaring the Democratic People's Republic the ruling power of all of Korea.

With the election of the South Korean government, the U.N. recommended the occupying powers withdrawal their forces from Korea. Russia followed with an announcement that all her occupation forces had withdrawn from North Korea. On 23 March 1949, President Truman approved the withdrawal of the remaining U.S. troops from Korea.

NORTH KOREAN INVASION (JUNE 1950)

With the withdrawal of U.N. forces, North Korea began its campaign to overthrow the South Korean Government. Civil disorder was promoted in the south, while incidents increased along the border. Over the next year, border incidents and guerrilla attacks in South Korea continued.

On 8 June 1950, the P'yongyang newspaper published a manifesto adopted by the United Democratic Patriotic Front proclaiming its objective to be a parliament which could be elected in early August consisting of both North and South Koreans. The parliament's first meeting was scheduled in Seoul on 15 August 1950, the fifth anniversary of the liberation from Japanese rule.[21] The manifesto clearly indicated that the communist regime in North Korea expected to rule a united Korea. During mid-June, the North Korean Army deployed its regular divisions along the 38th Parallel in preparation for an attack on South Korea.[22]

On Sunday, 25 June 1950, North Korean tank units began the invasion. The attack came as a surprise to Washington, which had known for months that the North Koreans had the capability to invade the South, although no intelligence source indicated it as an imminent possibility. Some observers recorded that the shock in Washington resembled that of Pearl Harbor.[23]

On the evening of 26 June, General MacArthur informed President Truman that Republic of Korea (ROK) forces could not hold Seoul and were in danger of total collapse. Subsequently, the United Nations Security Council passed a resolution calling upon member nations to give military aid to South Korea in repelling the North Korean attack. This measure was passed only because the Soviet delegate abstained to protest the U.N.'s refusal to admit Communist China.

The invasion rapidly picked up momentum as the South Korean resistance collapsed. Seoul fell on 28 June, and the South Korean government fled south to Taejon. The U.N.'s resolve to assist South Korea militarily prompted President Truman to commit U.S. ground forces. The nearest U.S. combat forces were four divisions serving as occupational forces in Japan. Those divisions, the 7th, 24th, and 25th Infantry Divisions and the 1st Cavalry Division, were

considerably under strength. Due to reductions that had occurred after the end of World War II, there were only two battalions in each infantry regiment instead of three. Similar shortages were present in the other divisional combat arms units, which averaged about 70 percent of full strength. Three of the divisions numbered between 12,000 and 13,000, while the remaining had about 15,000 soldiers. The divisions were also short of heavy weapons, such as recoilless rifles and 4.2 inch mortars, and the divisional tank units were equipped only with the M24 light tank, and had no main battle tanks. Nearly all divisional equipment reflected wear from service in World War II.[24]

The United States planners believed that, after limited action, North Korea would retreat and the war would end quickly. This early attitude significantly affected not only the preparation of combat forces, but also the quantity and quality of logistical support to the theater. The view that Korea would be a quick operation, coupled with the fact that Western Europe still had the highest global military priority, meant the Korean Theater had to compete for equipment and personnel. Washington felt a successful full scale war in Europe depended on maintaining sufficient troops and equipment prepositioned in Western Europe.

UNITED STATES DEPLOYS TROOPS TO KOREA

In Japan, General Walton H. Walker, commander of 8th Army, was instructed to order the 24th Infantry Division to Korea at once. Because of the shortages of personnel and equipment, the 8th Army transferred over 2,100 soldiers to the 24th Division, bringing its strength to 15,965 men and 4,773 vehicles.[25]

Lieutenant Colonel Charles B. Smith, commanding officer of the 1st Battalion, 21st Regiment, was selected to command the first American ground troops to meet the enemy in the Korean War. Notified of the battalion's deployment on 30 June 1950, Task Force Smith's 440 men arrived in Pusan on 1 July, unaware of what was in store for them.

Four days later, Task Force Smith engaged the North Koreans at Osan. The task force was competently led and, Lieutenant Colonel Smith chose his position well. Despite a heroic effort by the task force, there was little it could do against a North Korean division equipped with tanks. The result was 150 American casualties. Task Force Smith became a symbol of imprudent military cutbacks and lack of readiness.

SHIPPING AND TERMINAL OPERATIONS

With U.S. Army ground forces arriving in South Korea, the number of supply requisitions to support the Korean Theater rose from 48,000 to over 98,000 a month, foreshadowing the major support that would be required in the future.[26] As a normal procedure, requisitions were funneled through the San Francisco port of embarkation (SFPOE), Overseas Supply Division (OSD), subordinate to the Chief of Transportation.

In 1950, control of the OSD was assigned to the Department of the Army Director of Logistics (G4), while the port of embarkation (POE) remained the responsibility of the CofT. With the supply and port operations in two different organizations, the need for effective communications was critical.

Throughout the hostilities in Korea, the SFPOE, commanded by Maj. Gen. Graham W. Lester, remained the primary port for equipment and personnel deploying to the Korean Theater. The port commander was responsible for the troop movement through the port, loading and unloading of ships, inland waterway movement of cargo and personnel, maintenance, operations of railway equipment and motor vehicles assigned to the port.

The OSD was staffed with representatives from all the technical services (Quartermaster, Ordnance, and Chemical) to oversee the movement and requisitions of their respective classes of supply. The OSD received requisitions by teletype, radiogram, standard prepared forms, and machine record cards. Once verified, requisitions would be forwarded to the respective supply depot to fill. Once the requisitions were filled and delivered to San Francisco or the secondary port in Seattle, supply requisitions would arrive in Korea 120 days after the date the requisition was submitted. High priority cargo, beyond the capacity of airlift, would go by Marine Express (MARINEX) top loaded on fast sailing vessels directly to the Korean Theater.[27]

Though air transport was much faster, it was also very expensive, costing $5,000 to fly one ton of cargo to Korea, while the cargo rate by sea was only $38 a ton. Even by the end of the Korean War, the Air Age had not fully arrived. Less than 1 percent of all cargo arriving in the theater moved by air.[28]

The bulk of the 31.5 million tons of supplies sent to the Korean theater arrived by Liberty and Victory ships. In 1950, a Liberty ship with a capacity of between 6,000 and 7,000 tons could make a one-way trip from San Francisco to Korea in 16-20 days. Once a ship arrived, the ability to berth the ship and unload its cargo could easily equal transit time.

Beginning with the deployment phase of the Korean War, the SFPOE saw its tonnage jump from 94,000 measurement tons a month to 501,823 tons during August of 1950. During the same month, the port shipped 10,238 tanks, trucks, trailers, and ambulances, almost tripling the peak monthly outload for World War II.[29] Transporters operating the port of San Francisco saw a 530 percent increase in work, with a very little increase in additional manpower. The accomplishment was a tribute to the Transportation Corps' capability to respond rapidly to support a major military operation.

With the increased demand for transportation expertise to support the U.S. Army's deployment needs, the training operations at Fort Eustis, Virginia were increased. To satisfy that requirement , the Army established the Transportation Center during August 1950 to serve as the Corps' training base. The Transportation Center was organized into three elements: The Transportation Corps Board, the Transportation Corps Research and Development Station, and the Transportation Corps Training Center. The overall purpose of the Center was "To carry out the responsibilities of the Chief of Transportation for training, research and development and all other activities located at Fort Eustis, as well as to provide for the overall operation of Fort Eustis and the subinstallations".[30]

With the expansion of the Korean Theater, the Japan Logistical Command established the Pusan Base Command, which had the responsibility to receive, store, and forward supplies to the 8th Army throughout South Korea. Less than two months later, the rapid escalation of forces led to design of a new logistical command commanded by a transportation officer, Brig. Gen. Paul F. Yount. The 2d Logistical Command was the first logistical command organized under an approved table of organization during combat operations.[31]

The 2d Logistical Command had the immense responsibility for unloading and preparing cargo for onward movement into the Korean Theater. The primary port used throughout the war was the Port of Pusan, the only one in South Korea with adequate deep water dock facilities for handling a substantial volume of general cargo. The four piers and intervening quays at Pusan could berth 23-29 Liberty or Victory ships, while an additional 12-15 Landing Ships Tank (LST) could unload on the beach at one time, for a port discharge potential of 45,000 measurement tons per day.[32]

The 8057th Provisional Port Company established initial port operations. Stepping up unloading to respond to the deployment surge into Korea, the 8057th supervised the discharge of 309,000 measurement tons of cargo during July 1950. Their workload continued to increase to a record 846,000 measurement tons by December 1950.[33]

Confusion rampant at Mukhojin-ni, Korea

By late 1950, the 7th Transportation Major Port (today the 7th Transportation Group, Fort Eustis, Virginia), commanded by Col. Raymund G. Stanton, had assumed operational responsibility for the port, discharging over 28,000 tons of cargo per day. By late 1952, the 7th Port celebrated its ten millionth ton of military cargo shipped through the Port of Pusan since the outbreak of the Korean War. By the end of 1952, it handled about one million measurement tons of cargo a month. All other ports together in South Korea were handling a total tonnage about one third as great.[34]

Inchon was the second port, with a discharge tonnage of about 4,600 measurement tons during the month of June 1951; by late 1952, it was handling over 55,000 tons a week.[35] Some small ports on the south coast were outports of Pusan with specialized missions. For example, Ulsan to the east handled ammunition and petroleum, oil, lubricants (POL) at two separate terminals. Kusan, on the west coast, south of Inchon was directly under the 2d Logistical Command and handled primarily civilian relief shipments such as coal, grain and fertilizer, and cement for both civilian and military use. The port also provided support to the nearby U.S. Air Force K-8 Air Base, notably POL discharged from coastal tankers at the port and moved by pipeline to the base. The port was inland on the Kum River, subject to 20-30 foot tides, and ships had to be lightened in Yokohama or Pusan to clear shoals in the river.

The port was commanded by Lt. Col. Richard C. Biggs from 1952-53. In the Spring of 1953, Lt. Col. Biggs expanded operations across the river to establish a temporary ammunition outport served by a branch of the main north-south rail line. At that time extraordinary measures were being taken to bring theater reserves, particularly ammunition, to authorized levels in anticipation of restrictions in armistice terms. Following the truce, the port also hosted a United Nations Inspection Team established to monitor compliance with armistice restraints on imports of war materials.

Port operations throughout South Korea were effective in sustaining the large combat force in Korea, yet the ability to reach operating capacity was hindered by several problems. The first and most significant was the availability of a skilled work force. Local stevedores were mainly inexperienced and hard to get, and the language barrier caused problems in running the docks in Korea.

There was also a high pilferage and breakage rate. During a visit to the Port of Pusan during February and March 1951, one observer noted that the Korean stevedores, with no supervision in the holds, would drop cargo instead of lowering it in order to break open the contents. Subsistence and post exchange packs were favorite targets. Once broken, the cargo would be searched and roughly 10 percent would be stolen.[36]

Besides pilferage and breakage, the port at Pusan had a significant shortage of harborcraft. With an overwhelming demand for dock space, lighterage was used to transfer cargo ashore from ships anchored in the harbor. As use of the port increased, the demand for lighterage exceeded available assets. The shortage hindered the port commander's ability to reduce vessel turnaround time.

Port congestion also hampered throughput in the Port of Pusan. It was the product of two factors: establishing supply depots in close proximity to the port and the lack of adequate transportation facilities for clearing the port cargo into the theater. Rated at a discharge capacity of 45,000 measurement tons a day, Pusan had an actual average daily discharge rate of only about 14,000 tons during fiscal year 1951. Other South Korean ports had similar limitations, resulting in vessels waiting an exorbitant amount of time before discharge. At times, ships had to remain at the outer harbors for as long as twenty to twenty-five days (The average Victory ship took 18 men 14 days to unload). At one time thirty-six vessels were at the Port of Inchon with an average in-port time of 22 days.[37]

The congested ports, pilferage, and breakage resulted in the Transportation Corps developing a reusable steel container somewhat resembling a bank vault. The container, initially called the Transporter, was designed to be easily transported by all modes of surface transportation. The Transportation Corps began the Container Express (CONEX) service during late 1952 with a shipping route between the United States and the Far East. Transporters were moved by military or civilian truck, a flatbed, or gondola rail car. From the depot to the Port of San Francisco, they were shipped by Marine Express (MARINEX) to Yokohama, Japan. From there, Transporters were shipped to U.S. ports in Korea.

Military vehicles delivered the Transporters to consignees and returned with empty containers. The ability to rapidly handle these containers reduced port pilferage and breakage, and significantly reduced transportation time. With an average round trip of 55 days, at least 25-30 days of transit was saved.[38] This was an important logistical accomplishment for resupply of the Korean War, and the beginning of containerization in the Transportation Corps.

When cargo cleared a Korean port of debarkation, the job of the Transportation Corps' had just began. The success of any military operation was directly related to the ability to supply it by surface transportation. In Korea, the most significant impediment was Korea's poor road network.

TRUCK TRANSPORT OPERATIONS

By American standards, the only first-class road in Korea was the Inchon-Seoul highway, a paved dual lane thoroughfare, and a few stretches of roads branching out from Seoul. Most Korean roads were poorly surfaced with crushed stone and barely wide enough for one way traffic. Bridges were extremely narrow and had low weight capacities.[39]

1st U.S. Cavalry Division convoys to new positions outside Seoul, Korea 28 April 1951

Weather affected these roads considerably. In the rainy season, they turned to mud; in the winter, both roads and bridges were covered with ice. During the dry periods, dust clouds revealed the location of even the smallest convoys. These conditions were compounded by the mountainous character of Korea. Over 70 percent of the country has slopes greater than 30 percent grade, which placed severe limitations on military transportation.

By the end of the war, South Korean and U.S. Engineer units with the help of countless Korean citizens, built over 2,700 miles of roads, which were maintained for exclusive military usage. Constant repair of the main supply route (MSR) meant truck transport was able to take some of the burden off the rail network. The Pusan-Seoul highway, like several of the other MSRs, had a capacity of 8,000 tons over a 24-hour period. The Inchon-Seoul highway was the exception, with a capability of around 20,000 tons a day. By May 1951, the highway transport system was moving about 465,000 tons of cargo per month.[40]

The tonnages transported on the poor Korean roads placed a heavy maintenance burden on already strained truck resources. By World War II planning figures, the Korean theater was supposed to have at least 48

transportation companies. However, by mid-1951, only 36 companies were available. These 36 truck companies provided the theater with 1,491 two and half ton trucks and 181 ten ton trucks, with a readiness rate of 80.5 percent and 74 percent, respectively.[41] The 73d Transportation Company set a maintenance standard unheard of in a combat environment by compiling more than one million truck miles without having one of its 48 trucks miss a single day of service.[42]

Even with the extreme dedication to mission accomplishment portrayed by the 73d, the Korean Theater still had a significant shortage of truck transport. The line haul support required to sustain the incredible ammunition demands during the Communist spring offensive of 1951 taxed the very limits of the theater's distribution system. During the Battle of Soyang, expenditures of artillery rounds reached unheard-of rates. In seven days, from 17-23 May 1951, 21 battalions supporting X Corps fired over 309,000 rounds — more than 8,730 tons of ammunition. This rate of fire placed extreme demands on the corps' truck transport system. To offset the demand, X Corps set up and operated a "Truck Bank" where corps truck assets were pooled to maximize the corps' lift capacity.

Trucks from every possible unit were gathered to augment the corps' transport assets. On numerous occasions, the 52d Transportation Battalion commandeered trucks to haul class V to forward ammunition points. Military police (MP) established checkpoints along routes heading north into the X Corps sector. At these checkpoints, trucks were inspected. If empty, they were loaded with ammunition and the driver instructed where to deliver the load.[43]

Commandeering vehicles was not a preferred method of resupply, but these unconventional methods allowed the X Corps to successfully launch a counteroffensive against the Chinese Communist forces. The "Truck Bank", pooling truck assets to support the commander's plan, was also used to support other successful X Corps operations during the Korean War.

The ability of truck companies to support military operations depended a great deal on the ability of the rail system to maintain continuous logistical support. As long as the railroads carried their current tonnage without interruption, the number of truck companies was sufficient.[44]

The problem with rail was twofold. Enemy interdiction and sabotage could significantly alter the rail system's ability to support front line soldiers. Secondly, although rail transport was and remained the most economical way for moving large tonnages on land, rail lines in Korea could only move supplies up to a certain point. After railcars reached the furthest railhead, truck transport or Korean laborers had to complete the movement to division supply dumps.

Therefore, as the main thrust of the battle advanced, unless rail construction could keep up, the dependence on truck transport increased.

The Transportation Corps had to make every effort to ensure a balanced transport system. This need was demonstrated during the I Corps breakout of the Pusan perimeter in September 1950, when a demolished bridge cut the rail transport to the corps. Trucks were the only means to resupply I Corps, hauling supplies from Pusan (Waegwan) to Taejon and then to Osan. The 84-mile round trip from Waegwan to Taejon took 24-hours; the second leg from Taejon to Osan was another 30-hour round trip. With the poor quality of roads and long turnaround time, the strain on truck resources was extensive.

During the war, 8th Army assigned truck companies on the basis of ton/miles required per 24-hour period. One truck company was assigned for each 15,000 ton/miles required in that period (the equivalent of hauling 100 tons of supplies 150 miles per day). Additionally, organic division transportation was augmented when the division had to move supplies more than 25 miles from an Army supply point to the division area.[45]

Despite the shortage of truck companies and poor road networks, truck drivers performed sometimes herculean feats in support of the war operations. In the week ending 26 October 1952, 26 truck companies assigned to 8th Army transported 57,998 tons of supplies and some 34,337 troops, for an average round-trip distance of 52 miles,[46] an amazing performance, using predominantly two and half ton trucks.

The most difficult aspect of transportation in Korea was supplying front line soldiers. The cross-country mobility of two and half ton trucks and jeeps was insufficient in the mountainous terrain U.N. forces occupied during much of the fighting.[47] The 8th Army's answer to the problem was the Civil Transport Corps, comprised of units staffed with civilian refugees and drafted laborers. They had the mission of carrying supplies from a division's rear boundary to front line positions that were inaccessible to motor vehicles. A Korean Service Corps laborer was expected to transport 50 pounds of supplies over a distance of 10 miles per day.[48]

RAIL TRANSPORT OPERATIONS

The railroad was the predominant mode of transportation support in Korea. The 8059th Transportation Military Railway Service (Provisional), began railway operations during the first weeks of the conflict. In August 1950, the 3d Transportation Military Railway Service (TMRS) assumed control of all railway operation. The 3d TMRS was organized with two railway operating battalions

Supply train leaving Pusan, Korea in 1952

(the 724th and 712th) and one shop battalion. Upon assuming control of the railways, the 3d TMRS had responsibility for 270 miles of railroad, 280 locomotives, 4,300 freight cars and 450 passenger cars, all in varying states of disrepair.[49]

By July 1951, after extensive work on both tracks and cars, the rail system was moving about 42,000 short tons of freight per day. On an average day in 1951, over thirty trains were dispatched: 25 carrying supplies to forward railheads, three or more carrying troops, and two or more carrying causalities to the rear area.[50]

Repair of the rail network in Korea and an extensive locomotive rebuild program in Japan increased the capacity of the rail system dramatically. By the end of 1952, the rail system was moving over 153,000 tons and 19,500 passenger per week. During the last year of the conflict, monthly freight

movements more than doubled, averaging about 1,250 million short tons and 300,000 passengers a month.[51]

To expand the rail capability, the Transportation Corps relearned many of the lessons of World War I and World War II. Movement and control of trains significantly lacked central guidance. Though the 3d TMRS operated the railroads, no organization was established to centrally plan or prioritize the use of rail cars. Little effort was made to prioritize cargo, coordinate multi-stop rail service, or even coordinate the unloading and loading in the forward areas. The lack of centralized control of the various modes of transport was a systemic problem in an already overburdened transport system. Not until 1957 did the Chief of Transportation approve a change in doctrine which would lead to the emergence of movement control procedures that the U.S. Army uses today.[52]

Despite its imperfections, the rail system in Korea was invaluable for providing logistical support to the theater and, more specifically, ensured the success of numerous tactical operations. General Walker, Commanding General, 8th Army, referring to the use of rail for the tactical movement of forces on the battlefield, said: "It was a history making maneuver saved Pusan". He referred to the movement of the 25th Infantry Division from the Kunchon front into fighting positions east of Chinju in only two days during some of the most critical days of the war.[53]

On 1 August 1950, the enemy threat to Pusan was critical. The 25th Infantry Division, engaged with the enemy 150 miles north of Pusan, was needed immediately to defend the Pusan perimeter. Before a move of that size could be made, the 8th United States Army Korea (EUSAK) Transportation Section had to clear the southern tracks of railcars left by the 1st Cavalry Division during its redeployment from the combat area. Not only was the U.N. forces trying to relocate units to support the fight, but Korean refugees were desperately trying to escape the front lines. Besides moving railcars, U.S. MP and Republic of Korea National Police were dispatched to clear an estimated 7,500 refugees from the area in which the railcars were staged.

Once the rail lines were cleared, EUSAK Transportation personnel quickly marshaled the 75 railcars and locomotive power needed to move the 25th Division to the Pusan perimeter. In fourteen days, Transportation Corps personnel moved three divisions to the threatened perimeter, ensuring the successful defense of Pusan by U.N. forces. The accomplishments of the personnel involved in the move earned Transportation Corps personnel a Legion of Merit and eight Bronze Stars.[54]

AIR TRANSPORT OPERATIONS

Unlike the tonnages moved by rail, air transport accounted for very little — about one percent — of the tonnage moved from the United States to Korea. Air cargo ranged from whole blood to the new 3.5 inch Bazookas, and flights accounted for 20-30 percent of the soldiers arriving in the Korean theater each month.[55]

Intertheater lift by air was the responsibility of the Air Force, with space allocations coordinated through the Joint Military Transportation Committee of the Joint Chiefs of Staff. The Transportation Corps responsibility began with the operation of the aerial ports of debarkation (APOD), which were controlled by the Transportation Corps until 1951. In that year, the 315th Air Division took control of all the APODs in Korea, and the Transportation Corps picked up responsibility for Army cargo at holding areas located in the APOD. Forwarding Army cargo was the responsibility of the Transportation Air Forwarding Division (later redesignated the Air Movement Control Division) which provided liaison teams at 315th Air Division Headquarters. In 1953, an Army-Air Force memorandum of understanding resolved the issue of which service ran aerial ports, by awarding the responsibility to operate all aerial ports to the Air Force.

Intratheater airlift was equally important. U.N. forces began to outrun their supply lines as they pushed retreating Chinese Communist forces northward during October and November 1950. Bombing by U.N. aircraft had destroyed rail lines and bridges to such an extent that surface transport could not keep up with advancing combat units. Truck transport took as long as six to eight days to travel the 300 miles of rough road, while air transport made the same trip in two hours. With the improvement of several landing strips, C-47s moved emergency supplies daily to forward areas. These air transport requirements led to the design and production of the C-123 cargo aircraft, which had a capacity to lift 16,000 pounds and take-off or land on landing strips 3,000 feet long.[56]

Like rail, this valuable mode of transportation also had its own movement control problems. Doctrine outlining the use of intratheater airlift to support ground forces did not exist. This led to waste of an already scarce resource, not fully corrected until 1957 when the Chief of Transportation approved new movements control doctrine.

In addition to involvement in the use of cargo aircraft to resupply tactical units, the Transportation Corps, in August 1952, assumed responsibilities for Army aviation that had been prerviously assigned to the Ordnance Corps. In early 1953, the movement of Army cargo on the battlefield underwent revolutionary changes as the first two transportation helicopter companies were deployed to Korea. On

Trucks are loaded with ammunition and supplies from a C-54 airplane at a South Korean air base 28 June 1950

15 June 1953, the 1st Transportation Corps Army Aviation Battalion (Provisional) was activated. Those actions began a new phase in the Army's capability to move supplies and combat troops rapidly on the battlefield.

The Chief of Transportation, Maj. Gen. Frank Heileman wrote in a 1952 article in the *Army-Navy-Air Force Journal:* "The helicopter is going to be used to extend our lines of communication and facilitate our movement where its unique capabilities will allow it to overcome the difficulties of our other resources. We are not going to scrap our trucks, pull up our railroads, or burn our bridges; we are going to integrate into a complete transportation system, designed to serve the army in the best and most efficient manner possible, this newest addition to Army transportation resources and to the Transportation Corps."[57]

The Transportation Corps proved itself on the battlefields of Korea. Highlights of those successes included the move of the 25th Infantly Division to the Pusan Perimeter, essential to U.S. forces retaining a foothold in Korea; and General MacArthur's bold assault on Inchon in September 1950 in which transportation units operated almost 500 harbor craft to transport 49,000 soldiers, 5,356 vehicles and 22,000 tons of cargo ashore in only six days and changed the outcome of the war.[58] The retrograde of the X Corps from Hungnam to Pusan in December 1950 after the Chinese intervention required moving over 215,000 people, 18,000 vehicles and 250,000 tons of supplies within two weeks on 193 ships. In Operation Changey Changey, some 40,000 soldiers from front line and reserve units were moved over an 850-mile, truck-sea-air route to change places in the battle area.[59] These operations were major contributions, but the Corps' day-to-day operation of ports, the rail system, highway transport, and helicopter flights constituted the underpinning and spearhead of logistics in Korea.

The Korean War proved the foresight of making the Transportation Corps a separate branch of the Army. A corps of highly motivated, well trained transportation specialists was not only desirable, but necessary for the Army to operate on the modern battlefield. In the three years of the war, the Transportation Corps developed doctrine for marine, air, rail, and truck transport. Sea transport, still the predominant means for transporting large forces between theaters of operation was altered dramatically during the Korean War. The Transportation Corps demonstrated that port operations in a theater could be rapidly established to deploy and sustain large forces. Developed almost overnight, Pusan was handling over a million tons of cargo and 300,000 personnel per month a year later. Additionally, the development of a rapid sea delivery service, Marine Express (MARINEX), allowed the United States to ship critical priority cargo to a theater of operations in a fraction of the normal shipping time.

Although only a fraction of the tonnage required in the theater was transported by air, transporters in Korea capitalized on this rapid means of transportation. Due in part to their efforts, airlift would develop into a significant strategic mobility asset.

Surface transport was fundamental to the success of U.N. ground forces. Rail transport rapidly grew more capable and dependable, eventually moving 1,250 million tons of cargo and 300,000 passengers per month, a significant accomplishment.

DUKW Amphibian landing during the Korean War

The accomplishments of the Transportation Corps in overcoming the extremely poor road network and shortage of trucks, theater wide, testified to the Corps flexibility and resourcefulness. On numerous occasion, transportation operators overcame shortages of trucks by supporting large operations with "Truck Banks" which massed lift capability. As in World War II, the truck shortages also prompted extraordinary measures, such as the commandeering of empty trucks to haul ammunition to front line units.

By July 1953, the Transportation Corps moved more than 7.1 million tons of cargo and 3.2 million passengers over the Korean road network. Developments in each mode of transport were extremely important to the future of U.S. military transport. The rapid development of transportation infrastructure in Korea demonstrated the vital need for a Transportation Corps that could effectively support a logistics surge required by tactical operations in a distant theater. The signing of the Korean Armistice on 27 July 1953 not only signaled the end of the Korean War, it also marked the coming of age of the Transportation Corps.

DOMINICAN REPUBLIC

The mid-1960s saw the beginning of the era of "force projection", the requirement of the United States to rapidly project a combat force to points of the globe on short notice. This requirement changed the way U.S. military commanders looked at deployment. Instead of a gradual buildup, a force sometimes had to be projected in a matter of hours or days instead of weeks.

The beginning of this era was marked by numerous transportation innovations. One evolved from the highly successful Transporter, a reusable steel box introduced during the Korean War and the forerunner of routine container use in the U.S. Army. By 1965, container ships were serving as the workhorse of strategic mobility. The container ship could carry large amounts of general cargo secured inside the reusable steel containers, not only reducing pilferage, but significantly reducing the loading and unloading time compared to palletized or breakbulk cargo.

Containerization had a major impact on the transportation industry, which expanded its use by "piggybacking", in which a railcar carries a trailer cross country, reducing overall transportation costs. At its destination, the trailer was pulled by a tractor to its final destination.

The early 1960s saw the creation of a new Transportation Corps organization. The Military Traffic Management and Terminal Service (MTMTS) was established and made responsible for the management of all U.S. Army ports worldwide. It served as the transportation manager for all surface moves within the continental United States, with profound impact on strategic mobility.

The first test for these innovations occurred in 1965 when the United States intervened in the Dominican Republic. Roughly the size of Vermont and New Hampshire combined; the Caribbean nation had a population of about five million people. It occupies the eastern half of the island of Hispaniola, lying between Cuba to the west and Puerto Rico to the east.[60] (see Map 36)

"Marked by a politically unstable past," a historian of the 1965 intervention has noted, "the Dominican Republic has had 123 rulers, mostly military men, from its discovery in 1492 until Trujillo. Chaos, political factionalism, corruption, and economic instability continuously wrecked the country, contributing to the sense of resignation, fatalism, and low self-esteem that engulfed large segments of the population."[61]

In 1965, a military-civilian coup erupted against the Dominican Republic regime. The possibility of the overthrow of the government meant total loss of control in the country. That prospect gave Washington two overriding concerns. The first was the security of American citizens in the Dominican Republic, and

the second was President Johnson's concern that the Dominican Republic was about to become "another Cuba". Previous presidents had been severely criticized for losing Cuba; and, along with the humiliation of the Bay of Pigs failure, President Johnson was determined not to suffer a similar debacle.[62]

The situation continued to deteriorate and, on 28 April 1965, the U.S. ambassador requested the landing of U.S. Marines. That same day, 500 Marines came ashore to protect American lives and property. Subsequently, the rapid deployment force at Fort Bragg, North Carolina, on standby for the previous two days, was alerted for deployment to Puerto Rico. Once en route, the 3d Brigade, 82d Airborne Division (Power Pack) was diverted to arrive at San Isidro Airfield, Dominican Republic, and Maj Gen. Robert H. York, 82d Airborne Division commander, was designated Land Force Commander.[63]

By 0215, 29 April, U.S. Army forces landed, marking the beginning of another military operation that required Transportation Corps support. Though not large in comparison with campaigns such as Korea, transportation support was critical to the success of the operation. The Transportation Corps began its participation by supporting the rapid deployment of the 82d Airborne Division and the XVIII Corps element to the Dominican Republic. Simultaneously, the Transportation Corps began assembling the infrastructure required to support the new arena of operations.

Support needs grew on 26 April 1965 when the Joint Chiefs of Staff (JCS) alerted two battalion combat teams of the 82d Airborne Division for possible deployment to the Dominican Republic. Transportation Corps activities at Fort Bragg began moving supplies and equipment in preparation. Basic load items were moved from contingency warehouses, while equipment was transported to the heavy drop rigging facility in preparation for a possible forced insertion.

As preparations continued, the JCS deployment orders arrived, and transportation units at Fort Bragg moved cargo to Pope Air Force Base (Green Ramp) in preparation for air movement. Simultaneously, C-130 cargo aircraft arrived at Pope to load the 82d for their 1,400 mile trip to the Dominican Republic. The 82d's deployment met with numerous delays. Loads arrived out of sequence; they were not properly prepared for air movements; and /or they arrived too rapidly for the outload facility to handle them. Those problems would recur in the years to come.[64]

The 82d follow-on forces went out in "packages", designed for combat readiness once on the ground. The follow-on packages were not flexibly configured, requiring almost all of the division's equipment to be flown to the theater, whether it was needed or not. This was a poor use of air transport,

because equipment whether needed or not for the particular contingency was shipped. Lieutenant General Bruce Palmer, Jr., task force commander, summarized the situation by saying; "It appears in some respects that we are still fighting World War II . . . we must, in conjunction with the Air Force, develop procedures permitting greater flexibility, and quicker response to changing tactical and support requirements".[65]

Once marshaled, operational security prevented first echelon forces of the 82d from communicating with anyone, including family members. The deployment requirements caused numerous problems with soldiers' families not having any money, car keys, PX cards, etc. Unaffected families pooled together resources and helped the families in need. These uncoordinated effects became the forerunner of the Army Community Service.[66]

Even with these delays, the lead aircraft for Power Pack departed Pope Air Base at 2052 hours, four hours after the JCS ordered the deployment. The 144 aircraft (33 carrying 1,800 paratroopers, 111 carrying equipment) created a virtual air bridge between the United States and the Dominican Republic, marking the beginning of a new "Power Projection" capability of the United States Armed Forces.[67] The Dominican Republic operation was the largest sustained United States troop airlift accomplished up to this time.

The Transportation Corps established the sustainment infrastructure in the Dominican Republic. Deploying from Fort Meade, Maryland, the 502d Transportation Company's primary mission was movement control at both the Port of Rio Haina and the busy San Isidro Airfield. During the initial days of arrival, aircraft were "nose to tail" with C-130 cargo aircraft running while they were unloaded so they could take off immediately and allow arriving aircraft to land. No ground materials handling equipment (MHE) was available, and the air drop platforms had to be manually unloaded from each aircraft.[68] Once airfield operations were stabilized, the Joint Airfield Central Coordination Center assumed control of airfield operations at San Isidro Airfield.

The 502d Transportation Company personnel played a key role in ensuring Army cargo moved smoothly through the aerial port, and matching cargo with the right owner and directing it to the correct destination. During the first fourteen days of the operation, the U.S. Air Force flew over 1,500 sorties and delivered 14,650 personnel and their equipment to the island.[69]

Ten days later, sea lines of communication were established to the theater. Primary players in the initiation of port operations were the 105th Port Company, 491st Transportation Detachment, and the 159th Transportation Battalion (Provisional), all of which deployed from Fort Eustis to operate the

Port of Rio Haina. During the next year these units operated the only seaport of debarkation. They began the arduous task of unloading the large amount of cargo, supplies and munitions destined for the 24,000 American troops. Staff Sergeant Luis Romero recalled, "seeing cargo specialists under the hot sun of the Caribbean, discharging breakbulk supplies of cement and combat rations, diesel and gasoline, tentage and bead, vegetable and grocery supplies, barbed wire and weapons in sufficient quantities to equip and sustain the forces."[70]

Even though the majority of the cargo arriving in country was breakbulk, roll on/roll off (RO/RO) ships were used for the first time to support combat operations. Using the RO/RO concept, vehicles drove on to a vessel and at its destination were driven off, significantly reducing cargo handling and minimizing the requirement for ship or port cranes.

U.S. Army ground transportation was necessary to clear cargo from both the sea and air ports of debarkation. Command and control for the bulk of the ground transport was the responsibility of the 507th Transportation Group headquarters.

Deployed out of the 1st Logistical Command, Fort Bragg, the 507th Transportation Group managed the Corps' truck assets deployed in the theater. The 9th Transportation Car Company (Airborne) provided command and control vehicles for the Army forces. The 379th Transportation Company (medium reefer truck) provided refrigerated transport for classes I and VIII supplies. The 546th Transportation Car Company provided transport support to the XVIII Corps and was collocated at the Port of Rio Haina with the 839th Transportation Company, which provided truck assets for support of the theater forces. The 489th and the 490th Transportation Detachments provided theater level transportation support. With the 489th providing truck transport and the 490th movement control.

To support the 82d Airborne Division, the 407th Supply and Transport Battalion from the Division's Support Command deployed its organic truck company, providing transportation support to the 82d Airborne Division's operations.

As the U.S. military occupation of the Dominican Republic continued, a rapid buildup of combat forces turned into a stability and peacekeeping operation. The threat to U.S. forces changed from all-out attack on U.S. positions to random rebel sniper fire, which accounted for the majority of American causalities during the intervention.[71]

Once the situation stabilized, the mission of the 82d Airborne Division and the 4th Marine Expeditionary Force quickly turned to humanitarian aid. By May

1965, the distribution of over 15,000 tons of food and 15,000 pounds of clothes had begun, along with community repair projects and the establishment of free medical clinics.

President Johnson's desire for an operative multinational peace force was realized with the creation of the Inter-American Peace Force (IAPF), which assumed operational control of the peacekeeping forces in the Dominican Republic in June 1965. This was a more palatable solution to neighboring states than a U.S. occupying force. In all, seven countries contributed forces to the IAPF: the United States, Brazil, Honduras, Paraguay, Nicaragua, Costa Rica, and El Salvador.[72] As the IAPF became operational, Brazilian troops began relieving U.S. troops, marking the drawdown of the U.S. occupation of the Dominican Republic. By 6 June 1965, U.S. Marines began redeployment back to the United States.

Over the next few months, Transportation Corps units continued to provide logistical support to both U.S. forces and other members of the IAPF. As the redeployment of U.S. forces continued, the 105th Port Company was instrumental in the outload of the massive amounts of equipment and supplies returning to the United States. Since rapid redeployment was not essential, the majority of equipment went by sea; thus, port operations at Rio Haina served as the primary outload operation for redeployment. On 21 September 1966, the last of the U.S. forces, under the auspices of the IAPF, left Dominican Republic soil.

CHAPTER XI

Vietnam

"The transportation system moved goods so fast and
too efficiently for the logistical system to keep up with the
sophisticated job of translating boxes and measurement tons into
supply items and balancing item demand in a constantly changing
combat environment. . .we must have control and positive
documentation of supply built into the transportation system.
By the time the box arrives on the ground,
it is already too late to start finding out what it is."
Honorable Dr. Robert A. Brooks, Assistant Secretary of the Army,
Installations and Logistics, Vietnam War

INTRODUCTION

The nation of Vietnam is a crescent-shaped land mass bordered by Cambodia and Laos to the west, China to the north, and the South China Sea to the east. The land area, formerly known as Indo-China, is dominated by the Annamite mountain chain, which extends southward from Vietnam's northern border to within sixty miles of Saigon (see Map 32). It is a country of jungles, deltas, swamps, plains, and mountains in a tropical climate subject to monsoon rains, making logistical support of military operations extremely difficult.

At the end of World War II, the French attempted to reimpose colonial rule over Indo-China which had been occupied by the Japanese during the war. They were opposed by the Viet Minh, an indigenous anti French group comprising a coalition of various groups all of which wanted independence from the French. The Viet Minh was led by Ho Chi Minh, a Soviet trained communist. The United States had no desire to help any nation reestablish colonial rule, but France was a wartime ally and prevention of the spread of communism had become a matter of national policy. Therefore, the United States underwrote up to seventy-five percent of France's expenses in the conduct of the war and provided millions of dollars worth of military equipment.[1]

By 1954, the French attempt to reestablish colonial rule was failing. That same year, the United States, France, Great Britain, and the Union of Soviet


SOUTHEAST ASIA
NORTH VIETNAM
Gulf of Tonkin
LAOS
VIENTIANE
American Embassy
AID, USIA, CIA
Phu Phien Range
war zone
DMZ-17th parallel
Demilitarized Zone
Hue
Phu Bai
Da Nang
Chu Lai
Quang Ngai
I Corps Tactical Zone
THAILAND
Korat
9th Log Command (B)
44th Engineer Gp
USA Depot (division)
Lop Buri
Teams, 1st Special Forces Gp
II Corps Tactical Zone
Pleiku
An Khe
Qui Nhon
SOUTH VIETNAM
Tuy Hoa
CAMBODIA
Nha Trang
Cam Ranh Bay
War Zone C
War Zone D
Phan Rang
PHNOM PENH
Phuoc Vinh
Bien Hoa
Phu Loi
Di An
Xuan Loc
Cu Chi
SAIGON
Long Binh
Long Thanh
Phuoc Le
III Corps Tactical Zone
Vung Tau
Dong Tam
Binh Thuy
Can Tho
South China Sea
IV Corps Tactical Zone
Southeast Asia: U.S. Order of
(Not shown are Burma, Malaysia, Singapore, Indonesia and the Philippines.)
major roads
pacification areas
tactical zone boundaries
National Priority Areas for 1967
(Revolutionary Development)
1 Da Nang
2 Qui Nhon
3 Saigon
Bien Hoa
Binh Duong
Gia Dinh
Hau Nghia
Long An
Phuoc Tuy
4 An Giang
Phuong Dinh
Vinh Long

Map 32

Socialist Republics met in Geneva to discuss a political settlement of the Korean War and a truce in Indochina. Simultaneously, the Viet Minh, at great cost, dealt a devastating psychological blow to the French by defeating their troops at Dien Bien Phu. That victory resulted in the withdrawal of French forces from Indochina.

At Geneva, a series of accords outlined the future of Vietnam. All French forces were to withdraw. The area was partitioned near the 17th parallel, and two nations were created. Neither North nor South Vietnam was to interfere in the internal affairs of the other, and the Geneva Accords included a general ban on the introduction of new troops or weapons into the area and a restriction on establishing new bases.[2]

Over the next few years, North Vietnam watched, hoping the South Vietnamese government would fail and allow the North to unite Vietnam under a "progressive socialist" administration. Free elections called for under the 1954 Geneva Accords never materialized, and by 1960, the North decided to resort to other means to unify Vietnam under their leadership.

The instrument adopted by North Vietnam to conquer the South was the Viet Cong, a guerrilla army of South Vietnamese Communists dedicated to undermining the government. In the early 1960s, the Viet Cong conducted a campaign of terrorism by killing South Vietnamese government and village officials in cold blood and spreading confusion and discontent. These depredations severely weakened the Saigon government, and by late 1963, the overthrow and assassination of President Ngo Dinh Diem demonstrated the seriousness of the situation.[3]

Realizing they could not fight the Viet Cong without assistance, the South Vietnamese government asked President John F. Kennedy for help in December 1961. Subsequently, the Military Assistance Command, Vietnam (MACV) was established to bolster the Military Assistance Advisory Group (MAAG) that had been put in place by the Eisenhower administration.

During January and February 1965, the situation in South Vietnam worsened as Viet Cong terrorism increased. The South Vietnamese Army, the Army of the Republic of Vietnam (ARVN), suffered a series of defeats, and its military future looked poor. The United States was no longer able to prevent the collapse of the South by merely providing aid.

ESTABLISHING THE THEATER

General William C. Westmoreland, Commander, MACV, stated as late as March 1965 that no decision had been made on U.S. intervention with ground forces, other then a Marine detachment to secure the Da Nang Airfield.

Consequently, there was no logistic infrastructure in place, and no development of secure logistical bases. The facilities operated by the South Vietnamese forces were woefully inadequate, and ports and airfields were insufficient. In addition, the South Vietnamese Army had no logistical organization and no supply, transportation, or maintenance troops.[4]

Despite the poor logistical infrastructure, the grave tactical situation led President Lyndon B. Johnson to order the deployment of U.S. combat forces. Because of force level ceilings and the decision not to mobilize the reserves, the logistical buildup lagged behind the combat force buildup.[5]

The massive deployment of forces to Southeast Asia into an unimproved theater of operations again placed great demands on the Transportation Corps. Never before had the Army's logistic system supported large numbers of ground combat troops operating in a counterguerrilla role with a supporting pipeline from 9,000 to 11,000 miles long.[6] President Truman's decision to establish the Transportation Corps as a permanent branch in 1950 would pay significant dividends.

LOGISTICS SUPPORT CONCEPT

The previous U.S. command organization in Vietnam had become over-extended and in need of reorganization. In 1960, the Military Assistance Advisory Group (MAAG) was the only U.S. military headquarters in Vietnam, serving as a joint organization containing Army, Navy, and Air Force sections. Those sections were responsible for advising their counterparts in the Vietnamese armed forces and assisting the chief of the advisory group in administering the Military Assistance Program. Logistical and administrative support was provided through each of the different service channels.

As the theater expanded, several logistical teams were sent from the 9th Logistic Command in Okinawa to provide the required logistical support to the arriving units. Later, as that logistical infrastructure became overburdened, this group of people formed the nucleus of the newly authorized U.S. Military Assistance Command, Vietnam. Authorized on 8 February 1962, MACV was established as a subordinate unified command under Lt. Gen. Paul D. Harkins, the Deputy Commander in Chief, U.S. Army, Pacific.

The U.S. Army Support Group was the Army component command within MACV with the mission of providing logistical and administrative support to the ground forces, providing an overly decentralized logistical support network with only limited coordination between services.

On 15 May 1964, the Military Assistance Advisory Group was formally dissolved and the reorganized MACV headquarters commanded by General

William C. Westmoreland was formed. Even with those changes, the logistical system had failed to keep pace with the expanding and complex support requirements. By 1964, the decentralized logistical infrastructure worsened. The U.S. Army received its support from Okinawa and the continental United States; the Marine Corps, from Japan and Okinawa; the Navy, from the Philippines and Hawaii; and the Air Force, from the Philippines. There was no single logistic agency to oversee and direct the support of U.S. forces in Vietnam.

Over the following year several different options were discussed at the Joint Chiefs of Staff (JCS) level to help correct the theater's logistical problems. Finally, in late April 1965, an Army logistical command was authorized, and in July, the 1st Logistical Command was formed. By the end of that year it had grown from 5,930 men to more than 22,000.[7]

The 1st Logistical Command was given the formidable mission of supporting all U.S. and free world forces south of Chu Lai. The area of South Vietnam north of Chu Lai remained the responsibility of the U.S. Navy and Air Force until 1968 when the Army also assumed that responsibility. The U.S. Navy was given responsibility to operate Da Nang port facilities because Army transportation elements were fully committed to operating ports in the south. The logistical support mission was complicated by the absence of a well-coordinated, understandable tactical plan. Unlike both World War II and Korea, Vietnam's tactical operations put U.S. soldiers a situation for which they had not been trained. Those operations were characterized largely by small, isolated actions consisting of ground and air assault operations mounted from numerous base camps around the countryside to combat counter- insurgency, guerrilla-type attacks.

With no neat, linear division between enemy and friendly forces, there were no front line or rear boundaries. Therefore, the theater did not have a recognizable combat and communications zone. In Vietnam they were one and the same. Instead, Vietnam was divided into four corps tactical zones, each conducting its own tactical operations against the Viet Cong.

The elusive and rapidly changing battlefield contested by battalion-size forces challenged the theater's logistical support infrastructure. Forces spread all over the theater required ammunition and rations at a moment's notice. Highway lines of communication to support the fight provided the Viet Cong with the maximum opportunity to interdict American logistical support. In addition to the Viet Cong ambushes of convoys, logistical bases were harassed by small arms fire, mortar bombardments, and sniper attacks. All those factors contributed to the complexity of the logistical mission that the 1st Logistical Command supported throughout the Vietnam War.

The 1st Logistical Command, commanded by Col. Robert W. Duke, developed in coordination with MACV the concept for logistics support of U.S. forces in Vietnam. The plan called for two major base depots and five support commands. The seas and rivers would serve as the main supply routes until the tactical situation permitted the use of ground transport routes. The plan was to establish the depots at Saigon and Cam Rahn Bay. The Saigon Depot would support the Vung Tau and Can Tho Support Commands, while the Cam Rahn Bay Depot supported the Nha Trang, Qui Nhon, and Da Nang Support Commands. This arrangement provided some dispersion in case of enemy attack and additional port capacity if the Port of Saigon was destroyed.

The 1st Logistical Command executed the proposal and established support depots at Saigon and Cam Rahn Bay. Staffed with only seventeen officers, the 1st Logistical Command operated the support commands. Prior to the buildup of U.S. forces, a U.S. Army major with a briefcase and a jeep was the command and control unit for Saigon.[8]

With ever increasing demands placed on the theater's transportation network and considering recent advances in transportation technology, the Commander, 1st Logistical Command recommended that an independent evaluation be conducted to determine what types of transportation organizations and resources were required to support the U.S. Army transportation mission in South Vietnam.[9] The evaluation was initiated in November 1967, when the Director of Transportation, Deputy Chief of Staff for Logistics (DCSLOG), Brig. Gen. Jack C. Fuson,[10] formerly commander, 4th Terminal Command, assembled a team of five officers under the overall guidance of the Commanding General, U.S. Army Vietnam, and the Commander, 1st Logistical Command. The evaluation included an assessment of the theater's water transport capability, including port discharge, lighterage, and SeaLand containerization.

From a port discharge standpoint, the study concluded that the Vietnam theater had the equivalent of forty-one terminal service companies, including six Army of the Republic of Vietnam (ARVN) companies, fifteen U.S. Army companies, and twenty civilian (company equivalent) organizations. This work force was capable of handling the theater's port discharge rate. Only rarely did surges at individual locations exceed the local capacity.

Lighterage according to the DCSLOG study, was in great demand throughout South Vietnam. Besides vessel discharge, medium boat companies were used for intracoastal transport and security, maintenance centers, aid stations, supply carriers, and fire control centers. The study determined that lighterage for port support was sufficient to support demand, except for a small

shortage in Saigon. Lighterage to support the intra-coastal waterways was significantly short since the monthly requirement was roughly 311,610 short tons, while the capability was 203,026 short tons. This shortfall was due to a theater wide shortage of harborcraft personnel and poor contractor maintenance. There was also a shortage of tugboats in the theater. Seventy-one were required but only sixty-four were on hand. The most significant shortage was in the Saigon Port Complex, which had six.

Containerization was still a fairly new concept in Southeast Asia, so the evaluation team analyzed the impact that containers would have on U.S. forces. One of their recommendations was for retrograde cargo to be shipped back to the United States in empty containers.

By far the most significant result of the study was the recommendation to establish a centralized transportation command in South Vietnam. Because of the geographical dispersion of forces and the lack of secure land lines in the theater, the current transportation command had three major support commands paralleling the three major port facilities. Transportation operating units were assigned to each of these support commands according to respective workloads. Each support command had its own transportation staff which coordinated and controlled activities with its subcommands. This fragmentation of transportation control created a requirement for transportation staff functions at all levels within the U.S. Army in Vietnam. The extreme decentralization and layering of commands provided a breeding ground for inefficiency and confusion for numerous functions including movement requests or even vehicle tasking.

The problems caused by the decentralization of transportation led the Commander, 1st Logistical Command to direct the Cam Rahn Bay Support Command to form a Provisional Transportation Command to consolidate transportation activities under one commander. This permitted a total system approach to the command and control of water terminal operations, local clearance, line-haul delivery from depot to consumers, and movement management.

The improved efficiency of the Provisional Transportation Command was the stimulus for the evaluation team to recommend a centralized Transportation Command (TRANSCOM) in South Vietnam. The TRANSCOM would consist of two transportation brigades controlling all U.S. Army transportation activities. Its strength was planned at 17,000 troops and 12,000 contract personnel engaged in transportation operations in South Vietnam. The TRANSCOM was to have an organic Movements Control Agency (MCA), and the subordinate brigades, Movement Control Centers. Those measures would streamline the command and control of the theater's transportation support, as well as provide an

understandable and efficient movements management system for common user transportation assets.[11]

Even though the analysis was accurate and the recommendations provided efficient solutions to the problems present, the proposal was ahead of its time. Interservice rivalry would not allow one service to control all transportation assets in the theater. The lack of command emphasis also played a part in not implementing the recommendations of the study, and it became a historical footnote instead. However, the concepts were practical and the passage of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 would eliminate many of the interservice inefficiencies and force a significant increase in joint duty. That 1986 act also increased the authority of both the Secretary of Defense and the chairman of the Joint Chiefs of Staff over military matters.[12]

The Provisional Transportation Command remained at Cam Rahn Bay, but its concept was not adopted throughout Vietnam. Transportation commands in South Vietnam remained oriented to three major support commands, Saigon, Cam Rahn Bay, and Qui Nhon, all geographically located at the theater's primary Army ports of debarkation. (see Chart 14).

At the Saigon Support Command (SSC), the 4th Transportation Command provided transportation support to the Port of Saigon, Newport, Cat Lai, and Vung Tau. Subordinate to the 4th Transportation Command were the 125th Transportation Command and the 48th Transportation Group, which were responsible for terminal operations and port clearance. The 125th Transportation Command, with its subordinate Terminal Service Company (117th) and a Transportation Augmentation Unit, was responsible for commercial operations at the Port of Saigon. The 48th Transportation Group provided truck transport for port clearance in Long Binh which supported the III and IV Corps tactical zones.

The remaining three battalions in the SSC served under the 4th Transportation Command. The 71st Transportation Battalion operated the newly constructed Newport Terminal outside of Saigon. The 11th Transportation Battalion operated the port at Cat Lai, seven miles southeast of Saigon, handling over 60 percent of all ammunition entering Vietnam. In 1968, the 11th Battalion, commanded by Lt. Col Nathaniel R. Thompson, Jr., handled approximately 42,000 tons of ammunition each month.[13, 14]

The Cam Rahn Bay Support Command, smaller than the Saigon Support Command, originally controlled the 500th Transportation Group (Motor Transport) and the 124th Terminal Command. (see Chart 15). The 500th Transportation Group provided the majority of the truck assets to clear the Cam Rahn Bay Port and move the supplies into the theater, while the 124th Terminal

1ST LOG COMMAND ORGANIZATION FEBRUARY 1968

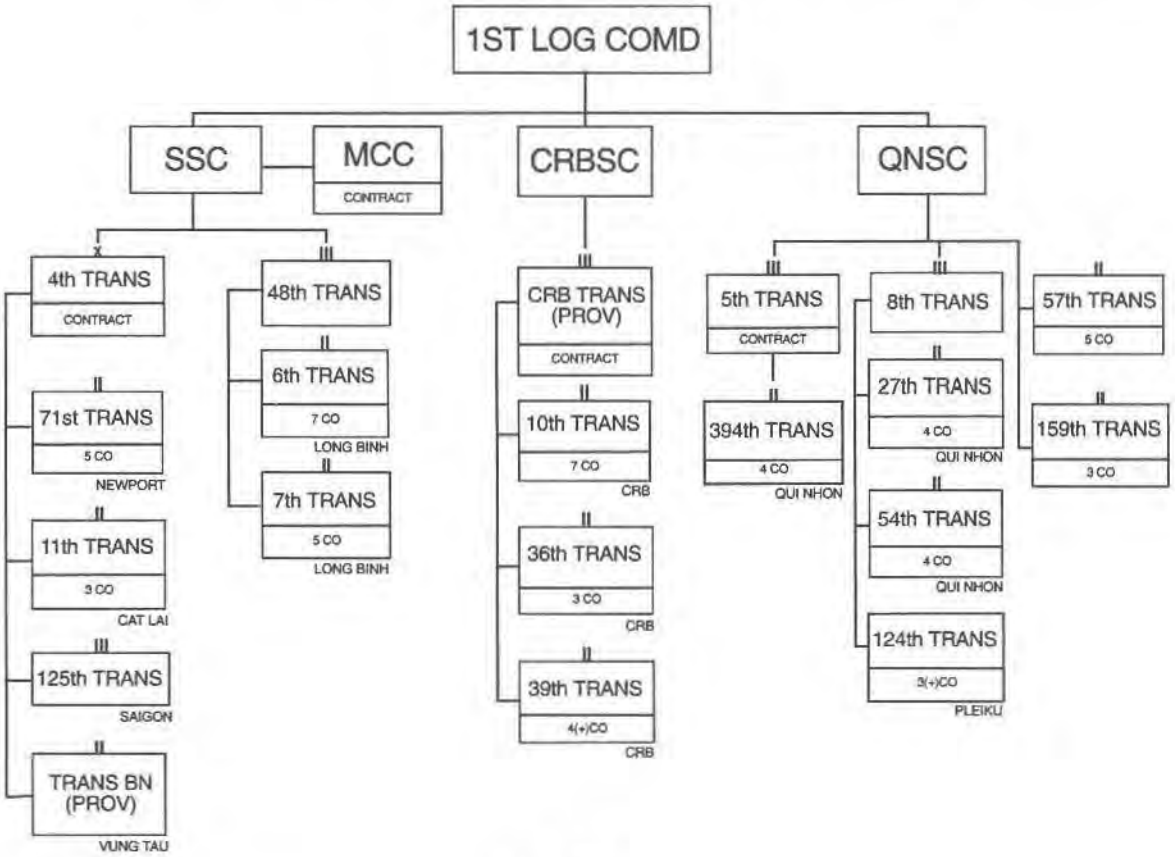


Chart 14

CAM RANH BAY TRANSPORTATION ORGANIZATION: (PRIOR TO 28 OCTOBER 1967)

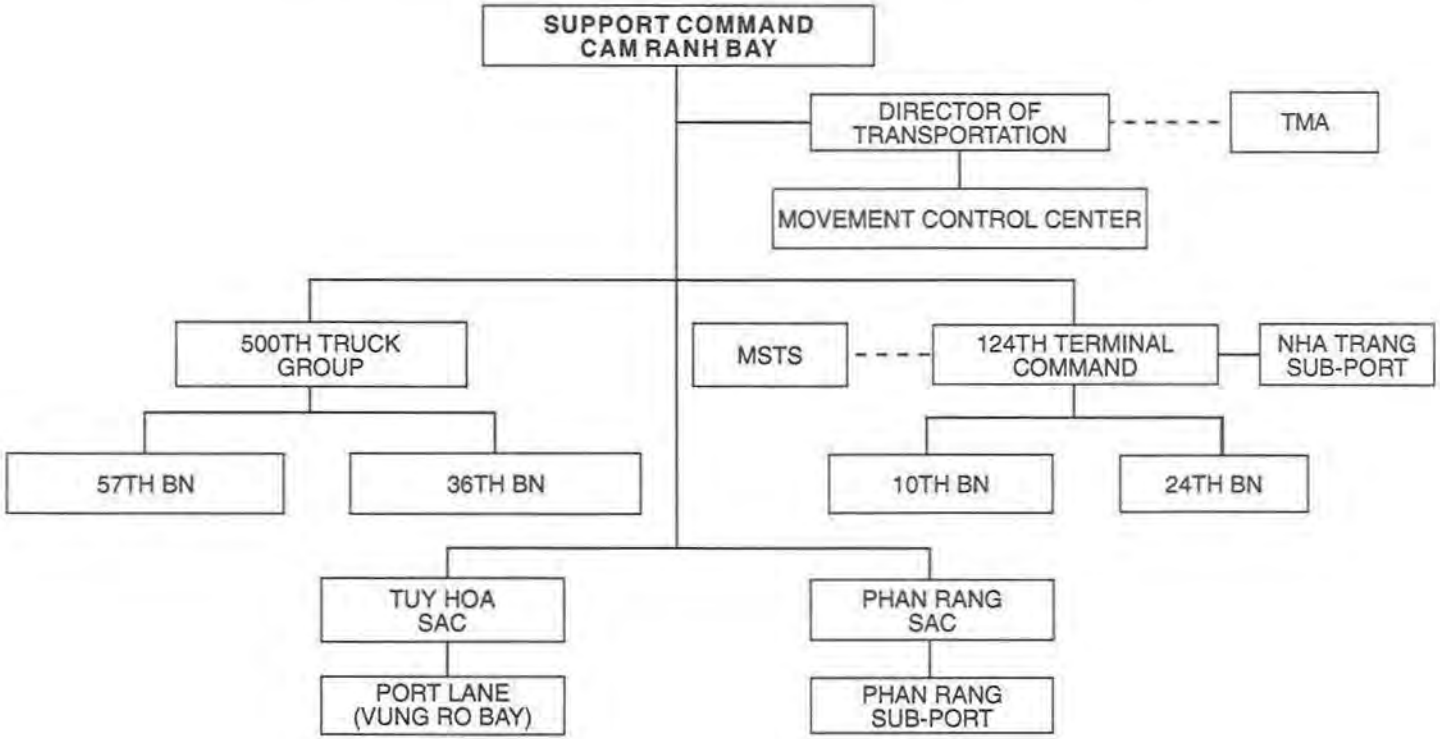


Chart 15

Command, commanded by Lt. Col. Richard E. Criner, provided the Port at Cam Rahn Bay with a majority of its terminal operations capability.[15]

By 1969, the Cam Rahn Bay Support Command was reestablished to form the Provisional Transportation Command. Designed to streamline transportation management and improve efficiency, the Command was built from assets of the 500th Transportation Group and the 124th Terminal Command. Activated in 1969, the command was established with three subordinate transportation battalions and given the primary mission of discharging and throughputing breakbulk and containerized cargos over five piers at the port of Cam Rahn Bay. It was instrumental in the discharge of both roll on/roll off (RO/RO) and containerships, both new concepts of transportation (see Chart 16).

The three subordinate units to the Provisional Command were the 10th, 36th, and 39th Transportation Battalions. The 10th Transportation Battalion, commanded by Lt. Col. Jimmy D. Ross, operated the port of Cam Rahn Bay while the 36th Battalion commanded by Lt. Col. Edward Honor, and 39th Transportation Battalion provided trucks for port clearance.[16]

The Qui Nhon Support Command (QNSC), the last of the three support commands, was the main source of supply for U.S. installations at An Khe and Pleiku and for Republic of Korea (ROK) army units. The support command had the 5th Transportation Command, consisting of the 8th Transportation Group with six battalions.

Included in the Qui Nhon mission, the 5th Transportation Terminal Command discharged and loaded deep draft and intercoastal vessels, delivered cargo to its first destination, and assisted in amphibious operations. The command also exercised operational control of the Han Jin Transportation Company, a Korean contractor responsible for a portion of the port operations. The 5th Transportation Command was originally activated at Fort Story, Virginia, in 1966 and arrived in Vietnam in October of the same year. By late 1968, the 5th Transportation Command began replacing its 500 military personnel with 700 local nationals, and by May 1970, the command was transferred to Vietnamese control, and the 5th Command redeployed to Da Nang.

The 8th Transportation Group had three subordinate truck battalions; the 27th, 54th, and 124th Transportation Battalions' primary mission was to provide motor transport support to tactical forces in the II Corps Tactical Zone. The 27th and 54th Transportation Battalions were collocated at Qui Nhon, while the 124th Transportation Battalion was located in Pleiku.[17]

The remaining two battalions that made up the Qui Nhon Support Command were the 57th and 159th Transportation Battalions. The 57th

CAM RANH BAY SUPPORT COMMAND: 20 FEB 68

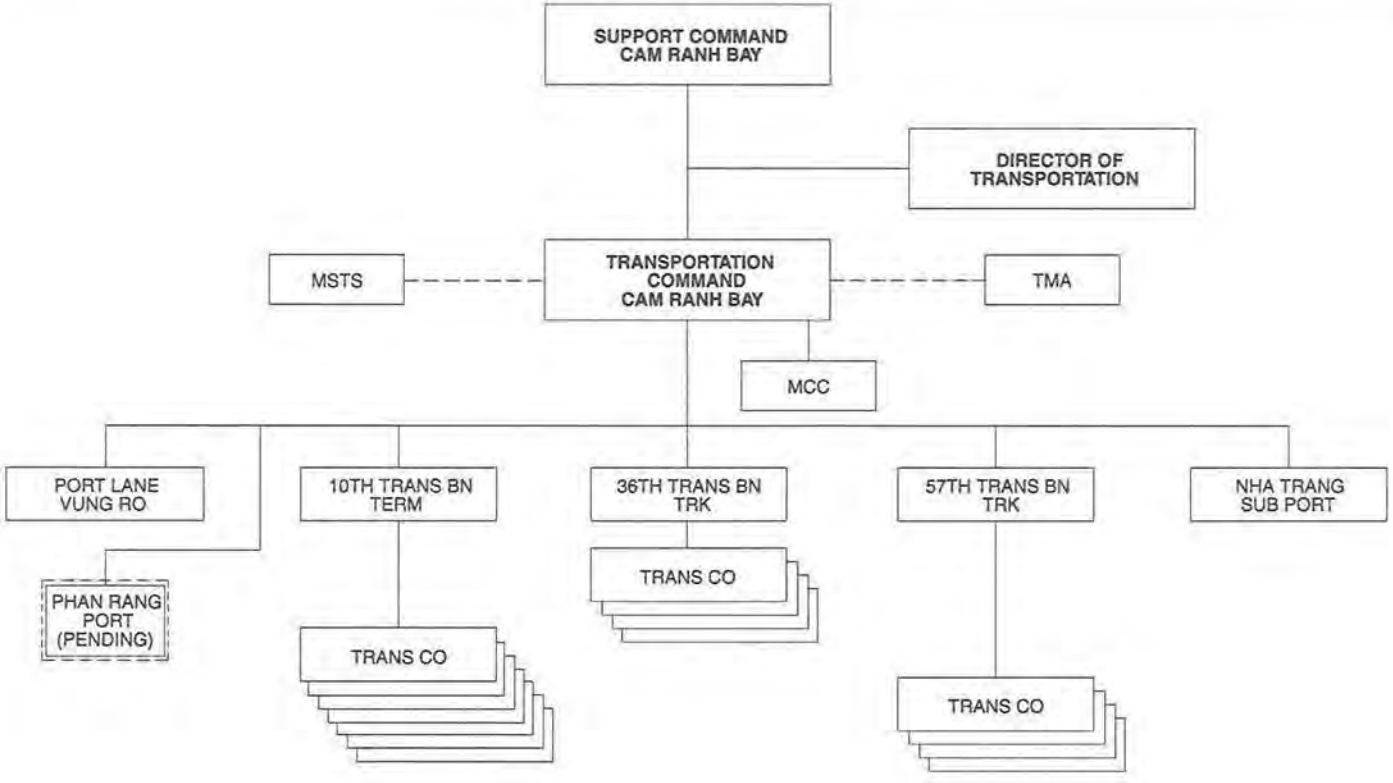


Chart 16

Transportation Battalion deployed to Vietnam in the fall of 1967, and provided a wide range of support to U.S. forces.

The only subordinate battalion of the 5th Transportation Command was the 394th Transportation Battalion (Terminal), which proved to be an invaluable port discharge asset. In January 1966, the battalion discharged over 59,000 short tons of cargo helping alleviate the theater's port discharge backlog. Even with terminal service personnel and material-handling equipment shortages, the battalion maintained a proud reputation for mission accomplishment throughout the Vietnam War.

In mid-1969, the Presidents of the United States and Vietnam announced an agreement to begin replacing United States troops with Vietnamese forces. The MACV headquarters issued on 21 July 1969 the Country Logistics Improvement Plan to implement the transfer of logistic support operational responsibilities, with the goal of a sulf-sufficient Republic of Vietnam Armed Forces (RVNAF) logistics system. During the succeeding years, until the probability of a cease fire became imminent, U.S. logistics units gradually transferred in-country operations to the Vietnamese, and continued to provide advisors to RVNAF units. In mid-October 1972, the MACV commander directed that plans be developed to withdraw all U.S. forces from South Vietnam within 60 days, and to establish the Defense Attache Office (DAO), Saigon. That office would continue to administer the United States Security Assistance Program, in coordination with the U.S. Ambassador to South Vietnam.

The cease fire was signed on January 27, 1973, and the DAO, Saigon was activated the following day, assigned to MACV, with a Transportation Corps officer, Maj. Gen. John E. Murray as the Defense Attache. At that time, only about 13,300 U.S. Army troops remained in South Vietnam. On March 29, 1973, the United States closed down its military role in Vietnam, and the DAO, Saigon took over administration of the Security Assistance program, contracting for support of the activity and as needed for necessary operational tasks such as monitoring use of program assets, beyond the limited capability of the DAO staff. DAO continued to administer the program until the fall of the South Vietnamese government in March 1975.

SHIPPING AND TERMINAL OPERATIONS

The success of United States operations in Vietnam depended upon the ability to move a large military force to the area and sustain it in combat. The depots established "in country" were the first step, but deployment of massive amounts of supplies and equipment required an adequate number of ships.[18]

A World War II vintage ship discharges U.S. Army equipment in Vietnam.

The cargo flow into Vietnam was 140,000 measurement tons per month. The last half of 1965 saw that figure climb to 460,000 tons, then to 740,000 by the end of 1966. With few exceptions, the ships of the Navy's service force used in Vietnam to support this flow of cargo, were of World War II vintage, and over the years, many of them had been scrapped because of budget cuts. There were few replacements because the Navy preferred to buy new combat vessels. Not only were the ships outdated World War II vintage, but floating dry docks, support vessels, and small harbor tugs were all drawn largely from reserve storage.

Sea lift did achieve great productivity and effectiveness as the construction and buildup program began to produce results. A project called "Sea Express" used high speed contract ships to expedite movement of the more critical bulk cargo to Vietnam. This method obtained not only priority response to urgent needs but also helped to meet the greatest part of the cargo movement for the

Port operations in Vietnam

war. Available data indicated that sea lift delivered 95 percent of the 17,200,000 tons of cargo ultimately put ashore in Vietnam.[19]

Even with massive tonnages that had to be transported by ships, the movement of cargo over sea lines of communications got off to a slow start. On 15 May 1965, the first ship arrived at the newly formed port of Cam Rahn Bay. Since Army stevedores had not arrived in theater, South Vietnamese stevedores were responsible for offloading the ship. However, the South Vietnam stevedore union refused to send civilians to Cam Rahn Bay, and a Transportation Corps lieutenant with a small group of enlisted men stepped forward to unload the ship. From this inconspicuous beginning, Cam Rahn Bay became an efficiently run major port.[20]

Between mid-1965 and late 1966, most cargo was transported by ship, while airlift moved the majority of troops and priority cargo. The dependence on sea lift placed a considerable strain on the limited port capacity of South

Vietnam. Most of the sea lift cargo was discharged at the Port of Saigon, which was the only port with any significant discharge capacity. Designed and built as a commercial port, it had a deep water berthing capacity for ten ships and was operated by civilian stevedores and managed by the Port Authority.

The overloaded port facilities meant that vessels were discharged by priority of cargo, resulting in numerous ships anchoring with only parts of the cargo discharged. This problem significantly increased the ships' turnaround times and caused demurrage costs to skyrocket. One ship could cost the United States between $3,000 and $7,000 a day moored for several weeks waiting complete discharge.[21]

The backup of shipping at Saigon was due in large part to slow discharge and clearance of cargo imported by the U.S. Agency for International Development (USAID) for civilian aid and to stimulate the Vietnamese economy under the Commercial Import Program (CIP). Cargo included fertilizer and food, particularly rice, and items such as refrigerators, bicycles, and manufacturing equipment. Relief cargo was processed slowly, and CIP cargo was habitually stored in the port areas by importers until sold, since port tariffs did not penalize long storage. Not only was the port area congested, but commercial port facilities were used jointly, and civilian and military cargo, including POL and ammunition was handled at adjacent berths, and stored side by side until cleared; a very unsafe situation.

Prior to his assignment in DCSLOG, Col. Jack C. Fuson assumed command of the 4th Terminal Command in July 1966. He immediately charged the commander of the 11th Transportation Battalion, Lt. Col. Thomas H. Hoy, to recommend a location for a new ammunition port. Lt. Col. Hoy recommended the Cat Lai area, near the port which had adequate area, isolation and depth of water to moor ships for lighter discharge, but the land was swampy. The 1st Logistical Command commander approved the site and arranged for engineer support to emplace the immense amounts of fill needed and build lighter discharge facilities. As soon as partial operations were possible, the 11th Battalion built a tent city in the area and commenced discharging all ammunition for the U.S. Army, Air Force and RVNAF in the Saigon and Mekong Delta areas. Subsequently, when the 1st Logistical Command established a general depot at Long Binh to receive, store, and distribute cargo cleared from the port, the immense port clearance load on the Fish Market general depot near the port was relieved to a considerable extent, facilitating overall clearance of cargo. Concurrently, construction progressed on a new port facility up river from the commercial port. Newport, as it was named, came on line with ramps for LST and lighterage in October 1966, and four deep draft piers, one with RO/RO

The *MV John U.D. Page.*

capability in July 1967. Newport was manned entirely with U.S. troops, and its opening left the main port area in Saigon free to handle AID and commercial cargo. The 4th Terminal Command worked with the Vietnamese port authorities to obtain additional equipment, and to modernize port tariffs which helped to reduce long term storage and congestion in the port area. The number of U.S. transportation advisors to RVNAF port operators was increased and the Vietnamese operations also showed major improvements in efficiency during 1967-1968.

Discharge problems were aggravated by the shortage of shallow-draft vessels, both military landing craft, mechanized (LCMs) and landing craft, utility (LCUs), which were used to discharge vessels when adequate berthing capabilities did not exist.[22]

One solution to the shortage of lighterage was the assignment of the *MV John U. D. Page* to the theater. Equipped with the latest marine terminal technology, this shallow-draft vessel played a considerable role in the discharge of numerous deep draft vessels. The vessel, a one of a kind in the U.S. Army, used a vertical axis propulsion system to allow it to maneuver next to a deep-draft vessel to take on cargo (either through lift or RO/RO) in support of a logistics-over-the-shore (LOTS) operation. The vessel had the capability to take a deck load of seventy 2 1/2-ton trucks or thirty-seven large trailers. Once beached and the cargo discharged, the vessel's hydraulic ram would push the ship off the beach.[23]

In addition to modernizing equipment and expanding port facilities, Army transporters realized that command and control had to improve if they were to operate an expanding theater port operation effectively. The 4th Transportation Command arrived in South Vietnam on 12 August 1965. Initially assigned to the 1st Logistical Command, the 4th was the first senior terminal command and control unit to arrive in the theater, assuming responsibility for all land and water transportation units.

Preceding the 4th Transportation Command's arrival, the 11th Transportation Battalion (Terminal) was the first Army transportation unit to begin port operations. Arriving in Saigon on 5 August 1965, the 11th Battalion immediately assumed responsibility of the Saigon Port complex from the Navy. On 23 September 1965, the 10th Transportation Battalion arrived in theater, augmenting the 4th Transportation Command, assuming operations at the Cam Rahn Bay Water Terminal.[24] The 6th Transportation Battalion, commanded by Lt. Col. Oren E. DeHaven, soon followed and was given responsibility for port clearance at Saigon port complex and onward movement of supplies into the 3d Military Region, South Vietnam.[25, 26]

The 4th Transportation Command, with a strength of 7,000 personnel, initially had the mission of operating the port complex at Saigon and the water terminals at Cam Ran Bay, Nha Be, Qui Nhon, Phan Rang, Nha Trang, and Vung Tau. It was also required to provide motor transport support of port and beach clearance, as well as tactical operations and the establishment of the Army Air Cargo Terminal at Tan Son Nhut Air Base.[27]

As the theater matured and additional transportation commands arrived, the 4th Transportation Command's mission was changed to operating the Saigon port complex, a subport at Vung Tau, and various ammunition distribution sites. With this change of mission, the 4th Transportation Command's truck units were reassigned to other transportation groups in the theater. The continual flow of

A Rough-terrain 10-ton Forklift loads a CONEX
during a logistics-over- the-shore operation in Vietnam.

transportation units into the theater, construction of additional ports, and establishment of command and control terminal headquarters helped increase the theater's terminal throughput capacity.

By the end of December 1967, the Army had ten ports. Saigon, Qui Nhon, Cam Ran Bay, Vung Ro, Vung Tau, Cat Lai, and Nha Trang were deep-draft ports. Dong Tam, Pan Rang, and Can Tho were shallow-draft ports. The improvements in port capabilities brought about a reduction in the average time a deep-draft ship waited for a berth in Vietnam ports. The average time had decreased from 20.4 days during the most critical period of 1965 to the 1970 average of less than two days.[28]

CONTAINERIZATION

As they did in the Korean War, port operators welcomed the use of containerization as an efficient means for moving supplies into the theater. The Transporter was a reusable steel container with a capacity of about 9,000 pounds. It played a major role in moving unit cargo and supplies to Vietnam, where it became popularly known as CONEX for its use in the Container Express System (CONEX). When the 1st Cavalry Division deployed to Vietnam in 1965, it used about 2,500 CONEXs, each prominently marked with the big yellow division patch. Army aviation units also employed CONEXs for the

prebinned stockage of rivets, cotter pins, and the myriad of small items necessary for aviation support.[29]

As the conflict escalated, the demand for CONEXs grew exponentially. Extremely handy, the CONEX was used for a variety of purposes from command posts to dispensaries and even portable stores. While the popularity increased the demand for CONEXs, it did not enhance the transportation network. Containers sent to forward areas disappeared and were not back hauled. More had to be sent to Vietnam until the theater inventory exceeded 150,000.

Containers played an important part in a special project to make Cam Rahn Bay a major U.S. Army supply base. With the rapid influx of supplies, major construction did not keep pace with the demand for storage. During June 1966, Cam Rahn Bay was supporting some 95,000 men and their complement of equipment. The Army Materiel Command (AMC) prepared a prepacked container depot that contained a 60-day stockage level of repair parts for all units supported by the depot at Cam Rahn Bay. When completed, the entire package of about 53,000 line items, together with a library of manuals, stock records, locator cards, and other documents, was contained in 70 military van semitrailers and 437 binned containers.[30]

Containerization reached a new plateau during the Vietnam War with the introduction of containerships from SeaLand Container Services, Incorporated. First used to support the theater during 1967, SeaLand containers were the next step in the use of intermodal containers (containers that could be shipped by rail, truck, air, or ship). The SeaLand ships were specifically designed to carry the SeaLand container, which could be easily removed from a flatbed trailer or railcar and placed on the ship. This new method of containerization required a special type of crane either on the ship or at the port to discharge the vessel.

SeaLand containership service to Cam Rahn Bay began in November 1967, delivering containers for Saigon, Qui Nhon, and Cam Rahn Bay. The deliveries were made twice a month by nonself-sustaining vessels to Cam Rahn Bay and discharged over a Delong pier, upon which two large gantry cranes were installed. Containers destined for Saigon and Qui Nhon were transferred to smaller C2 self-sustaining vessels owned and operated by SeaLand, and shipped to the appropriate destination. By February 1968, six containerships had delivered more than 3,683 containers to the theater.[31]

Initially, containers were to be pushed to the port complex, unloaded, and returned. As idle containers became available, SeaLand allowed the Army to transport containers inland by military truck. This reduced the handling of cargo,

155mm rounds being discharged at a Forward Supply Base in Vietnam.

but conversely increased the demand for materials handling equipment (MHE) in forward locations.

This widespread use of commercial containers represented a new era in the movement of supplies and allowed the Transportation Corps to analyze port activities that affected throughput capacity. These activities included identifying and sorting cargo, providing adequate MHE, and determining how far forward it was feasible to ship containers.

Achieving total visibility of containerized cargo was not as simple as was planned. Throughout the Vietnam War, the problem of identification and control of supplies remained a considerable one. The Honorable Dr. Robert A. Brooks, serving as the Assistant Secretary of the Army, Installations and Logistics, during a considerable portion of the Vietnam War, identified intransit visibility as a significant problem to the armed forces. Dr. Brooks stated: "The

Transportation system moved goods so fast and too efficiently for the logistical system to keep up with the sophisticated job of translating boxes and measurement tons into supply items and balancing item supply against item demand in a constantly changing combat environment."

In 1965, during Defense Secretary McNamara's visit to Vietnam, the problem of identification was so serious that an Air Red Ball Express was established. The express service used a dedicated aircraft each day to transport high-priority repair parts to the theater. By using dedicated inventory supply points and aircraft, critical repair parts were being transported into the theater much more rapidly, increasing equipment readiness rates.

Even with the Air Red Ball Express, identification and control of supplies arriving in theater remained a problem throughout the war. Dr. Brooks' summary of the situation was very concise: "we must have control and positive documentation of supply built into the transportation system. By the time the box arrives on the ground, it is already too late to start finding out what it is ."[32]

AMMUNITION OPERATIONS

The containerization of ammunition was successfully tested during the Vietnam War. From December 1969 to January 1970, test shipments of containerized ammunition were conducted to determine the feasibility of shipping ammunition from the United States to Vietnam by that mode. A self-sustaining containership was used to move 226 containers of ammunition from the United States to Cam Rahn Bay. Some containers were unloaded at Cam Rahn Bay, while others were transshipped on lighterage to Qui Nhon and forward supply points.[33] Through the container's storage capability was not always 100 percent utilized, the use of containers significantly decreased the ports' handling requirements.

Prior to January 1970, the ability to simultaneously build the theater stockage level of ammunition while engaged in combat was severely restricted by throughput capacities of the ports. Until mid-1966, the discharge of ammunition ships was limited because ammunition was removed from pallets at U.S. outloading ports and loaded aboard ship by individual box or projectile. When a ship arrived in Vietnam, cargo nets and hooks were used to offload the ammunition piece by piece, after which ammunition was arranged by lot and repalletized.

At the request of the commanding general, 1st Logistical Command, this practice ceased and ammunition was shipped on its original pallets. This single decision increased the discharge rate of ammunition ships nearly 100 percent, allowing discharge offloading times to decrease from seven days per ship to four days.[34]

Despite the change to palletized shipments, the sheer volume of ammunition moving through the ammunition offload facilities still had ships spending time offshore waiting for an empty berth. During December 1967, the average wait for a berth was 6.5 to 7 days, a considerable amount of time with eleven ammunition ships calling on South Vietnam during that month.[35]

To alleviate the discharge delays and improve the management of ammunition, a new management technique called "Inventory in Motion" was adopted. It allowed an overall reduction in ammunition stockage on the ground from 285,000 short tons to roughly 142,500 short tons. Inventory in Motion also allowed supply managers to reduce large stockage levels by having total visibility of the stockage on the ground and intransit to the theater.[36]

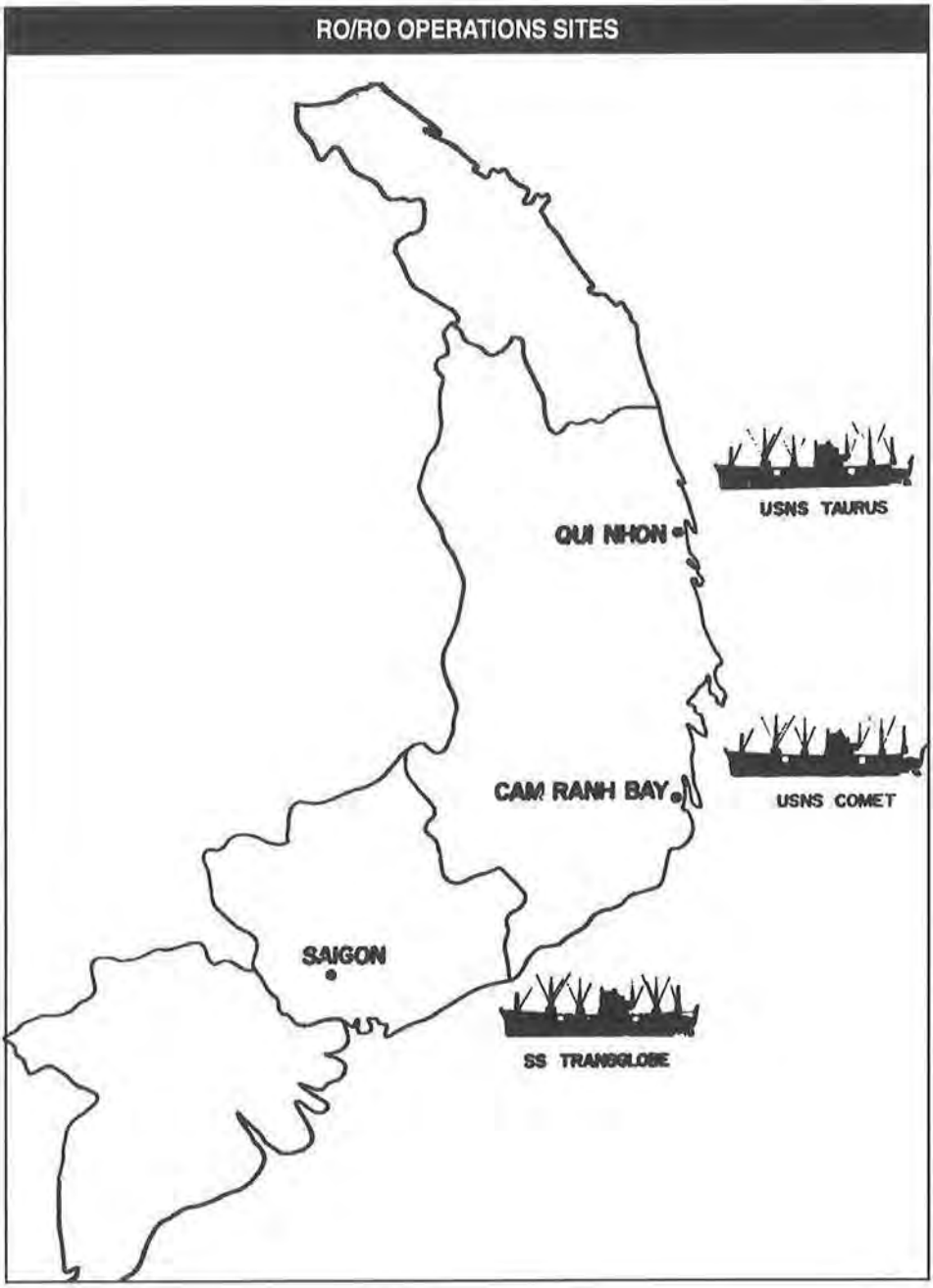
RO/RO VESSELS

Augmenting the container service, and another first in the shipping industry, was the use of Roll On/Roll Off vessels. The RO/RO vessels embodied a new concept by which cargo is checked at the point of origin and unloaded onto a trailer-type conveyance, transported to a vessel at the port of loading, rolled into the vessel, stowed, rolled off at the port of discharge, and dispatched to forward destinations.[37]

General Frank S. Besson, Jr., is credited as father of containerization and RO/RO, for his efforts in introducing the RO/RO concept and pressing for the construction of RO/RO vessels to support defense shipping requirements. During his tenure as Commander Army Material Command from 1962 to 1969, during the buildup in Vietnam, and later in his assignment as the chairman of the Joint Logistics Review Board, General Besson had much to do with the successful logistics support of the Vietnam Theater.[38]

The RO/RO concept, operated by the Military Sea Transportation Service (MSTS), was combined with the U.S. Army Trailer Service Agency to facilitate the movement of general cargo from Okinawa to support operations in Vietnam.[39] The service began in March 1966 and operated between Okinawa; the three Vietnam ports, Cam Rahn Bay, Saigon, and Qui Nhon; and Bangkok, Thailand.

The MSTS ships *Comet, Transglobe,* and *Taurus* were assigned to RO/RO operations and were capable of transporting trailers, containers, and large or small military vehicles.[40] In addition to the ships, 2,400 trailers were assigned to the RO/RO operation. These trailers were meticulously tracked to ensure they were returned to the system. When the RO/RO vessels arrived in one of three South Vietnam ports, tractors from Transportation Corps units attached to local support commands


RO/RO OPERATIONS SITES
USNS TAURUS
QUI NHON
USNS COMET
CAM RANH BAY
SAIGON
SS TRANSGLOBE

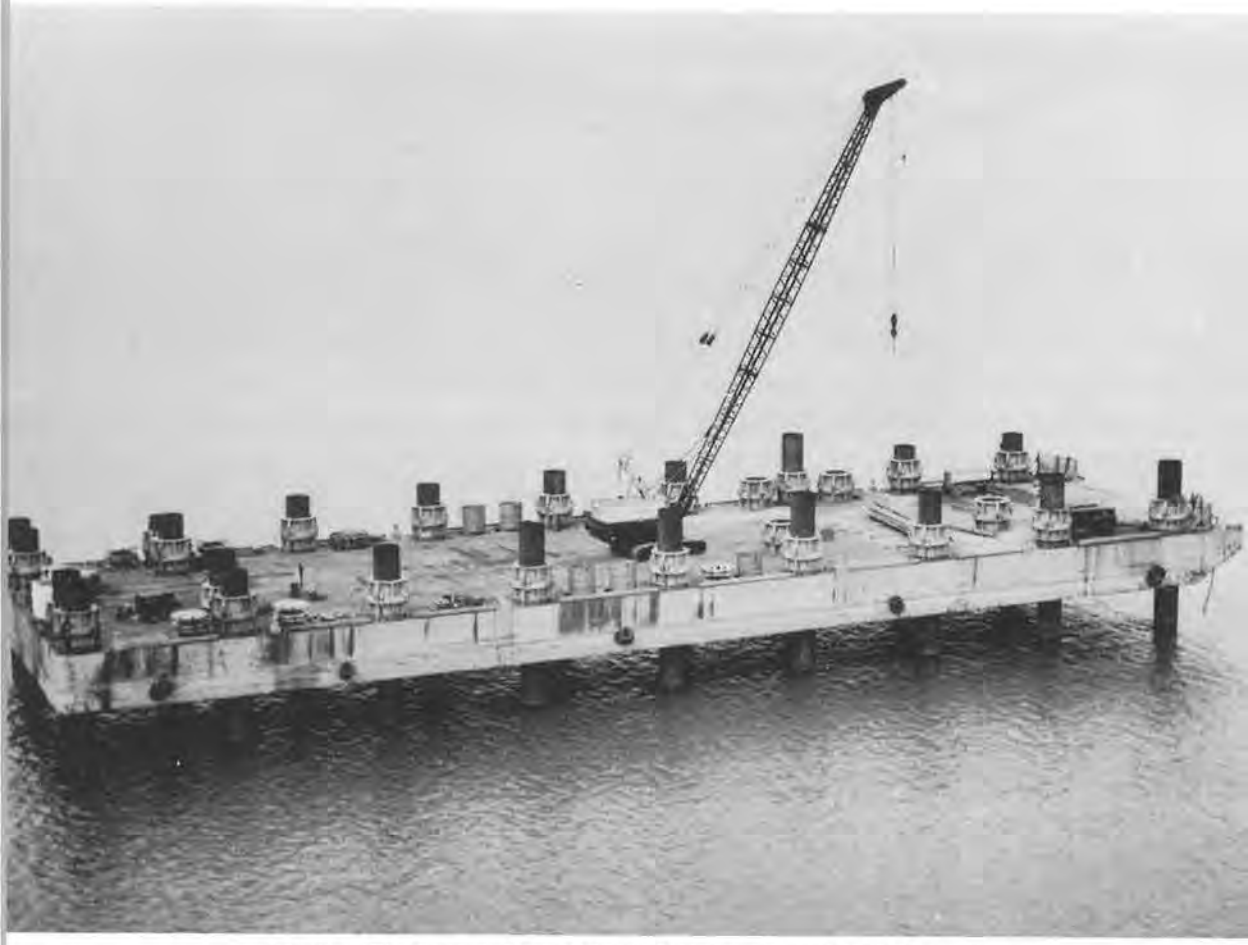
Map 33

LCM-8 in support of the Vietnam intercoastal operations.

drove aboard to remove the trailers from the vessels. (see Map 33). At Qui Nhon, prime movers were furnished by the 8th Transportation Group; at Cam Rahn Bay, by the 500th Transportation Group; and in Saigon, by the 48th Transportation Group. Subordinate elements of the U.S. Army Trailer Service Agency located in South Vietnam controlled trailer disposition, making it an intertheater trailer transfer system. This eventually led to the development of trailer transfer points, which broke long main supply routes (MSRs) into manageable segments, provide driver rest stops, and provide a location to transfer loads when the responsibility for transporting that load changes.

LOTS OPERATIONS

In addition to fixed port operations, the Transportation Corps used several logistics-over-the-shore (LOTS) operations to move soldiers and supplies into



A Delong Pier in support of offshore discharge operations in Vietnam.

the theater. Two of these included the LOTS operation at Wunder Beach and Operation Highland in support of the 1st Cavalry Division.

After a brief tour in the Dominican Republic, the 159th Transportation Battalion was deployed to Vietnam to provide terminal service support. The battalion provided the Qui Nhon Support Command with the unique capability, to conduct LOTS operations. With the immense buildup of tactical forces in the I Corps Tactical Zone, another line of communication was required to alleviate the theater's overburdened fixed port operations. The members of the 159th Transportation Battalion set up and operated a LOTS operation on Wunder Beach, along the South China Sea just south of the Demilitarized Zone. Using lighter, amphibious, resupply, cargo (LARCV) from the 165th Transportation Company, and 60 ton LARC LX from the provisional LARC Company as lighterage,

the LOTS operation was extremely successful. Operating under combat conditions with units like the 101st Airborne Division, the 1st Cavalry Division, and the 5th Mechanized Division, the men of the 159th proved the necessity for a strong LOTS capability. Cargo was discharged from deep draft vessels by the soldiers of the 71st and 561st Terminal Service Companies, then moved across the beachhead into a depot area where the 403d Terminal Transfer Company and the 625th Supply and Service Company offloaded, stored, maintained, and issued all five classes of supply.[41, 42] At the depot area, trucks from the 57th Transportation Battalion moved the cargo inland to provisional supply activities and other logistical installations in Co Lin, Dong Ha, Quang Tri City, and Hue.

During the six-month LOTS operation, the 159th Transportation Battalion discharged an average of 1,000 short tons of cargo per day over the shore. The operation was terminated as a result of the monsoon season. The 159th Transportation Battalion's LOTS operation made possible the major U.S. summer offensives in I Corps that relieved Khe Sanh and swept the A Shau Valley.

Another early mission accomplished by a LOTS operation took place in September 1965. Operation Highland was named for the reception and onward movement of the 1st Cavalry Division into the Republic of Vietnam. Because of its size and complexity, Operation Highland was a difficult assignment. With no docks or wharfs available for a more traditional ship offload, the Transportation Corps was tasked to support the offshore discharge of an entire division and bring it ashore in only two weeks.

The 394th Battalion Commander, Lt. Col. Thomas D. Emory, and his headquarters detachment arrived from Fort Eustis, Virginia just thirty days before the start of the operation. The 394th Battalion headquarters was augmented with four transportation companies: the 1098th Medium Boat Company, the 155th Terminal Service Company, the 344th Light Amphibian Company, and the 597th Medium Truck Company. After an appeal to the 4th Transportation Command in Saigon, eight additional transportation companies and several smaller detachments were sent to Qui Nhon to further support the operation.

The 394th prepared for the mission by training its personnel and preparing its equipment. By 12 September 1965, the unit had a strength of over 3,000 men and equipment that included four barge amphibious resupply cargo vessels (BARCs); nineteen LCM's; twenty-two LARC's; four LCUs; a floating crane; and a landing ship, dock (LSD) provided by the Navy. Operation Highland, also a logistical milestone, would begin that same day.

Ships arrived with cargo loaded for multiple ports. Therefore, cargo had to be removed and stowed on the crowded beach. Several ships had insufficient lifting equipment, and the 60-ton floating crane was needed in several places at the same time. The open bay meant that heavy surf continually washed away the loading ramps, sand and laterite formed sand bars offshore further hampering operations of the landing craft.[43]

Landing Craft Utility loaded with troops plowed ashore at Blue Beach making more than 100 landings on the beach and unloading as many as 3,000 men a day. Once ashore, the men were immediately trucked to the helipad and flown to An Khe. Cargo was unloaded at Red Beach. Stevedores from the 71st, 117th, 119th, and 155th Terminal Service Companies operated the ships' winches and booms, loadedg the landing craft at sea and unloaded them on the beach. Once the cargo was delivered to Red Beach, massive convoys were formed. One of these convoys, the "Monsoon Express" transported the 1st Cavalry Division to its area of operations.

Operation Highland concluded on 28 September 1965, ending the first LOTS operation of its size in which troops were not staged in a debarkation area. During the operation, 38 million pounds of cargo and 16,000 soldiers were unloaded from ships and moved over the beach and into a camp 70 miles away.[44]

HIGHWAY TRANSPORT OPERATIONS

The requirement for cargo truck assets to clear the ports and move supplies to the user or a depot was immense. Trucks played a major role in providing combat support to numerous tactical operations. In addition to providing truck transport for the theater, the Transportation Corps, until late 1967, was responsible for its own second echelon-level maintenance. Transportation unit commanders had to manage the equivalent of 1990's organizational level and direct support level maintenance operations on a daily basis.

When U.S. combat troops arrived in Vietnam, there were few roads and those were merely gravel or dirt. Consequently, in mid-1965 most highway transport units were located at or near the major port areas. Until the arrival of additional transportation commands, all truck units in the theater were subordinate to the 4th Transportation Command. As the theater matured and support commands were established around the major ports of embarkation, transportation units were placed under the control of the support command in their geographical area. Initial truck transport was provided by three truck companies at Saigon and Cam Rahn Bay and a combination of medium truck companies (two cargo and one POL) at Qui Nhon. The three truck companies

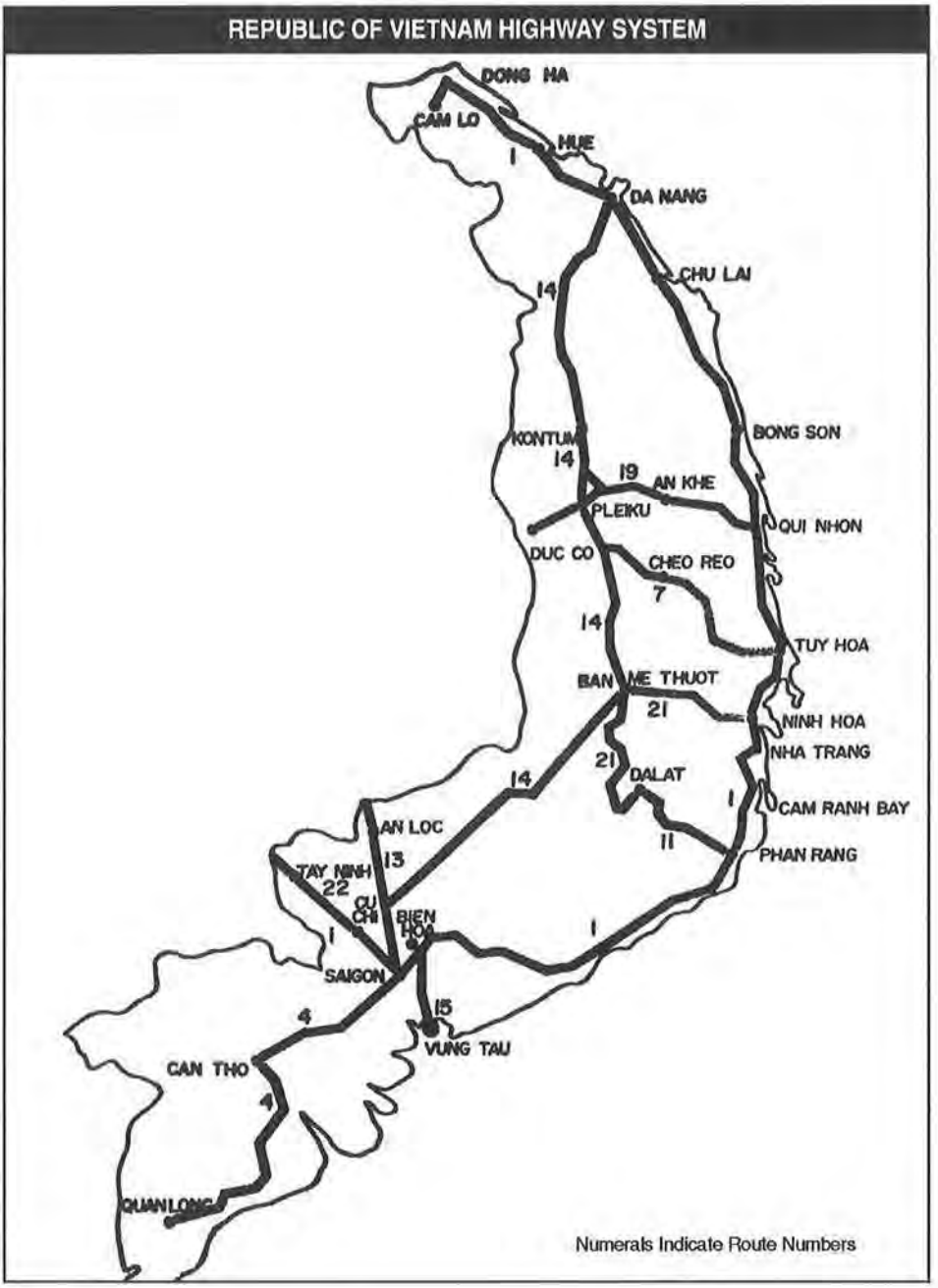
M52 tractor with a M127 trailer.

included the 120th Light Truck Company (arriving on 12 July 1965) at Saigon the 163d Light Truck Company (6 September 1965), at Cam Rahn Bay; and the 10th and 62d Medium Truck Companies (2-8 September 1965), which formed a composite company to support operations at Qui Nhon.

As force levels increased, so did requirements for highway transportation units. The requirements were met by the arrival of a Transportation Motor Transport Group, headquartered in Saigon and its subordinate military truck units, the use of commercial trucking contractors, and the arrival of the 1st Transportation Company (GOER)[45] (see Map 34).

The 48th Transportation Group (Motor Transport) was the first truck group to arrive in South Vietnam. It was assigned to the U.S. Army Support Command, Saigon, in May 1966. Subordinate to the 48th Group were the 6th and 7th Transportation Battalions. The 6th Battalion had 396 2 1/2-ton trucks and 60 5-ton trucks, providing port clearance and support to the III and IV Corps. The 7th Transportation Battalion, with 305 5-ton trucks and 420 12-ton trailers, assisted the 6th Transportation Battalion with the 48th Transportation Group's port clearance mission.[46]

Upon its arrival, 48th Transportation Group's two battalions were augmented by a contracting officer representative (COR) for Equipment Inc., of


REPUBLIC OF VIETNAM HIGHWAY SYSTEM
DONG HA
CAM LO
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AN KHE
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DUC CO
CHEO REO
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14
TUY HOA
BAN ME THUOT
21
NINH HOA
NHA TRANG
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DALAT
14
1
CAM RANH BAY
AN LOC
11
PHAN RANG
TAY NINH
13
22
CU CHI
BIEN HOA
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SAIGON
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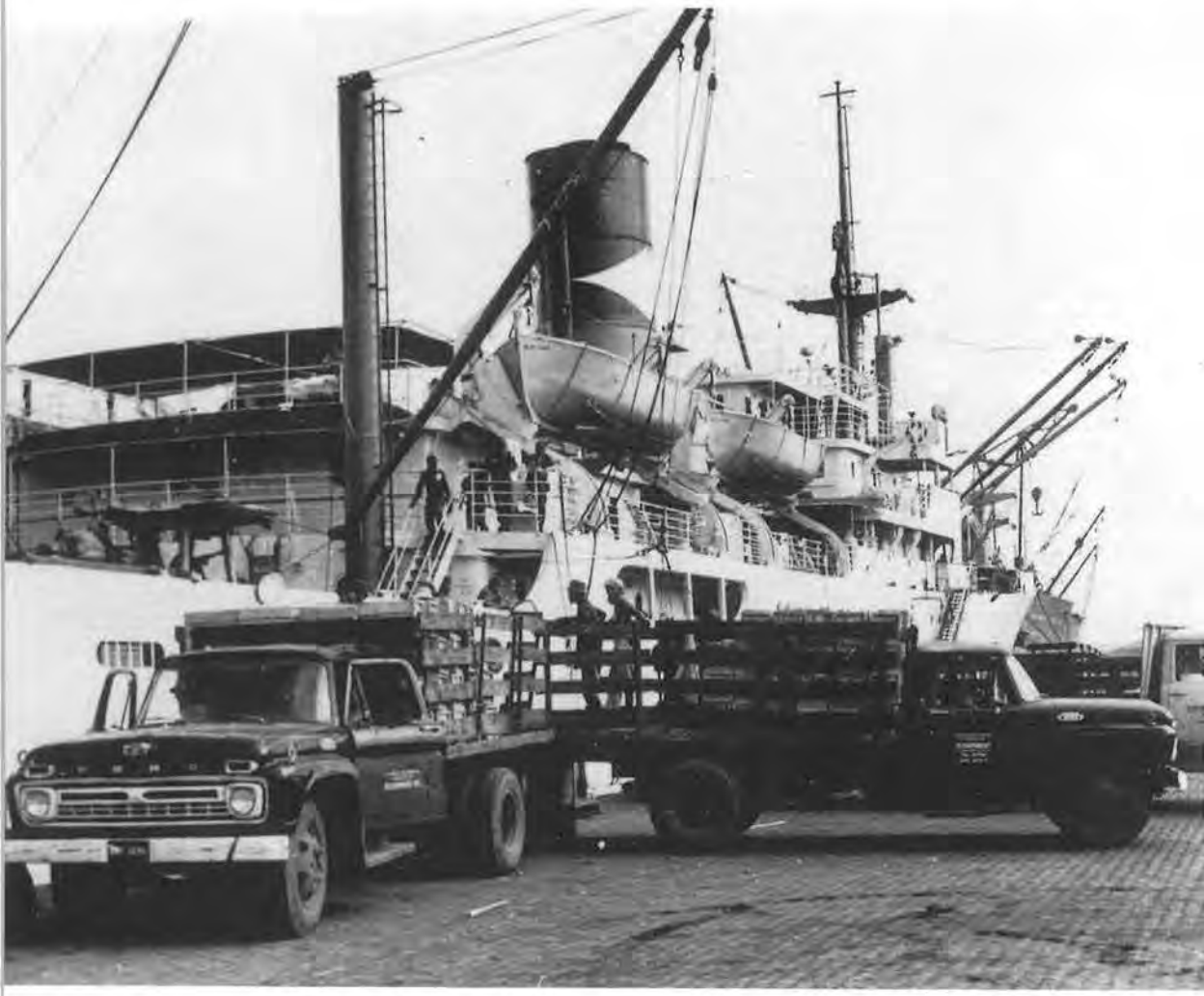
QUAN LONG
Numerals Indicate Route Numbers

Map 34



Contract trucks operated by the 48th Transportation Group in support of port clearance Vietnam.

SeaLand and Philco Ford. It immediately took command of the five companies that were operational in the III Corps area. The 48th's original transportation battalions included the 6th and 7th Transportation Battalions, arriving in Vietnam on 13 August 1966 and 2 August 1966, respectively. Philco Ford was contracted and assigned to the 48th Group to provide ground transport support, because of a theater shortage of trucks. Becoming operational on 1 March 1967, the 48th Group performed the majority of its missions supporting port clearance and interdepot hauls, while Philco Ford was instrumental in providing a bulk of the theater's line haul capability.

GOER 8 ton cargo truck.

The reliability of the contractor was superb, but transportation of cargo in a hostile environment required military trucks and drivers. Even though the entire theater was considered a combat zone, there were routes that were fairly secure and others on which Philco Ford would not operate. The contracting of trucks served an immediate need for truck assets but reduced the flexibility of transportation planners.

The 7th Transportation Battalion, the "Orient Express," had five medium truck companies, (10th, 62d, 446th, 534th and 572d) and two trailer transfer points (506th and 508th). The 7th Battalion's prime mover was the 5-ton tractor with M127, 12-ton stake and platform trailer. The 6th Transportation Battalion, the "Doers", consisted of six light truck companies, (86th, 87th, 120th, 163d, 261st, and 543d). Since the 6th Battalion was composed of light truck

companies, its primary workhorse was the 2 1/2-ton truck with 1 1/2-ton trailer and the 5-ton truck. With 760 trucks, the 48th Group operated over 1.2 million miles per month during fiscal year 1967 supporting tactical operations and transporting critical combat supplies.

One operation the 48th supported was Operation Cedar Falls, in which the U.S. Army attacked and destroyed a Viet Cong stronghold known as the Iron Triangle. A taskforce consisting of twenty-eight U.S. Army battalions reduced the supposedly impregnable position to farmland. The objective was achieved by a well-managed concentration of men and material and by unstinting transportation support. During the battle, the gun tubes of the supporting thirty-four artillery batteries rarely cooled. To support this operation, the 5-ton tractors of the 7th Transportation Battalion hauled loads day after day from Long Binh to Lai Khe and Dau Tieng. Over 7,000 tons of ammunition were delivered by the Orient Express, often directly to the firing sites.

Because it was operating a great distance from its "TC Hill" base in Long Binh, Operation Cedar Falls strained the transport resources of the 7th Battalions' five medium truck companies. In January of 1967, the unit's vehicles cleared 20,500 tons of cargo from the port of Saigon and distributed 45,000 tons of supplies throughout the greater Saigon area. The battalion also hauled 26,000 tons of supplies by military convoys through hostile country in III and IV Corps areas in support of combat operations of the 1st, 4th, and 25th Infantry Divisions, the 196th and 199th Light Infantry Brigades, the 11th Cavalry Regiment, and the 173d Airborne Infantry Brigade.[47]

The "Orient Express", commanded by Lt. Col. Otto Meerbott, was the workhorse of the 1st Logistical command's land transport service in the Saigon area. Averaging a half million miles driven per month with only one accident per 100,000 miles was a monumental achievement for tractors and trailers operating over some of the most difficult and dangerous terrain in the world. This feat was a tribute to the training and professionalism of the soldiers in the Transportation Corps.

The professionalism and valor of the 7th Transportation soldiers were demonstrated time and time again. One example was the heroism of Sgt. William W. Seay on 25 August 1968. Sergeant Seay, while assigned to the 62d Transportation Company (Medium Truck), 7th Transportation Battalion, was participating in a resupply mission carrying ammunition and supplies from Long Binh to Tay Ninh.

During this mission, a Viet Cong battalion ambushed the convoy with intense rocket, machine gun, and automatic weapons fire. When his convoy was forced to stop, Sergeant Seay, took up a defensive position behind his truck,

which was loaded with high explosives, and successfully repelled a frontal assault, killing two enemy soldiers. Spotting an enemy sniper 75 meters to his front, Sergeant Seay killed him. When an enemy grenade was thrown under an ammunition trailer near his position, he left his protected position, picked up the grenade and threw it back at the enemy, killing four more and saving the lives of fellow soldiers around him. When another grenade was thrown at his position, Sergeant Seay again threw the grenade back at the enemy.

This time Sergeant Seay was wounded in his wrist and began giving encouragement and direction to his comrades. After moving to the relative cover of a nearby ditch, Sergeant Seay spotted three enemy soldiers preparing to fire on his comrades. Weak from the loss of blood, and with his right hand useless, he stood up and fired his rifle with his left hand, killing the three enemy soldiers and saving the lives of his comrades. Later, he was mortally wounded by a sniper's bullet. Sergeant Seay was awarded the Medal of Honor posthumously 9 April 1970.[48]

In October 1966, the 8th Transportation Group joined the 48th Group in supporting combat operations in Vietnam. Consisting of the 27th, 54th, and the 124th Transportation Truck Battalions, the 8th Group began daily operations out of the coastal city of Qui Nhon to support tactical units in the northern II Corps. Each month, truckers from the 8th Group delivered over 90,000 tons of ammunition, building materials, fuel, and other supplies. Convoys of up to 200 vehicles made line-haul missions 200 miles long in a single day.

Route 19 was one of the most difficult and dangerous roads traveled by the drivers of the 8th Group. The highway began near Qui Nhon, then wound its way westward through two treacherous mountain passes. Only partially paved, it had little or no shoulder and was pitted with potholes. Sniping and mining incidents were frequent. The enemy made a determined effort to destroy the route's numerous bridges, of which there was an average of one every three miles.[49]

Because of frequent attacks along the narrow stretch of graveled road between An Khe and the base of the Mang Giang Pass, the truck drivers named that section of Route 19, "Ambush Alley". As the frequency and ferocity of the enemy's attacks on the convoys increased, the 8th Transportation Group commander, Col. Joe O. Bellino, realized that something had to be done to increase convoy security. Military Police were already fully committed in a wide range of missions and were unable to provide further assistance. Combat units could offer some security while convoys were traveling through their area of operations, but not enough.

8th Transportation Group's *Eve of Destruction* Guntruck.

After an extremely vicious attack on a U.S. convoy traveling through Ambush Alley, the 8th Group instituted the hardened convoy concept. They used trucks that normally hauled cargo and outfitted them with sandbags on the floors, beds, and sides for protection. A crew consisting of a driver, two M60 machine gunners, and a noncommissioned officer in charge (NCOIC) was assigned to each of the hardened security trucks, commonly known as guntrucks.

In addition to providing security vehicles to convoys, the number of trucks in individual convoys was reduced. Columns contained fewer than 100 vehicles, with march units (the subdivision of a column) of 10 to 20 trucks each. More guntrucks were outfitted until there was an average of one security vehicle for

every 10 task vehicles. The price for hardened vehicles was not cheap. A reduction of 10 percent in carrying capability was a high price to pay in terms of mission accomplishment. Security vehicles required additional personnel, thus reducing the number of available drivers, who were already in short supply.

After weeks of experimentation, guntrucks became more sophisticated. The sandbags absorbed water from the frequent rains, thereby increasing the weight and overloading the truck. A young warrant officer from the 8th Group found sheets of steel plating in a nearby salvage yard and had them welded to the sides and bottoms of the security vehicles. The steel plates were a superb replacement for the heavy sandbags and gave the 8th Group their first armor-plated guntruck.[50]

The typical guntruck was armored on the front, rear, and sides, as well as the cab floor and bed, for protection against mines. Pedestal mounts for the M60 guns were installed in the bed, and sections of the side plate directly in front of each gun were cut down several inches to provide a field of fire. A grenadier, armed with the M79 grenade launcher, was also added to the crew.

As ambushes continued, so did the evolution of the guntruck. The 2 1/2-ton truck was phased out and replaced with the 5-ton cargo truck. Another change came with the addition of tools, extra tires, oil, and water, which allowed the guntruck to double as a maintenance vehicle for the convoy. In addition, the location of the guntruck was altered so frequently it prevented the Viet Cong from predicting its location in the convoy.

Some guntrucks had double plates of armor to protect against rocket-propelled grenades (RPG), while the addition of .50 caliber machine guns increased the truck's firepower. The "quad fifty" innovation included four electronically synchronized .50 caliber machine guns mounted in the bed of a 2 1/2-ton truck. At one time, the 8th Group employed eight of these trucks for convoy security. A few guntrucks even mounted 7.62 millimeter mini-guns, which could fire several thousand rounds per minute.

The use of guntrucks became common practice among the truck units in Vietnam. Never standardized or officially approved, only their names and reputations became legend. Among the most famous was the "Eve of Destruction". Other guntrucks, such as the "Bounty Hunter", "Ho Chi's Hearse", and the "VC Undertaker", were familiar sights to the drivers of the 8th Group in Vietnam.

The personnel who operated these security vehicles maintained an extremely high level of morale and exemplified the esprit d'corps of the truck drivers of the Transportation Corps. These soldiers were credited with saving

lives of many truckers who daily traveled the road network of Vietnam. Their personal bravery and fighting spirit were a model worthy of emulation by their successors.

Guntruck crews' luck and courage were exemplified by Specialist Four Dallas Mullins of the 444th Transportation Company and Specialist Four Larry A. Dahl of the 359th Transportation Company. When the driver of Mullins' guntruck was wounded during a highway ambush, the vehicle became stalled in the center of the enemy kill zone and was subjected to intense small-arms fire. Even though Mullins was wounded twice in the arm and once in the leg, he came to the aid of the wounded driver and maneuvered the truck out of the line of fire. During another ambush on Route 19, Specialist Dahl threw himself on an enemy grenade that had been tossed into the back of his guntruck. He saved the lives of the rest of the crew with the sacrifice of his own. For their unselfish acts, Mullins was awarded the Silver Star Medal and Specialist Dahl, posthumously, the Medal of Honor.[51]

In addition to the unusually large number of Bronze Star and Purple Heart Medals awarded in the transportation companies, the 8th Transportation Group was awarded the Presidential Unit Citation. It was also the only transportation group in Vietnam to receive the Vietnamese Cross of Gallantry.[52]

Known affectionately as "Frustrated Tankers" by the combat units they supported, the 8th Group maintained an exceptional reputation for the support of front line forces. Constantly aware of the dependency of the tactical forces upon the cargo moving forward, the officers and men of the 8th Group continually risked death and injury to transport the necessary material and equipment over insecure and enemy infested roads.

One such example was the 27th Transportation Battalion's support of Operation Highland. The 27th's support mission of Operation Highland was formally referred to as the "Monsoon Express", which was a convoy run daily between Qui Nhon and An Khe, headquarters of the 1st Cavalry Division. The "Monsoon Express" was established by Capt. Robert Luberacki and 1st Sgt. I. L. Landrum, who formed the nucleus of a provisional transportation battalion to coordinate and control assets during the early stages of the Monsoon Express Operation. After the operation grew in size and with the assignment of a transportation battalion to this mission, the 27th took control of the daily operations of the Monsoon Express.

The teamwork of the 2d, 48th, 61st, 541st, and 597th Transportation Companies under the 27th Transportation Battalion helped to make this operation a success. The Monsoon Express made its first haul on 3 September 1965, operating the largest convoys in Vietnam and the first to run from the sea to An Khe. During the support of Operation Highland to receive and emplace the

M54 5 ton truck.

1st Cavalry Division, more than 3,400 vehicles traveled Route 19 with convoys as long as 300 vehicles.

The skill and determination of the truckers from the 27th Transportation Battalion, who participated in the Monsoon Express, demonstrated the Transportation Corps' ability to expertly support critical operations. The Monsoon Express was the last leg of a complete operation in which a division was brought ashore by a LOTS operation, offloaded from lighterage, transloaded onto either ground or air transport, and then moved into the theater. It was the forerunner of what would later become a routine operation.[53]

The 500th Transportation Group, which arrived in October 1966, was the last truck group sent to Vietnam. It was assigned to the U.S. Army Support Command, Cam Rahn Bay, and had the primary responsibility for motor transport operations in the southern portion of II Corps. The group consisted of two truck battalions, the 57th and the 36th. Unlike the 8th, the 500th Group's main concentration was not line-haul operations, though occasionally they were tasked to support tactical operations involving line-haul missions. Instead, the group concentrated on port and beach clearance, with the major resupply of the Phan Rhan Air Base as the principal objective.

M35A2C Drop Side Truck.

In addition to port clearance, the 57th had a wide array of other missions. After deploying to Vietnam in late 1967, the 57th conducted operations in Quang Tri for eleven months. By November 1968, the 57th relocated to Chu Lai and provided transportation, supply and service, and direct support maintenance for the Army's largest active duty division, the 23d Americal Infantry Division. The 57th was ultimately awarded the Meritorious Unit Citation.

Over the next 26 months, the battalion performed several different missions, which included operating a field laundry, bakery, frozen storage facility, helicopter refuel point, POL battalion, POL bulk storage yard, and medium boat company. In addition to its diverse support missions, the 57th played an integral part in the LOTS mission at Wunder Beach. It also supported Operation Pegasus, which provided the relief forces for the Khe Sahn outpost, that had been under siege for over two months during the Tet Offensive of 1968. The 57th was truly a forerunner of today's multifunctional battalion, which in the 1990s can be found in a forward or rear corps support group. Even with such a wide array of missions, the 57th managed to perform all of them. The 500th Transportation Group was inactivated in

October of 1969, and its assets were combined with the 124th Terminal Command to form the Transportation Command (Provisional) at Cam Rahn Bay.

Even with three transportation truck groups in theater, the truck requirements exceeded capabilities. Transportation planners used units' tables of organization and equipment (TOE) capabilities to plan the number of truck units required in the theater. These capabilities were based on a 20-hour, two-shift workday on fairly good roads. With the unsecured ground lines of communications, truck units were forced to operate almost entirely during daylight hours and divert cargo trucks to perform security missions. To further complicate the problem, the road network was unimproved, further reducing the truck company's productivity level. The combination of these factors could reduce a unit's capability to 25 percent of those stated in its TOE. To combat the problem and increase the theater's truck capabilities, new transport equipment was introduced, while contractors were hired to offset some of the theater's transport shortfalls.

In September 1966, the GOER vehicle arrived in Vietnam with the one-of-a-kind 1st Transportation Company. There were nineteen vehicles in three configurations: the 8-ton vehicle, 8-ton 2,500 gallon tanker, and the 10-ton wrecker. The GOER vehicle was a large-tire, rough-terrain, cargo-carrying vehicle designed and built by the Caterpillar Tractor Company. The vehicles were quite versatile, possessing both a cross-country and swim capability. They were used extensively and were especially effective in the monsoon period. The GOERs were not good road vehicles, and maintaining them was difficult. Without the intermediate warehousing of repair parts in theater, all parts had to come directly from the continental United States. Despite these maintenance obstacles, the service they performed significantly augmented the Transportation Corps' off-road capabilities.[54]

The amount of cargo moved by motor transport in Vietnam was enormous. During the period December 1967 to December 1968, highway tonnage moved by a combination of military and commercial motor transport was approximately 10 million tons. Tonnage moved by the same means during the period January to July 1969 was approximately 5 million tons. As the war progressed, it was evident that the conventional military truck was not designed to handle palletized and containerized loads efficiently. The fixed sides of the cargo bodies on the 2 1/2-ton and 5-ton cargo trucks did not permit forklifts to reach the full length of the cargo compartment. Consequently, the push and pull method used in loading and unloading operations, was damaging truck bodies.[55]

To facilitate operations, U.S. Army Vietnam obtained eighteen dropside cargo trucks from the U.S. Marines Corps to serve as test vehicles. The test

proved that the dropside trucks were highly desirable and effective cargo carriers, and through their use, more cargo could be hauled with easier access to the entire length of the body, with little or no damage to the truck. U.S. Army Vietnam requested that the Department of the Army procure these trucks for use in Vietnam. After the war in Vietnam, dropside trucks became the standard for Transportation Corps light cargo trucks.[56]

By late 1965, transportation planners realized they would have to further augment the theater's military truck transport capability to clear the South Vietnamese port congestion. During the period March 1966 to June 1967, the U.S. Army Procurement Agency, Vietnam, awarded ten major contracts for trucking services to augment the military capability.

One of the major contractors used in Vietnam was the Vinnel Corporation, which also provided stevedore support, beach and port clearance, and vessel maintenance support. The highway support offered by Vinnel included the operation of thirty Army procured Kenworth trucks and trailers. These vehicles proved extremely effective on the sand dunes of Cam Rahn Bay.

Other major trucking contractors used in the Saigon area were Equipment Inc., Philco Ford, and Do Thi Nuong. The Han Jin Company of Korea was used for trucking and stevedore services in the Qui Nhon area. The Alaskan Barge and Transport Company provided stevedores, trucking, and intracoastal barge movement. It operated an extensive tug and barge fleet between Cam Ranh Bay and its outports, which included the entire South Vietnamese coast.

The use of contractor services for trucking, terminal, and marine purposes provided the Vietnam Theater with the extra capability necessary to support a rapidly expanding logistical base, but it also limited the theater commander's flexibility. The ability to mass logistical capabilities to support a large combat operation could be hindered by either contractual agreements or the reluctance of contractors to place their employees and equipment in harm's way, a problem faced by commanders since the Revolution.

The contracting of logistical shortfalls was sometimes the best alternative. As stated by Maj. Gen. John E. Murray, "Contracting for the Vietnamese to run the gauntlet up the Mekong in barges with ammunition to Phnon Penh was the best way to go without risk of American life, and with people who knew the river, the terrain and the finesse of getting through the Viet Cong." Yet, a balance had to be achieved so that the theater did not overrely on contracting for transportation.

This mix of transportation support did not go unnoticed by the Department of Defense, which decided that in the future, the commitment of Reserve and National Guard transportation units was preferable to contractor support.

Though the employment of the Reserves and the Army National Guard was largely a political decision, transportation planners were determined that the commitment of those forces was necessary in any future large-scale conflict.

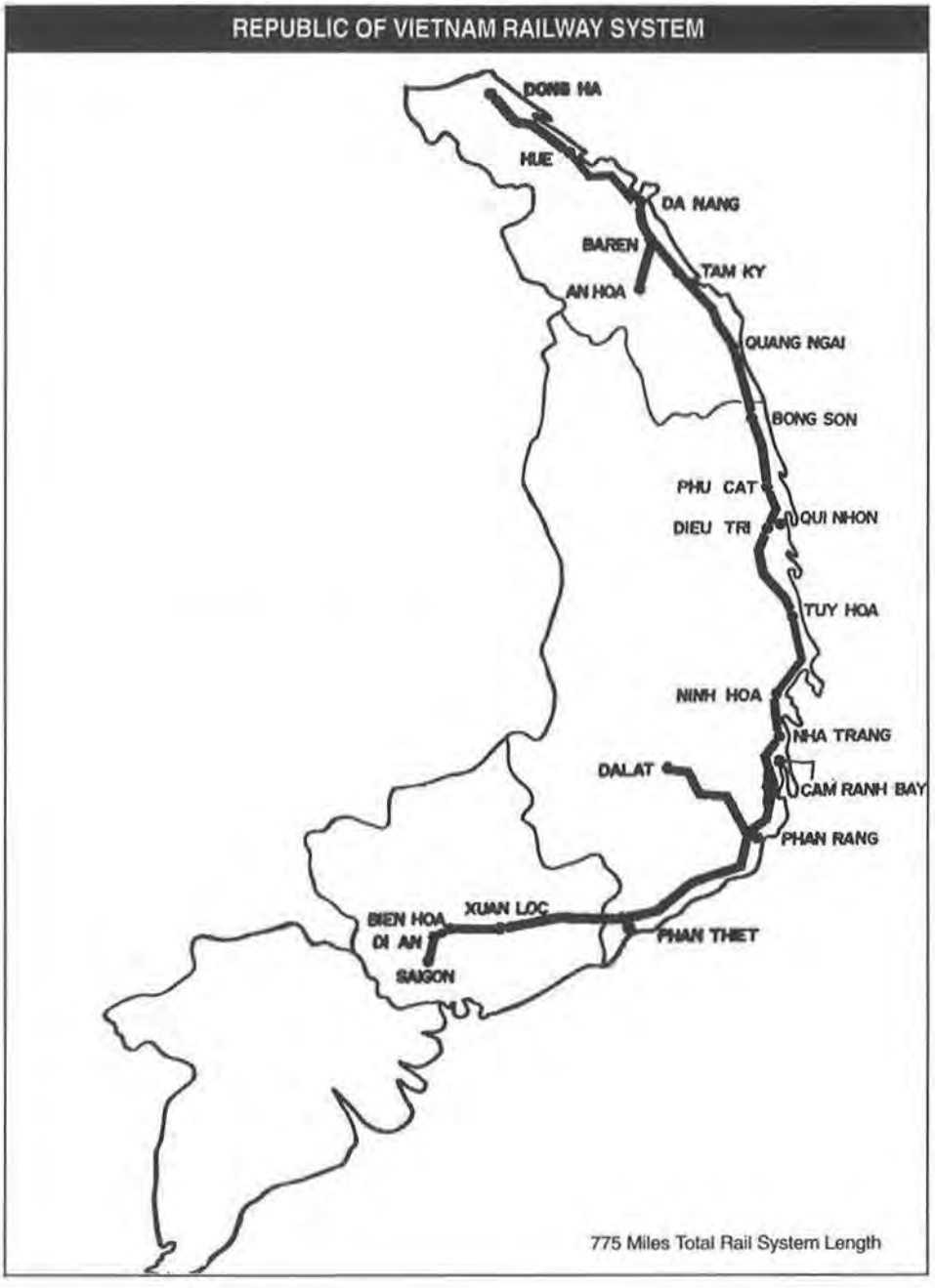
RAIL TRANSPORT OPERATIONS

In addition to truck transport, rail transport was making its mark on history, both in the Southeast Asia and European theaters. In the United States, the construction of railcars had tripled in five years. Nearly 105,000 new or rebuilt freight cars were put into service by American railroads and private car lines during 1966. This represented the best car building year since 1948. In terms of overall carrying capacity, new and rebuilt units represented the highest level achieved in forty-three years.

The new cars were equipped with the latest bearing, wheel, and cushioned underframe technology. Not only were the cars of 1966 larger (79-ton average capability versus 54 tons for cars replaced), but the newer cars were built to last longer and provide a more stable ride. The improvements were reflected in the doubling of new car cost over the past decade from $7,800 in 1955 to $15,400 in 1966.

The development of rail lines and cars in Southeast Asia was also experiencing a record boom. With the immense force buildup in Vietnam, every effort was being made to repair the Vietnam National Railway and bring it up to operating standard. The system was government owned and operated under the supervision of the Ministry of Communications and Transportation. The Vietnam National Railway System originated at Saigon and served the entire coastal area from Phan Theit to Dong Ha. (see Map 35) The overall condition of the rail line and rolling stock was poor. The long period of intense interdiction and destruction by the Viet Cong and North Vietnamese regular units had resulted in a system unable to carry significant tonnages. The 830 miles of meter gauge railroad was well-engineered, with 413 bridges, 27 tunnels, controlling grades of less than 11/2 percent, steel ties, and vertical elevations well above the waterways.[57]

In 1969, the rolling stock of the railroad consisted of 59 serviceable locomotives and over 500 serviceable freight cars. The major repair facility located in Saigon was well-equipped to perform major engine and car repair. The railway employed approximately 3,500 personnel. Overall planning for railway restoration began in June 1966 as a joint effort by the government of Vietnam and U.S. agencies. Actual construction was the responsibility of the Vietnam Railway System, except for rail spurs to U.S. military installations, which were funded and built by U.S. forces.


REPUBLIC OF VIETNAM RAILWAY SYSTEM
DONG HA
HUE
DA NANG
BAREN
TAM KY
AN HOA
QUANG NGAI
BONG SON
PHU CAT
DIEU TRI
QUI NHON
TUY HOA
NINH HOA
NHA TRANG
DALAT
CAM RANH BAY
PHAN RANG
XUAN LOC
BIEN HOA
DI AN
SAIGON
PHAN THIET
775 Miles Total Rail System Length

Map 35

Helicopter escort of a truck convoy in Vietnam

The U.S. Army had considerable interest in this railroad because of the potential it offered in the bulk movement of cargo at low rates. The system was used to support the MACV construction program, transporting hundreds of thousands of tons of rock and gravel to air base and highway sites. In 1967-1968, 200 U.S.-procured freight cars were delivered to Vietnam. These cars were maintained and operated by the railroad for the United States, and the freight rate for cargo handled on the cars was about 15 percent lower than normal rail rates. Vietnamese personnel operated the engines, did their own repair work, and restored sections of track destroyed by the Viet Cong. To help the Vietnamese modernize their fleet, the U.S. Army assigned technical advisors to the railroad, but for the most part, the Vietnamese ran the entire operation.[58] From a miltary transportation viewpoint, the railroad system never lived up to its potential for moving American military freight because it was so easily interdicted. By 1972, the major operational section from Saigon to the Long Binh-Bien Hoa area was used only for Vietnamese movements.

HELICOPTERS AND INTRATHEATER AIRLIFT

With the rapid buildup of forces in the Republic of Vietnam, the country's entire infrastructure had to be expanded. Initially, construction centered on the ability to receive massive amounts of supplies at its few major ports. As the expansion process continued, the ability of the Transportation Corps was hampered by a crude road network. Not only did the network lack the capability for continuous truck operations, it also gave the Viet Cong maximum opportunity to harass the U.S. logistical buildup. Those disadvantages led military planners to increase their dependence on helicopters as a means for rapidly moving both supplies and personnel.

Helicopters were the trademark of the U.S. military operations in the Vietnam War. From 1967 through 1969, over 3,228,000 cargo movements were made by helicopter, freeing the Army from sole dependence on surface transportation.[59] The helicopter became an indispensable link in the forward area of operation because of its ability to operate day or night in any weather with minimal preparation of landing sites.

Helicopters used by the United States in Vietnam fell into four general categories: utility (UH), cargo (CH), observation (OH), and assault helicopter (AH). The UH-19 Chickasaw was used early in the war but was soon replaced by the UH-1 or "Huey." The Huey, officially named the Iroquois, was the workhorse of the Vietnam War. The Huey was used to transport troops and supplies and evacuate the wounded and it was eventually modified to serve as a gunship.

One of the first helicopters to serve in Vietnam was the CH-23, deployed as early as 1962. Although some CH-54 Skycranes were used in Vietnam, the standard cargo helicopter was the CH-47 Chinook. The Chinook had a twin-engine system with rotor blades fore and aft. It was designed to carry equipment, supplies, and troops (up to 33 passengers). By use of external slings, it could transport light artillery and other loads. Normally its maximum range was 150 to 200 miles with a speed of about 110 to 120 knots.[60]

Commonly referred to as a flying container, the Chinook played a significant role in transporting supplies to remote base camps and relocating units rapidly on the battlefield. By employing the sling load technique, it was not uncommon for the Chinook to airlift 100 tons of supplies a day within a 10-mile radius. Artillery units could support a fire mission, then rapidly relocate to provide fire support for another mission within hours. Additionally, when combat forces were actively engaged, Chinooks had the cargo capacity to

rapidly provide large quantities of ammunition, allowing U.S. forces to continue the fight.

Even with the success enjoyed by helicopters during the Korean War and the introduction of new and much more versatile helicopters in Vietnam, military planners were not positive that a heavy combat force could be completely resupplied by air. The notion of a large combat force totally isolated and dependent on helicopters for its existence gave most combat commanders pause.

To test the concept, Operation Remagen was conducted from 16 March through 29 April 1969. For forty-seven days, Task Force Remagen, consisting of two battalions from the 5th Mechanized Infantry Division, operated at a distance of 40 to 60 kilometers from the division base at the Marine Corps Vandergrift Combat Base, relying entirely on helicopters for resupply. When the operation was completed, over 1,000 short tons of supplies had been delivered to the task force.

Although it would be a routine operation in later years, Remagen laid the cornerstone for resupply by air. Months later, the exercise led to the reorganization of the 1st Cavalry and 101st Airborne as airmobile divisions. Thereafter, operations would be based on the ability of the helicopter to move troops regardless of terrain and resupply them even in enemy-controlled territory. For the latter mission, the Transportation Cargo Helicopter Companies proved admirably suited.

In addition to daily combat service support and resupply missions, the larger helicopters, the CH-47 and CH-54, were also used to recover downed aircraft and evacuate vehicles and equipment to the rear. Through extensive experience, procedures were developed whereby aircraft and other equipment and material could be rigged for pick-up by helicopter in a matter of minutes, even in enemy territory under fire. By 1974, helicopters had accounted for the recovery of over 10,000 aircraft, valued in excess of $2.5 billion.[61]

Almost ten years before the arrival of U.S. combat troops in Vietnam, the Transportation Corps had played a major role in the Army's Aviation program. General Order 76, Department of the Army, dated 11 August 1952, transferred a major portion of logistical responsibilities of the aviation program to the Transportation Corps. The order gave the Transportation Corps the twofold mission of logistical support by helicopter and the responsibility of operating helicopter companies.

The organizational maintenance of aircraft became the responsibility of the using unit with technical supervision from the Transportation Corps. The Transportation Corps activated theater Army aviation maintenance (TAAM) companies specifically to provide helicopter maintenance support. One company was normally assigned per corps for a total of three companies per field Army.

The company also recovered aircraft from the combat zone and provided replacement aircraft to using units on a limited basis.

The next higher unit in the logistical chain was the Transportation Corps' new heavy maintenance and supply company. This unit provided backup support to three TAAM companies. There was normally one heavy maintenance and supply company per field army or one per 1,000 aircraft equivalents. The unit provided fourth echelon repair for the helicopter battalions as well as for the TAAM companies. The Transportation Corps was capable of furnishing the logistical support required for a field army and was also responsible for depot-level maintenance, formerly the responsibility of the U.S. Air Force.[62]

The repair and recovery of helicopters during the Vietnam War was a vital mission of the Transportation Corps. With the intense flying hours accumulated by these aircraft, maintenance at all echelons was immense. On 11 December 1961, two helicopter companies arrived in Vietnam. The total number of U.S. Army aircraft had grown to 510 by 1 January 1965, then further increased to a peak of 4,228 by September 1969. When the buildup commenced in 1965, the U.S. Army Support Command Vietnam had one aircraft maintenance and supply battalion, the 765th Transportation Battalion, commanded by Lt. Col. Robert J. Dillard. The mission of the 765th was to provide direct, backup, and general support for all Army aircraft in country.[63]

As additional aircraft arrived in country, the Commanding General, U.S. Army Support Command, Vietnam, became concerned about the ability to support the large influx of aircraft. He appointed a committee to develop a plan to support the increasing numbers. The committee's recommendations included the formulation of a separate headquarters commanding all nondivisional aircraft supply and maintenance units assigned to the Aviation Brigade, 1st Logistical Command, or a separate command under U.S. Army Vietnam.

On 17 January 1966, the separate headquarters was activated, the 34th General Support Group, providing direct and general support to over seventy-nine aviation companies in Vietnam. The 34th consisted of two depot companies, five general support companies, eleven direct support companies, four aviation electronics companies and the Aviation Material Management Center. The 34th also included the 1st Transportation Battalion, located aboard the U.S. Navy ship, *Corpus Christi.* The *Corpus Christi* provided a floating aircraft maintenance facility, vital to the Army's mission in Vietnam. The ship offered excellent mobility by providing a floating support and general support facility that could be relocated at any deep water port to provide aircraft support based on the tactical mission.

The 34th General Support Group served throughout the remainder of the Vietnam War, providing direct and general aviation maintenance support to the entire theater, the only such unit in U.S. Army history. The outstanding performance by approximately 5,000 military and over 2,000 civilians of the 34th led to its award of the Meritorious Unit Commendation for three consecutive years in Vietnam (1967-1970).[64]

INTERTHEATER AIRLIFT: VIETNAM AND EUROPE

While Army Aviation was maturing and having a significant impact on intratheater lift, the Transportation Corps was also interfacing with the Air Force for the air movement of cargo to the Vietnam Theater. One such endeavor was based on the 1965 visit by Defense Secretary Robert S. McNamara, who visited Vietnam on 1 December 1965, and detected a critical need for a super-fast supply pipeline over and above normal supply channels. On 1 December 1965, he directed the formulation of a temporary top supply and transportation priority program called the *Red Ball Express.* The first *Red Ball Express* air shipment was made to Saigon on 7 December 1965, the anniversary of Pearl Harbor. The project was hailed as one of the most effective cooperative efforts in the history of military logistics, but it was merely a reiteration of programs used in World War II and Korea and would also be used again twenty-three years later in Operations Desert Shield/Desert Storm.

The new system for speeding critical repair parts to Vietnam was reminiscent of, and actually named after, the famous supply marathon that kept General George S. Patton, Jr.'s Third Army racing across France during World War II. The 1966 version of the Red Ball Express differed from its 1944 forerunner in one major respect. The 1965 Red Ball moved cargo by air transport. In addition, its pace was accelerated in direct proportion to the technological advances made since World War II in rapid telecommunications and improved administrative techniques. The system was originally designed to provide the requester a 168 hour (seven-day) turnaround time from time of requisition to time of delivery. The system had originally been planned to handle about one ton of supplies per day, but soon after its inception, the Red Ball was moving some 75 tons of cargo per day. This volume, however, overloaded the system and decreased its effectiveness.

The Red Ball reports indicated that almost one million requisitions were processed during its lifetime. Of this total, 98 percent, representing some 67,000 tons, were airlifted to Vietnam. The Red Ball concepts were integrated into

Army procedures in 1969, and U.S. depots gradually replaced the function of the Red Ball Express.[65]

By the early to mid 1960s, the Department of Defense realized the need to rapidly deploy heavy forces almost anywhere in the world, especially to Europe. For years, adequate technology in oceangoing vessels had existed to transport a heavy force (Army infantry/armor division) aboard several vessels to any point in the world that had deep water port capabilities, but delivering troops to a hot spot in which there was no port was very difficult. By the Vietnam era, the Transportation Corps had developed over-the-shore capabilities to offset inadequate port facilities. However, the United States still lacked the capability to fly the organic combat equipment of a U.S. Army infantry division to a potential combat area. Rapid deployment for heavy or outsized equipment was still measured in days, not hours. The trip from a U.S. East Coast port to Saigon was fifteen to eighteen days.

To alleviate the rapid deployment shortfall, Lockheed Corporation, based in Marietta, Georgia, was awarded the contract to build the world's largest aircraft, the C-5A Galaxy. The C-5A, with a wing span of 223 feet, a length of 246 feet, and a height of over 65 feet, was powered by four General Electric TF-39 turbofan engines, providing a maximum gross payload capacity of 265,000 pounds. The C-5A was operational by 1968 and continued to be a major asset in U.S. ability to rapidly deploy heavy or outsized military equipment.

The C-5A, like the other Air Force cargo aircraft (C-7, C-123, C-130, C-141, etc.), was also capable of transporting the standard Air Force cargo pallet. The pallet, designated by the U.S. Air Force as the 463L, is a lightweight metal and balsa wood platform that adapts easily to the floor of Air Force cargo aircraft. With the increasing dependence on air lines of communications, the 463L became a common piece of equipment used to transport cargo aboard Air Force aircraft. Cargo mounted on the 463L could be moved directly from the aircraft to a waiting truck without additional handling. Without the requirement to manually transload each piece, the amount of time a truck had to wait to load or offload was decreased significantly. This resulted in an overall increase in the efficiency of the Transportation Corps' truck fleet.

The 463L was also used to satisfy a variety of other, unauthorized needs. During the Vietnam conflict, it was used for tent floors, bunker ceilings, outdoor storage platforms, as well as siding and roofs for houses. The unauthorized use of the 463L pallet resulted in a theater wide pallet shortage, and in late 1968, the theater initiated a major pallet recovery plan. By August 1969, over 17,900

pallets had been recovered. The experience demonstrated the need for all services to share in the responsibility for pallet accounting and recovery.[66]

THE TRANSPORTATION CORPS IN EUROPE

In addition to an ever-increasing demand for truck transport in the Vietnam theater, the Transportation Corps was also developing the backbone of ground transport in the European Theater. The establishment of a single headquarters to command the surface transportation assets of United States Army Europe (USAREUR), was a large step in forming an integrated transportation service in Western Europe. With the activation of the United States Army Transportation Command, Europe, (TRANSCOM) on 2 December 1968, the major military surface transportation assets in Europe were placed under the single manager concept. As a major command under the United States Army Europe, the TRANSCOM was charged with operating an integrated transportation service for Central Europe in support of Army, Navy, Air Force, and other governmental agencies in the theater.

In order for the TRANSCOM to manage a wide variety of logistical missions, it was staffed with five subordinate commands and staff sections that were almost completely automated. The TRANSCOM maintained a data processing unit (DPU) to handle the command's automation needs, such as supply and transportation evaluation procedures (EURSTEP) and the retrograde passenger movement system. Automation greatly enhanced the TRANSCOM's ability to accomplish its myriad of missions.

The TRANSCOM's five subordinate commands included the Data Processing Unit, the Movement Control Agency, the 37th Transportation Group, the U.S. Army Reception Group, and the Army Materiel Command, Europe. By far the largest of these subordinate commands was the 37th Transportation Group (Motor Transport), which at the time was one of the largest trucking concerns in the world. The 37th was responsible for the operation of the highway line of communications within Western Europe for the support of U.S. forces.

Organized as a multinational transportation group, the 37th consisted of three U.S. Army Transportation battalions with fifteen medium truck companies, two heavy-equipment transport companies, one light truck company, and one German Labor Service Group with its three organic truck companies. The 37th Group was originally assigned the M52 5-ton tractor for transport operations along the German autobahns. Recognizing the shortcomings of the M52 tractor as a linehaul asset, steps were taken to outfit the 37th with the International Harvester 5-ton truck tractor. By 1969, the 37th was equipped with 1,000 of the

International Harvester diesel tractors. The group also had forty-eight of the M911, 55-ton heavy-equipment transporters, and 60 of the M35 series 2 1/2-ton trucks. The M911 heavy-equipment transporters were the 37th Group's organic capability to haul the M60 main battle tank.

The 37th Group also had a large inventory of trailers ranging from 2,200 of the M127A1 12-ton stake and platform trailer; 170 M349 7 1/2-ton capacity refrigerated vans; 120 M129, 12-ton cargo vans; and 30 M172A1 25-ton capacity low bed trailers. These assets were controlled throughout the European Theater by the use of trailer transfer points (TTPs). These small but vital activities expedited the forward movement of loaded trailers, provided trailer maintenance and repair services within their limited capabilities, and ensured empty trailers were returned in the system using tractors bobtailed to home station.[67]

The majority of the group's cargo entered Europe through the water terminal operated by the 11th Transportation Terminal Group, headquartered at Bremerhaven. The largest of the five terminals, Bremerhaven also controlled shipments processed through the North German ports of Nordenham, Bremen and Hamburg. The Benelux terminal at Rotterdam processed shipments through Belgium and Dutch ports at Rotterdam, Antwerp and Zeebrugge, and through the United Kingdom terminals in London, Liverpool, Southhampton, and Felixstowe. The Lisbon terminal processed cargo for U.S. activities in Portugal and the Azores, while the Rhine River Terminal at Mannheim handled river cargo moved by barge down from the northern ocean ports.

A million tons of cargo moved through these terminals annually, comprising virtually every item of supply and equipment used by U.S. forces in Europe. Food, clothing, weapons, ammunition, vehicles, post exchange items, mail, and other support material arrived and departed daily, forwarded to their final destination on 37th Transportation Group vehicles or by commercial rail, barge or highway carriers.

The TRANSCOM's day-to-day traffic management and movement control responsibilities were accomplished by the Movements Control Agency (MCA). With its headquarters collocated with TRANSCOM Headquarters at Camp King, Oberrusel, Germany, the TRANSOM's MCA operated on an area basis through its three movements regions and eight Transportation Movements Offices (TMOs), servicing over 300 customers along a supply pipeline 3,000 miles long. The MCA provided TRANSCOM with a highly integrated transportation management and control capability. Operational elements of the headquarters performed three unique functions: container control, passenger port calls, and centralized truck commitment.

One of the five subordinate commands of TRANSCOM was actually born out of the first Return of Forces to Germany (REFORGER) operation in 1968.[68] The U.S. Army Reception Group, Europe (USARAGE) was designed to function as a reception, processing, and staging element for troop units at arrival and departure airfields in the theater. Acting in close coordination with the MCA and the troop unit concerned, USARAGE provided the necessary interface between arriving and departing Army and Air Force units involved in the movement.[69]

With the withdrawal of France from NATO imminent, the 37th was given an additional mission in 1966. Under command of Col. John E. Murray, the 37th was given the mission to support the project to evacuate all U.S. armed forces and installations from French territory.[70] Given the operational name Fast Relocation Out of France, code named FRELOC, the bulk of the transportation portion of the operation fell to the 37th Group, despite the fact that many of its experienced senior noncommissioned officers had been sent to Vietnam.

Even with the challenge of training fairly inexperienced personnel, the 37th Group met the challenge and moved all U.S. cargo out of France on schedule. Amassing over 162 million ton miles from January to December 1966, the 37th Transportation Group established a new one year record exceeding the famed Red Ball Express record by over 40 million miles.[71] The 37th Group's significant accomplishments allowed Operation FRELOC to be completed on 31 March 1967 as scheduled.

The story of the TRANSCOM in Europe and the establishment of a single headquarters to command the surface transportation assets of USAREUR was an important one for the evolution of the Transportation Corps. The European Theater served as a model for future transportation developments. Not only did one commander control all surface transportation in the theater, but an integrated movement control system was emplaced to expertly manage those assets. While the concept of central management and integrated movements worked well in Europe, it was, for the most part, ignored in Vietnam. Recommendations to improve the situation were never adopted.

HOME OF THE TRANSPORTATION CORPS

The Transportation School in Fort Eustis, Virginia, was instrumental in providing the quality transportation personnel and leaders necessary to support the Vietnam War. From January 1965 through January 1969, the Transportation School trained over 64,900 personnel in transportation-related subjects. Additionally, it trained 3,645 officers in the Transportation Officer Basic and Advanced courses. The installation also provided the Army with over 2,480

Transportation Officer Candidate School (OCS) graduates. The first of the Transportation OCS classes (Class 1-67) graduated in December of 1966, marking the first officer candidate class at Fort Eustis since 1947.[72]

With the need to train the massive number of students at the Transportation School during the Vietnam era, other changes were occurring at Fort Eustis. By 1966, the U.S. Army Transportation Engineering Agency at Fort Eustis, under the jurisdiction of the commandant of the Transportation School, was transferred to the Military Traffic Management and Terminal Service.[73]

At the same time, the installation was reorganized as the U.S. Army Transportation Center and Fort Eustis, under Headquarters, Second United States Army. Later that year the First Army absorbed the Second Army and the Transportation Center and Fort Eustis became subordinate to First Army. In July 1973, after a major Army reorganization, the Transportation Center and Fort Eustis was designated a major subordinate command of Headquarters, United States Army Training and Doctrine Command (TRADOC).[74]

As the Transportation Corps expanded and new equipment replaced old, the need to preserve the history of the Corps became apparent. In 1959, Lt. Col. Kenneth Klinger, then Chief of the Training Aids Division, began a historical collection in a warehouse at Fort Eustis. The collection became a museum as a provisional activity during the mid-1960s when Brig. Gen. A.W. Lyon was Commandant of the School and General Frank S. Besson was Chief of Transportation.

By 1965, the museum became the official Department of the Army Transportation Museum. After the formation of the Army Transportation Museum Foundation in 1970, funds were raised through individual and unit donations to improve the facility. The Army Transportation Museum building opened on 9 July 1976 and was still open in 1994..

Although the Transportation Corps had established itself as an important branch within the Army, and had its own museum, the Corps still lacked a motto. When General William C. Westmoreland visited Fort Eustis in March 1969, he remarked during a speech to a class of students that the Transportation Corps needed a motto that exemplified its "outstanding spirit, accomplishments, and objectives." Over the next several months the Transportation Corps held a contest to find the best motto. After some 400 prospective entries were evaluated, "Spearhead of Logistics," written by Col. Thomas E. Collins, was selected and Maj. Gen. Howard F. Schiltz announced the motto during the annual Transportation Corps Anniversary Ball held in July 1970.[75]

CHAPTER XII

Post-Vietnam Era

"Force projection operations
require comprehensive logistics support from initial planning at the
strategic level to effective support for the soldier in the foxhole."
FM 100-5, 1993

REBUILDING THE FORCE

After the Vietnam war, the United States Army faced several challenges, many of which stemmed from to the nation's reaction to the war. While the nation's defense commitment to the North Atlantic Treaty Organization (NATO) alliance remained strong, neo-isolationist sentiments were prevalent both in Congressional restrictions that effectively precluded American action to counter Soviet proxy moves elsewhere, and in defense spending that extended well into the mid-1970s.[1] A majority of the challenges resulted from the Soviet military buildup. This buildup occurred when the need to support the Vietnam War caused resource shortfalls in other theaters and slowed U.S. weapon development for nearly ten years.

These developments forced Army leadership to reassess the way the Army would fight on the battlefield. A significant result was the activation on 1 July 1973 of the U.S. Army Training and Doctrine Command (TRADOC), commanded by General William E. DePuy.[2] United States Army Training and Doctrine Command was charged with the major Army missions of individual training and combat developments.[3] After assuming command, DePuy took an intense interest in the reform of U.S. tactics and training and sought to bring the U.S. military in line with the tactical lessons learned from the Arab-Israeli War of October 1973.[4]

Over the next few years, TRADOC aligned Army doctrine with conventional combined arms warfare in the Western European Theater, a change from almost ten years of infantry-airmobile warfare in Vietnam. With that, TRADOC evaluated possible scenarios and rewrote Field Manual 100-5, *Operations*. The result was the doctrinal

development of Active Defense, emphasizing the capabilities of weapons in an elastic defense. Over the next two years, the Active Defense doctrine received considerable criticism.

The transition from airmobile operations to the Active Defense doctrine changed the way the Transportation Corps supported the force. With the emphasis on defense and strategies built around weapons systems, the Transportation Corps sought ways to more efficiently support a large deploying force. Since the bulk of the force would go by sea, the Transportation Corps first reviewed its terminal service mission.

The doctrinal changes coincided with several developments in the transportation industry. They included the expanded use of modern commercial ocean terminal facilities and the reduction in the volume of Department of Defense (DOD) cargo being moved overseas as a result of the end of the Vietnam War. Those changes prompted the Military Traffic Management and Terminal Service (MTMTS) to reconsider its name and expanding mission.

On 31 July 1974, MTMTS was redesignated Military Traffic Management Command (MTMC), reflecting the evolution of transportation in the U.S. Army.[5] With the decline of military and DOD-owned ocean terminal facilities, the new name better described the evolving traffic management function of the command. Military Traffic Management Command retained the command's traditional responsibility for control and management of DOD cargo through commercial ports and expanded its traffic management responsibilities in the continental United States (CONUS).

In 1976, MTMC's responsibility to control and manage DOD cargo through commercial ports was expanded. Starting with the ports in Northern and Central Europe, ocean terminal operations in Europe, Okinawa, Panama, and Korea were transferred to MTMC. In addition, responsibility for sealift cargo and passenger booking was transferred from MTMC to the Military Sealift Command (MSC).

By 1977, further significant changes in doctrine occurred. Probably the most influential proponent of these changes was General Donn A. Starry, who assumed command of TRADOC on 1 July 1977. General Starry brought to TRADOC his experience as a corps commander in Europe as well as the command experience of the U.S. Army Armor Center and Fort Knox, Kentucky. General Starry's familiarity with TRADOC doctrinal changes gave him the background needed to continue development of the Army's war-fighting doctrine. The vision of General Starry and his staff helped prepare

the U.S. Army to move away from Active Defense toward the AirLand Battle concept.

Different "war-fighting" strategies were developed to prepare the U.S. Army for the future battlefield. From this development came the concept of an "Integrated Battlefield." On 25 March 1981, General Starry formally published an operational concept for the Airland Battle and a major revision of FM 100-5 followed.[6]

A second major change in the U.S. Army during the 1979-1980 time frame resulted from an evolution in national policy, requiring the Army to be ready to deploy rapidly to any area outside of NATO. While the commitment to NATO remained the cornerstone of 1980s foreign policy, General E. C. Meyer[7] stressed "the most demanding challenge confronting the U.S. Military in the decade of the 80s is to develop and demonstrate the capability to successfully meet threats to vital U.S. interests outside of Europe, without compromising the decisive theater in Central Europe".[8]

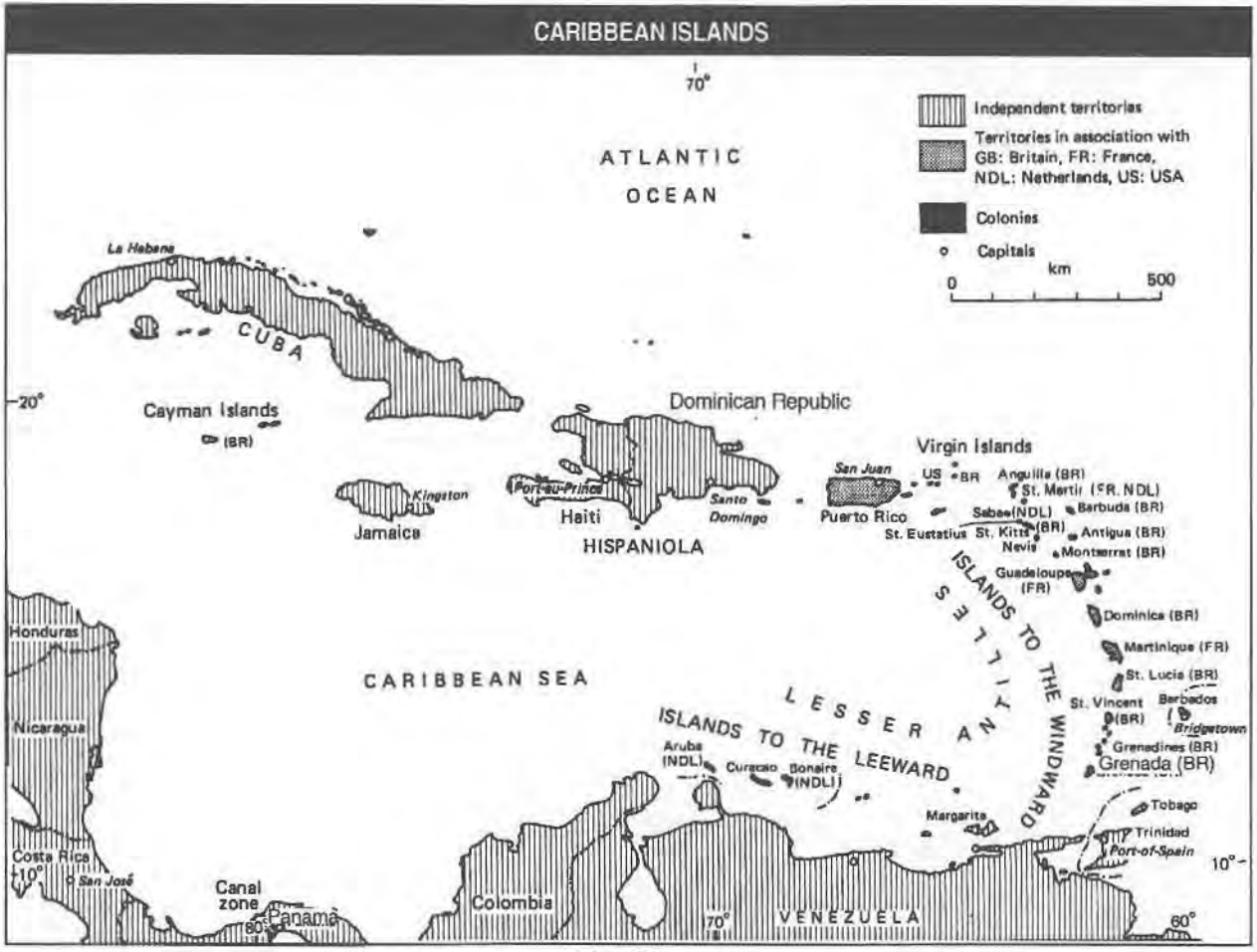
The Army's role in rapid deployment, marked by advanced weaponry and a new war-fighting doctrine, was the impetus for the development of the Army of Excellence (AOE). This initiative, together with the preceding Army 86 studies, brought about significant revisions in the Army's heavy divisions and created the light division and the contingency corps.

These changes had a far-reaching impact on the equipment and doctrine of the Transportation Corps. The concept of the battlefield became more fluid and the operational tempo increased significantly. The tenets of Airland Battle - initiative, depth, agility, and synchronization, - foreshadowed the need for transportation units to support the fight day and night, by providing critical resupply and mobility to both combat and supporting units.

With the development of light forces and a strong rapid deployment capability, the Transportation Corps took the lead in the development of strategic deployment support. Those developments, coupled with the Army's new light forces, provided the nation with a formidable strategic mobility capability.

URGENT FURY

The new doctrine was tested in October 1983, when the Transportation Corps was called on to support the deployment of U.S. forces to the Caribbean island nation of Grenada. There they conducted fixed port, logistics-over-the-shore operations (LOTS), and terminal transfer operations under the code name Urgent Fury.


CARIBBEAN ISLANDS
70°
ATLANTIC
OCEAN
Independent territories
Territories in association with GB: Britain, FR: France, NDL: Netherlands, US: USA
Colonies
Capitals
km
0
500
La Habana
CUBA
20°
Cayman Islands
(BR)
Dominican Republic
Virgin Islands
San Juan
US
BR
Anguilla (BR)
St. Martin (FR, NDL)
Barbuda (BR)
Saba (NDL)
St. Eustatius
St. Kitts (BR)
Nevis
Antigua (BR)
Montserrat (BR)
Guadeloupe (FR)
Dominica (BR)
Martinique (FR)
St. Lucia (BR)
St. Vincent (BR)
Barbados
Bridgetown
Grenadines (BR)
Grenada (BR)
Tobago
Trinidad
Port-of-Spain
Kingston
Jamaica
Port-au-Prince
Haiti
Santo Domingo
HISPANIOLA
Puerto Rico
ISLANDS TO THE WINDWARD
LESSER ANTILLES
ISLANDS TO THE LEEWARD
Aruba (NDL)
Curaçao
Bonaire (NDL)
Margarita
CARIBBEAN SEA
Honduras
Nicaragua
Costa Rica
San José
10°
Canal zone
Panama
80°
Colombia
70°
VENEZUELA
60°
10°

Map 36

Grenada is about twice the size of Washington D.C., and is part of a chain of small islands east of Puerto Rico (Map 36). Grenada's geographical location was of strategic importance. If its ports were controlled by an enemy force, the island could provide a staging point to influence a significant portion of the United States imported oil supplies and world shipping, as well as revolutionary politics in the region. During the late 1970s and early 1980s, Grenada developed an economic and military relationship with several Communist countries, including the Soviet Union, North Korea, and Cuba.

After Grenada became an independent nation in 1974, the country established a parliament with two major political parties vying for control. In March 1979, a bloodless coup, led by Maurice Bishop, seized control of Grenada. Bishop became the country's prime minister and established formal diplomatic relations with Cuba in April 1979.

Immediately, Cuba began providing Grenada with large quantities of weapons and ammunition, including 3,400 rifles, 200 machine guns, 100 shoulder-fired rocket launchers, twelve 82-mm. mortars, and twelve 12.7-mm. antiaircraft guns.[9] That same year, Cuba provided money and workers to build a new international airport, capable of landing large military aircraft.

In 1980, the Soviet Union provided the small nation with arms and ammunition. In return, Grenada granted landing rights to Moscow's long-range reconnaissance jets and negotiated with the Soviet Union to fund of a new port on the east coast, which could be used for recreational calls by Soviet vessels. The Soviet Union also secretly provided Grenada fifty armored personnel carriers.

Over the next two years, Moscow strengthened ties with Grenada by opening an embassy and furnishing aid to build a new radio transmitter. In April 1983, Grenada also began talks with North Korea, which secretly promised over $12 million in military aid. North Korea then publicly announced a five year development program that included the construction of a new 15,000 seat stadium and fruit processing plant.

By September 1983, however, the ruling party of Grenada was in turmoil and the internal power struggles within the Central Committee of the Communist- supported New Jewel Movement were reflected by chaos in the streets. In October, Prime Minister Bishop was placed under house arrest by a sixteen-member military council. Soon, crowds began to demonstrate for his release, and on 19 October 1983, the demonstrators forced their way into Mount Royal where Bishop was being held and freed him. Later in the day, Bishop was rearrested, and he and seven of his most loyal supporters were executed in the

courtyard of Fort Rupert. The country was placed under a 24-hour shoot-on-sight curfew.

Four days later, the United States received a formal request from the five members of the Organization of Eastern Caribbean States to assist in the joint effort to restore order and democracy on the island. Ironically, as the situation deteriorated, President Reagan was notified of the tragic bombing of the U.S. Marine compound in Beirut. By the next day, President Reagan was briefed on the crisis by Secretary of State George Schultz, Defense Secretary Casper Weinberger, and Chairman of the Joint Chiefs of Staff General John W. Vessey, Jr.

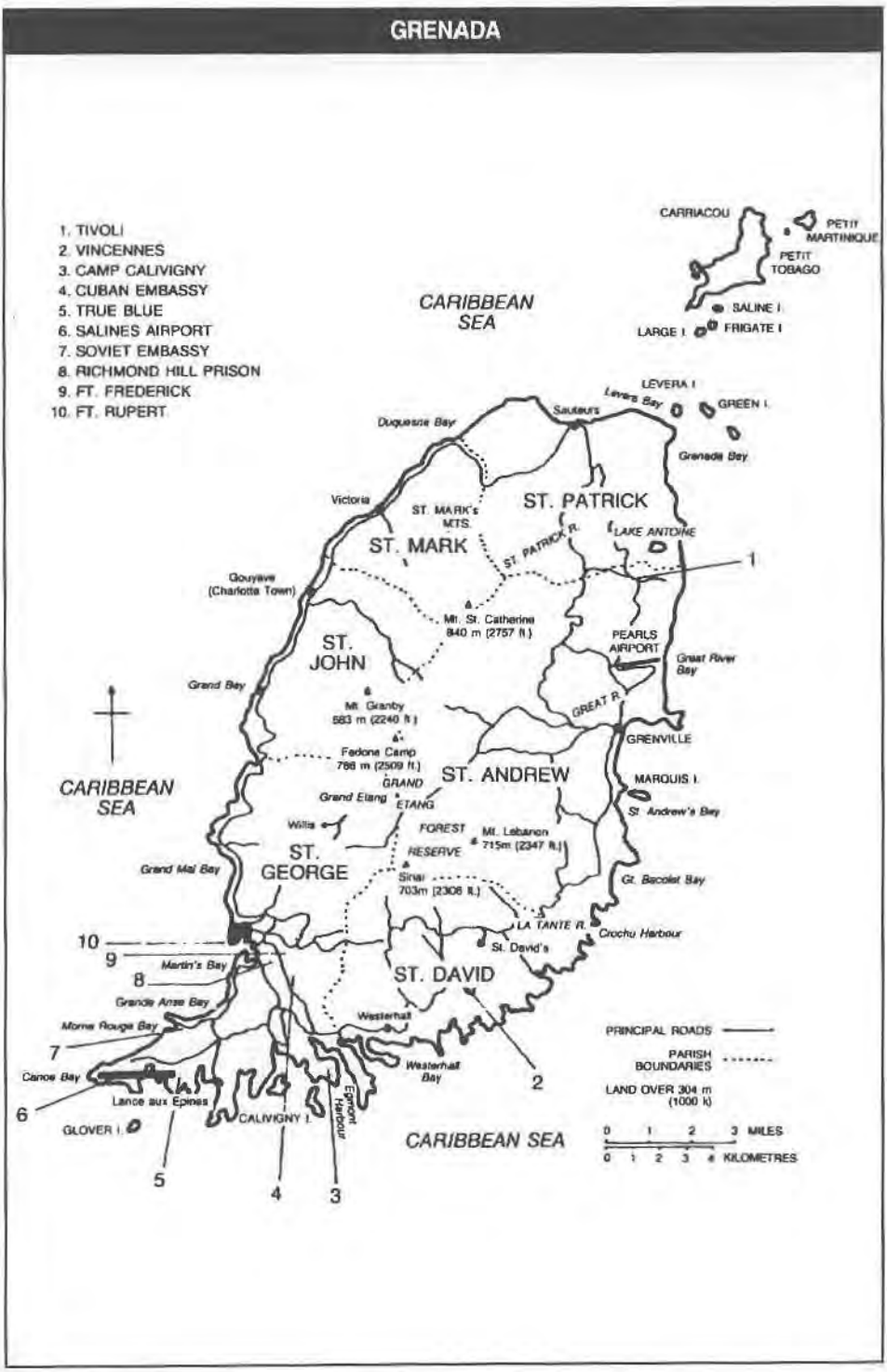
President Reagan agreed to provide the assistance requested. By the dawn of 25 October 1983, the largest U.S. military operation since Vietnam had begun. Urgent Fury was conducted primarily to protect the lives of 1,000 U.S. citizens on the island, many of them medical school students. Additional objectives were to restore democracy and remove the Communist threat generated by the New Jewel Movement.

Urgent Fury commenced with a combined force of U.S. Marines and Army Rangers simultaneously assaulting multiple objectives. Four hundred Marines conducted a helicopter assault on the Pearls Airport along the northeast coast. Thirty minutes later, about 350 Rangers conducted a forced insertion along the uncompleted International Airport at Point Salinas.[10] (Map 37)

The Rangers then pushed toward the capital of St. George's and the True Blue medical school campus. By midday, the campus was secure. About 500 prisoners had been taken. Behind the initial assaults, 750 paratroopers from the 82d Airborne Division arrived and assisted the Rangers with the evacuation of the medical school. As soon as the American Forces achieved their initial goals, 300 troops from the Eastern Caribbean force were moved in.[11]

After the island was secure, the U.S. military began the task of restoring order. At the same time they had to secure the mass of Soviet and Cuban arms located in caches around the island. Some caches contained enough arms and ammunition to outfit two brigades, or about 8,000 men. Most were modern combat rifles, stored in boxes labeled "granola" and "rice."[12]

The military success of the Grenada operation was achieved by synchronization between combat, combat service, and combat service support units. The day before the initial assault, Transportation Corps units assigned to the XVIII Airborne Corps, Fort Bragg, were busy moving the entire complement of combat supplies from the division ready brigade (DRB) to Green Ramp, Pope Air Force Base.[13] In addition, 1st Corps Support Command's (COSCOM) transportation units were also moving airdrop platforms from the heavy drop


GRENADA
1. TIVOLI
2. VINCENNES
3. CAMP CALIVIGNY
4. CUBAN EMBASSY
5. TRUE BLUE
6. SALINES AIRPORT
7. SOVIET EMBASSY
8. RICHMOND HILL PRISON
9. FT. FREDERICK
10. FT. RUPERT
CARRIACOU
PETIT MARTINIQUE
PETIT TOBAGO
SALINE I.
LARGE I.
FRIGATE I.
CARIBBEAN SEA
LEVERA I.
Levera Bay
GREEN I.
Sauteurs
Duquesne Bay
Grenada Bay
Victoria
ST. MARK'S MTS.
ST. PATRICK
ST. MARK
ST. PATRICK R.
LAKE ANTOINE
Gouyave (Charlotte Town)
Mt. St. Catherine 840 m (2757 ft.)
ST. JOHN
PEARLS AIRPORT
Great River Bay
Grand Bay
Mt. Granby 583 m (2240 ft.)
GREAT R.
Fedons Camp 766 m (2509 ft.)
GRENVILLE
ST. ANDREW
MARQUIS I.
GRAND ETANG
Grand Etang
St. Andrew's Bay
Willis
FOREST RESERVE
Mt. Lebanon 715m (2347 ft.)
ST. GEORGE
Grand Mal Bay
Sinai 703m (2306 ft.)
Gt. Bacolet Bay
LA TANTE R.
Crochu Harbour
St. David's
ST. DAVID
Martin's Bay
Grande Anse Bay
Morne Rouge Bay
Westerhall
Westerhall Bay
Canoe Bay
Lance aux Epines
GLOVER I.
CALIVIGNY I.
Egmont Harbour
CARIBBEAN SEA
PRINCIPAL ROADS
PARISH BOUNDARIES
LAND OVER 304 m (1000 ft)
0 1 2 3 MILES
0 1 2 3 4 KILOMETRES

Map 37

rigging site and paratroopers from the personnel holding areas to support the assault. At Green Ramp, Pope Air Force Base, Transportation Corps personnel performed the departure airfield control group (DACG) function to ensure the rapid loading of U.S. Army combat personnel and equipment on Air Force aircraft.[14] Their attention to detail and expertise ensured the timetable was met.

Once the airfields in Grenada were secured and cargo planes started landing, transportation units managed the influx of personnel and supplies. The first transportation units to arrive in Grenada were deployed from Fort Bragg and assigned to the XVIII Airborne Corps, 1st COSCOM. They included the 403d Terminal Transfer Company (Cargo Transfer) to support the reception of supplies and soldiers of the 7th Transportation Battalion and the 507th Transportation Group.

Some 193 soldiers of the 7th Transportation Group's 11th and 24th Transportation Battalions arrived in theater from Fort Eustis and Fort Story, Virginia, setting up port operations at the St. George's Port in Grenada. The soldiers participated in LOTS operations and loaded and off-loaded equipment and supplies from a fixed terminal operation. The first ship off-loaded was the roll on/roll off (RO/RO) vessel, the *American Eagle.* Over 800 pieces of equipment were discharged to support combat operations. As soon as the ship was off-loaded, 7th Group soldiers backloaded over 378 short tons of captured arms and ammunition.[15]

Transportation Corps units received over 750 flights into the island, processing some 18,000 personnel and receiving and transporting 8,800 tons of cargo. The Transportation Corps ended the major portion of Urgent Fury by loading out the majority of the U.S equipment and the remainder of enemy equipment aboard the break-bulk ship *Dolly Turman* in early November 1983.[16]

The U.S. Army had begun the era of rapid deployment with significant success. The years of developing new doctrine, improving U.S. weaponry, and developing a rapid deployment Army had paid dividends. From a strategic standpoint, Grenada was a major success, spelling an end to Soviet-Cuban power moves in the Western Hemisphere. However, subsequent analysis showed improvements were still needed in joint operations, interservice communications, and in the deployment and logistical support of forward deployed forces.

The remainder of the early 1980s was marked by larger defense budgets and more respect for the military on Capitol Hill. Yet the true measure of the effectiveness of the past decade's doctrinal work and the defense spending of the 1980s had not yet been realized. Several more years of combined arms training, the further evolution of Airland Battle, and the Goldwater-Nichols Act[17] were

required before the full potential of the 1980's Army would be realized. Its capabilities, partially tested in 1989, would later be demonstrated in the deserts of Southwest Asia early in the next decade.

ARMY AVIATION MISSIONS REALIZED

The decade of the 1980s witnessed changes in the Transportation Corps' basic structure. The evolution of Army aviation meant an ever increasing role for it in combined arms warfare. For that reason, the Army could no longer afford to develop aviation along separate branch lines, and on 12 April 1983, the Aviation Branch was activated, officially releasing the Transportation Corps from its aviation mission.

Supervision of the Aviation Logistics School at Fort Eustis was eventually transferred, in October 1988, from the Chief of Transportation to the Chief of the Army Aviation Branch, Fort Rucker, Alabama. The transfer gave the Aviation Branch complete control of aviation maintenance, as well as operation of aircraft.[18]

THE TRANSPORTATION CORPS REGIMENT

On 1 July 1986, the Transportation Corps celebrated its 44th anniversary, and 26 July marked the day the Transportation Corps regiment was officially activated, integrating it into the Army's Regimental System. The event was celebrated at Fort Eustis, Virginia, with an elaborate ceremony. The senior active duty Transportation officer, Lt. Gen. John D. Bruen, served as the reviewing officer. The ceremony was attended by thousands of distinguished transporters. The 7th Transportation Group, 8th Transportation Brigade, 140th Transportation Battalion (National Guard), and the United States Continental Army Band participated in the ceremony. The day provided an opportunity for the Transportation Corps to reflect on its past, but more importantly, the activation served as an important step in the continued development of the Corps.[19]

The activation of the regiment also marked the redesignation of several Transportation Corps training units, in order to provide a definitive link with past transportation successes. The Training Brigade was redesignated the 8th Transportation Brigade, honoring the 8th Transportation Group in Vietnam. The 8th Group had enjoyed an outstanding reputation in Vietnam for its support of numerous tactical operations as well as the development of the guntruck. The 2d Battalion, Training Brigade, was redesignated the 71st Transportation Battalion,

July 1986 Transportation Corps Regiment activation ceremony.

another unit that performed superbly during the Vietnam war. The 2d Battalion, 5th Training Brigade, Fort Dix, New Jersey, was the 36th Transportation Battalion, and the 5th Battalion, 4th Training Brigade, Fort Leonard Wood, Missouri, was redesignated the 58th Transportation Battalion.[20]

The new regimental crest was inscribed with "Spearhead of Logistics," the motto of the Corps, to serve as a symbol of a soldier's affiliation with the Corps. Officers who successfully completed the Transportation Officer's Basic Course were inducted into the regiment. Warrant officers, upon completion of their

Warrant Officer Candidate Course, and enlisted soldiers, upon completion of Advanced Individual Training, were also inducted.

The first Regimental Commander, Maj. Gen. Fred E. Elam, named General Frank S. Besson, Jr., as the first honorary Colonel of the Regiment, posthumously, in honor of his lifelong service to the Transportation Corps. Following the Regimental activation, a second ceremony took place at the U.S. Army Transportation Museum. A plaque was unveiled naming the museum building Besson Hall, in memory of General Besson, who had served as commander of the U.S. Army Transportation Center and School and as Chief of Transportation. The Regiment was established to foster a spirit of pride, unity, camaraderie, cohesion, and cooperation among the Corps' soldiers, as well as to provide an organization encouraging professional development and growth.

A UNIFIED TRANSPORTATION COMMAND

In 1987, Defense Secretary Casper Weinberger, in conjunction with a number of military planners, was looking for a means to strengthen the United States' ability to project power to reinforce forward deployed elements. The concept was to form a unified transportation command to efficiently manage the nation's transportation assets. This concept was not a new one. The idea first surfaced in 1949 prior to the Korean War, but the Department of Defense did not seriously consider the concept until 1978 when it realized the need for a unified command. The catalyst for this change of attitude formed because of serious problems that arose during a worldwide deployment exercise. The exercise, called Nifty Nugget, simulated a fast-breaking conventional attack in Europe. To fix the problems revealed, the Joint Deployment Agency (JDA) was established in 1979. The JDA coordinated and monitored the development of the Joint Deployment System (JDS) a computerized management information system designed to plan, execute, and monitor force deployments under peacetime or crisis conditions.

The JDA made significant improvements in the military's force projection capability, but it lacked the authority to direct corrective action to the unified/specified commands. In order to establish a headquarters that would improve efficiency and provide positive control of all U.S. Transportation assets, the Joint Chiefs of Staff (JCS) created the United States Transportation Command (USTRANSCOM).

United States Transportation Command was given responsibility for air, land, and sea transportation for the entire Department of Defense. To perform this mission, the USTRANSCOM was functionally rather than geographically

oriented, with three components: Military Airlift Command, Military Sealift Command, and the Military Traffic Management Command.[21] All of the common user strategic transportation forces of these three commands were under the operational command of the commander in chief of USTRANSCOM.[22]

In the years following the Second World War, the United States developed the world's leading transportation system. In the Korean War, the war in Southeast Asia, and in several international crises beginning with the Berlin Airlift in 1948, the U.S. military moved many tons of supplies and large numbers of troops to areas around the world. Those experiences demonstrated time and time again the need for a responsive transportation system. The USTRANSCOM gave the Department of Defense an effective means of balancing the different modes of transportation to ensure long-range commitments were met. The USTRANSCOM was capable of effeciently tasking, on a global basis, the mobility requirements necessary to support any crisis to which it was assigned.[23]

MODERNIZATION OF THE TRANSPORTATION CORPS' WATERCRAFT

The 1980s also marked a significant period for the modernization of the Army's watercraft capability. Probably the two most significant modernization events were the introduction of air-cushioned vehicles in 1985, and the commissioning of logistics support vessels (LSVs) in early 1988.

The lighter, air-cushioned vehicle (LACV) was not new technology. Used commercially in Europe for more than a decade to rapidly transport personnel and supplies across waterways, the LACV had significant military potential. The prospect of unloading cargo from ships anchored offshore, rapidly transporting it across water and then to a staging area on the beach, convinced military planners that an air cushioned vehicle would be a definite asset in logistics-over-the-shore or (LOTS) operations.

After a long procurement process, the Transportation Corps received its first LACVs on 20 August 1982. They were assigned to the 331st Transportation Company, Fort Story. The 8th Transportation Company was activated in 1984 to form the second LACV-30 unit, bringing the Army's total of LACV-30s to twenty-six. In the years that followed, the LACV-30s participated in numerous exercises such as Bold Eagle, Gallant Eagle, JLOTS I, II, and III. The LACV-30 deployed only one time outside the continental United States, to an annual training mission in Honduras.

The most important addition to the Army's watercraft fleet were the LSVs, built by the Moss Point Marine Shipyard in early 1987 and launched on 30 June of that same year. The LSV was 275 feet long and used a flat-bottom technology similar to the commercial container ships. The vessel was designed to discharge rolling stock from very shallow waters, working from a fixed terminal or from a larger ship anchored offshore.

On 14 January 1988, the Transportation Corps commissioned the first LSV, the *General Frank S. Besson* (LSV-1), the first time any vessel was commissioned at Third Port, Fort Eustis, Virginia.[24] The Besson, had an assigned crew of twenty-nine soldiers. The $10 million, 4,200-ton ship provided the Corps with a capability to carry up to twenty tanks or nearly three infantry companies.[25]

Guest speaker Lt. Gen. Jimmy D. Ross, Deputy Chief of Staff for Logistics, stated that the new vessel would have a significant impact on the Army "The *Besson* is the first of four logistics vessels scheduled to join the Army's fleet. . .The logistic vessel allows the Army to be self-sustaining and permits the rapid reposition and redeployment of cargo."

The new LSVs to serve the Army and the Department of Defense, would replace the slower less versatile vessels of the past. The LSVs opened a new era in Army strategic sealift capability, enabling the Transportation Corps to provide a more flexible response to support contingency operations of the future.

OPERATION JUST CAUSE

Almost six years after Operation Urgent Fury, President George Bush faced a political situation in some respects similar to the one that plagued President Reagan in 1983. Not only were relations between the United States and Panama declining, but the domestic situation in Panama was deteriorating and U.S. citizens were being threatened.

Panama was historically a sensitive area for U.S. political and military interests because of the Panama Canal. Panama, slightly smaller in size than South Carolina, had a population of about 2.3 million people in 1987, (see Map 36). Between 1914, when the canal was completed, and 1925, the United States intervened militarily on two occasions to settle election disputes and stabilize the country. Over the next forty years, the United States and Panama continued to negotiate treaties to govern and operate the strategically important canal. Through these sometimes hostile negotiations and anti-U.S. sentiments, the United States remained firm on its right to intervene militarily to ensure the

continuous operation of the canal, which was a major asset to military and commercial transportation.

By the mid-1970s, technological change had reduced the importance of the canal. Its economic and strategic importance declined because of the development of a two-ocean U.S. Navy, nuclear submarines, carriers, long-range bombers, and missiles. Further, the increased capability of ground transportation within the U.S., and the construction of cargo ships and tankers that were too large to transit the canal further reduced its commercial importance.[26] In September 1977, President Carter and Panama's President General Omar Torrijos signed the Panama Canal Treaties in Washington, D.C., and in October 1979, U.S. control ended.[27]

In August 1983, however, conditions in Panama took a new and different turn. After General Torrijos was killed in a plane crash, General Manuel Noriega assumed command of the Panamanian National Guard and became the de facto ruler. Over the next several years, General Noriega was linked to drug operations and the laundering of money for drug cartels.

With continuous drug allegations surfacing against Noriega and the public's increasing concern about drugs on American streets, the United States cut off all military aid in 1987. The domestic and political situation in Panama continued to decay, and in June 1987, the United States called for Noriega and his supporters to step down, pending the outcome of several drug and conspiracy charges. Noriega responded by ordering his paramilitary force to attack the U.S. Embassy and the U.S. Information Service facilities, with resulted in considerable damage to both.

Over the next two years, the relationship between Noriega and the United States became steadily worse. Increasing evidence pointed to Noriega's deep involvement in protecting drug shipments, laundering money, and providing a safe haven to the Medillien Cartel drug traffickers. Overwhelming evidence led to two federal indictments and the freezing of all Panamanian assets in the United States. Simultaneously, the United States began to increase the number of military personnel assigned to Panama.

Violence and corruption by the Panamanian Defense Forces (PDF) continued to be the law of the land. Results of a democratic election were nullified by the Panamanian dictator. At the same time, the United States continued to tighten economic sanctions against Panama. By mid-1989, joint exercises, rehearsing parts of the later Operation Just Cause, commenced. The plan called for the U.S. Contingency Corps and special operations forces to

conduct a night assault on primary objectives, to be closely followed by multiple attacks on key Panamanian military facilities.

On 1 October 1989, General Maxwell R. Thurman took command of the United States Southern Command in Panama. His main mission was to update the Just Cause plan and prepare Southern Command for a possible U.S. invasion of Panama. The crisis escalated when Noriega named himself the "Maximum Leader" in December and declared his nation to be "at war" with the United States. President Bush then ordered the execution of Operation Just Cause. Military commanders immediately made pre-attack notifications and the U.S. military prepared for the contingency operation. On H-Hour, 12:45 A.M., 20 December 1989, Joint Task Force South hit 27 targets simultaneously.

The assault forces were organized in six task forces, each concentrating on its respective targets. Over the next two days, these task forces swept their targets and secured their assigned areas. By 24 December 1989, the large-scale operational military actions were over. By 3 January 1990, Just Cause had fulfilled the president's four national objectives: protect U.S. citizens, support the democratic initiatives in Panama, ensure the safe operation of the Panama Canal, and apprehend General Noriega and bring him to justice.[28]

The ability of the U.S. military to conduct lightning-quick assaults by forces stationed in Panama and the rapid deployment of troops from the United States could not have been accomplished without the professional support of U.S. Southern Command as well as a trained Transportation Corps. Pre-attack transportation support of deploying forces was much like that provided during Urgent Fury. Transportation Corps units were busy supporting the deployment of both the 82d Airborne Division and its follow-on forces from Fort Bragg and the 7th Infantry Division (Light) from Fort Ord, California.

At Fort Bragg, predeployment activity was conducted under the cover of a planned emergency deployment readiness exercise (EDRE). Transportation assets on post shuttled equipment from the 82d Division's Ready Brigade (DRB) to the heavy drop rigging site for rigging of the brigade's forced insertion package. While paratroopers were being shuttled to designated sites to go through prejump operations, the 126th Transportation Company, 7th Transportation Battalion, was loading and transporting the DRB's ammunition from the post's ammunition supply point .

The departure airfield control group (DACG) operations at Green Ramp, Pope Air Force Base, mirrored those of Urgent Fury in 1983.[29] Load preparations and final loading operations moved at an accelerated pace, and the only factor affecting the on-time departure of the deploying aircraft was the

weather. Unlike Urgent Fury, Mother Nature put a hold on the 82d's deploying aircraft. Temperatures dropped to the point that ice was forming on the wings of loaded aircraft waiting for takeoff. Five-minute departure intervals quickly exhausted the Air Force's capability to de-ice the planes. Several aircraft were delayed on the tarmac until they were adequately de-iced. Despite the weather delays, there were only slight interruptions to the overall execution of the plan.[30]

Weather, in the form of dense fog, also took its toll on the timely deployment of the 7th Infantry Division (Light) from Fort Ord. Since Fort Ord had no adjoining air base, the transportation units established convoys to move the contingency package to Travis Air Force Base. The fog slowed the deployment timetable, but had no significant effect on the overall execution of Just Cause.

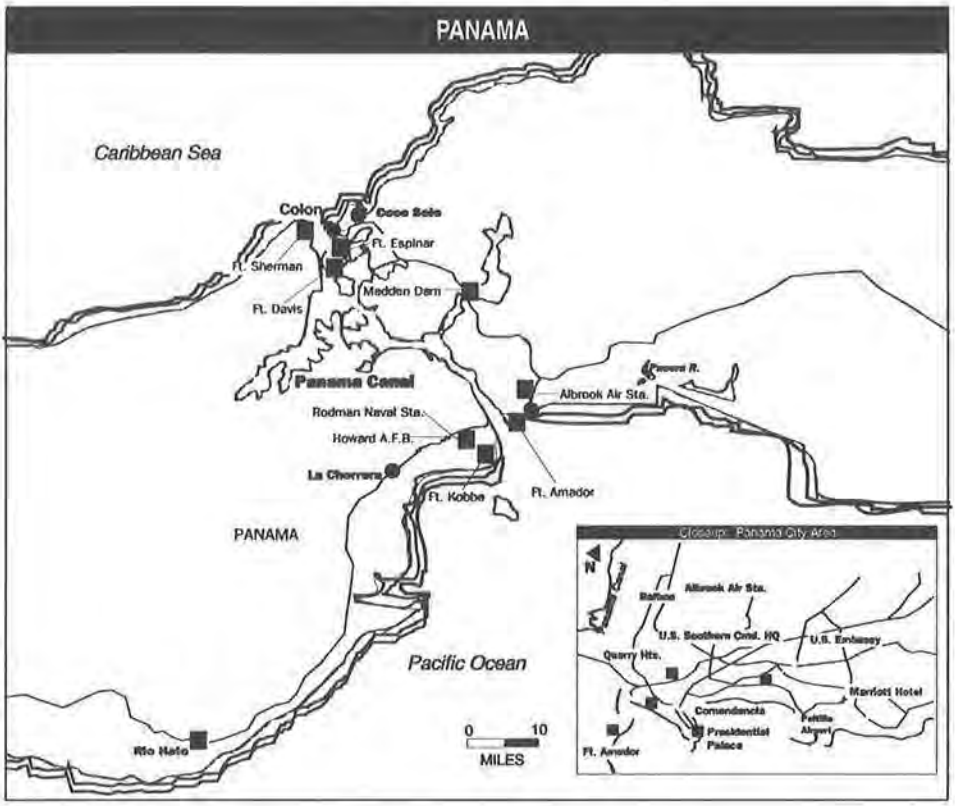
In the objective area, Special Forces and U.S. Rangers made parachute assaults on several key terrain points, and behind them came reinforcements from the 82d Airborne Division's DRB 1. Made up mainly of combat arms soldiers, the paratroopers' missions were to reinforce the Rangers at Torrijos/Tocumen Airport, seize control of designated terrain, and engage the Panamanian Defense Forces Battalion 2000 at Fort Cimarron. Because of the complexity of the mission and the importance the division placed on the arrival of follow-on forces, the 82d's commander decided to provide the 403d Transportation Company with seats on one of the initial aircraft.

Several 403d paratroopers made the combat jump and then served as the nucleus of the arrival/departure airfield control group (A/DACG) at Torrijos/Tocumen Airport. The decision to have skilled transporters on the ground ensured a smoother arrival of follow-on personnel and equipment. It was a crowning success for the first combat jump by transporters.

The heavy fighting was coming to a close by 24 December, but the transporters' jobs were just beginning. Follow-on personnel and supplies continued to arrive in the theater to assume the expanded logistical missions, supporting a theater that had doubled in size and a growing number of Panamanians requiring food and shelter.[31]

To support the expanded logistical mission, Transportation Corps units established a temporary transportation network to ensure that the theater could rapidly be resupplied. The first concern was the operation of the Army's primary aerial port of debarkation (APOD), at Howard Air Force Base, Panama. (see Map 38)

The airfield was operated jointly by the Air Force and Army. The Air Force's major mission was the control and support of flights into and out of the



Map 38

airfield. The Army, by doctrine, had responsibility for the Army cargo only after the Military Airlift Command aircraft were unloaded. However, because of the large number of flights into the relatively small airfield, Transportation Corps personnel unloaded aircraft and directed personnel and equipment to their correct destinations.[32]

Airfield operations were critical to the success of the logistical support mission. With one main port of entry, the ability to efficiently process personnel and supplies was critical to the entire theater. The bulk of airfield operations was conducted by soldiers deployed from the XVIII Corps' Movement Control Center (MCC) and 7th Transportation Battalion. In addition, one team of soldiers working at the airfield prior to the operation came from the 7th Transportation Group, Fort Eustis.[33] Fewer than thirty Transportation Corps soldiers operated the airfield on a 24-hour basis, an operation normally requiring a complete cargo transfer company with three 50-person cargo transfer platoons.

Personnel cleared from the airfield were staged by final destination and moved there by commercial buses. While supplies were staged by unit, they were shipped by ground or air. Shipments in a 20 to 40 mile radius were transported by a composite truck platoon attached to the 1st COSCOM.[34] Supplies to remote sites or those that were part of "push packages" were shuttled to the sling-load yard where a team of soldiers prepared the load. Helicopters, controlled by the XVIII Airborne Corps MCC, then carried the external load to final destination. The sling-load facility, next to the airfield on Howard Air Force Base, helped alleviate the theater shortage of military trucks. Units also relied heavily on commercial buses to transport personnel, even in combat. In one instance, an assault force from the 193d Infantry Brigade had to be moved by bus for an attack on the Panamanian National Department of Investigations. The commercial transportation was actually an advantage because the buses did not draw attention to the assault force.[35]

Once personnel and supplies were in the theater, the Transportation Corps used its capabilities to support the operation. The 1097th Medium Boat Company primarily performed combat and combat service support missions on the Atlantic side of Panama and in the Canal. By 31 December 1989, the company had transported 2,442 passengers, 848 prisoners, and 738 short tons of cargo. In addition, LCM-8 crews performed combat patrols and furnished suppressive fire for landing troops.

As the theater matured, a shuttle service, using dedicated C-130s, moved personnel and supplies from Howard Air Force Base to remote airfields throughout the country. The shuttle service was extremely effective in responding to resupply needs of remote sites during the final mopping-up phase of the operation.

On 3 January 1990, General Noriega, in full military uniform, walked out of the Vatican Embassy and surrendered to U.S. Maj. Gen. Marc Cisneros. He was taken to Howard Air Force Base where he was arrested on drug charges and subsequently transported by a C-130 back to the United States.

The 1st COSCOM established a Redeployment Control Center (RCC) to expedite the redeployment operations. The RCC centralized the preparation of personnel and cargo for redeployment, including U.S. Customs and Department of Agriculture inspections, load planning, marking of center of balance and vehicle weights, hazardous cargo certification, and vehicle staging and call forward.[36]

The RCC was a complete success. The Transportation Corps ensured that all load times were met and that the redeployment operations were completed within the

short timeline. By 13 February 1990, only 13,504 personnel remained in country, 593 fewer than before the operation. After the departure of the XVIII Airborne Corps in mid-February 1990, transportation units remaining in country, together with Military Traffic Management Command processed military equipment and the numerous caches of arms and ammunition through the MTMC terminal in Panama. This completed the redeployment of U.S. forces and equipment.

Just Cause was a textbook example of rapid deployment proving the value of combined arms doctrine, demonstrating the combined capabilities of airborne, light infantry, and special operations forces. The successful operation was the culmination of years of force development and training.

CHAPTER XIII

Desert Shield

"Victory is the beautiful, bright colored flower. Transport is the stem without which it could never have blossomed."

Sir Winston Spencer Churchill

ORIGINS OF THE CONFLICT

In 1989, the Soviet alliance system that had been established at the outset of the Cold War began to unravel. The catalyst for this change was the death of communism as a political and social force in the Soviet Union and its Eastern European Satellites. Lacking the cohesiveness provided by the Moscow-directed bureaucracy, the Soviet Union by 1991, had broken down into independent states. Soviet influence in the Middle East was significantly reduced. With the end of U.S.-Soviet confrontation in the region, a dangerous power vacuum developed.

With the rising military power of Iraq, the inherent political stability of the region was a concern for many Middle Eastern leaders. Fearful of invasion, several nations in the Persian Gulf area formed the Gulf Cooperation Council of the Arab States (GCC). They included Saudi Arabia, Kuwait, Bahrain, and the United Arab Emirates (UAE), Qatar, and Oman. Formed primarily as a defensive pact, the GCC was designed to demonstrate that the Persian Gulf states would defend themselves. Their concerns were well-justified. Oil, because it is the lifeblood of the modern industrial nations made the world, centrally dependent on its Persian Gulf source.

Iraq's designs on its small, oil-rich neighbor, Kuwait, had roots in past border disputes and recent oil disagreements. Borders in the region had been arbitrarily imposed by the British during the 1930s. A major point of continual conflict was the large Rumaila oil field, which straddled the Iraq-Kuwait border.[1] (see Map 39)

Iraq claimed Kuwait was pumping more oil from the Rumaila field than it was entitled to. It also claimed that Kuwait ignored Organization of Petroleum Exporting Countries (OPEC) production ceilings in the late 1980s by selling

more than its quota on the open market. Iraq claimed millions of dollars in lost revenues. Since Iraq and Kuwait were once part of the old Ottoman Province of Basra, administered from Baghdad, Iraq argued that Kuwait should rightfully have been made part of Iraq in 1932 when it achieved independence.

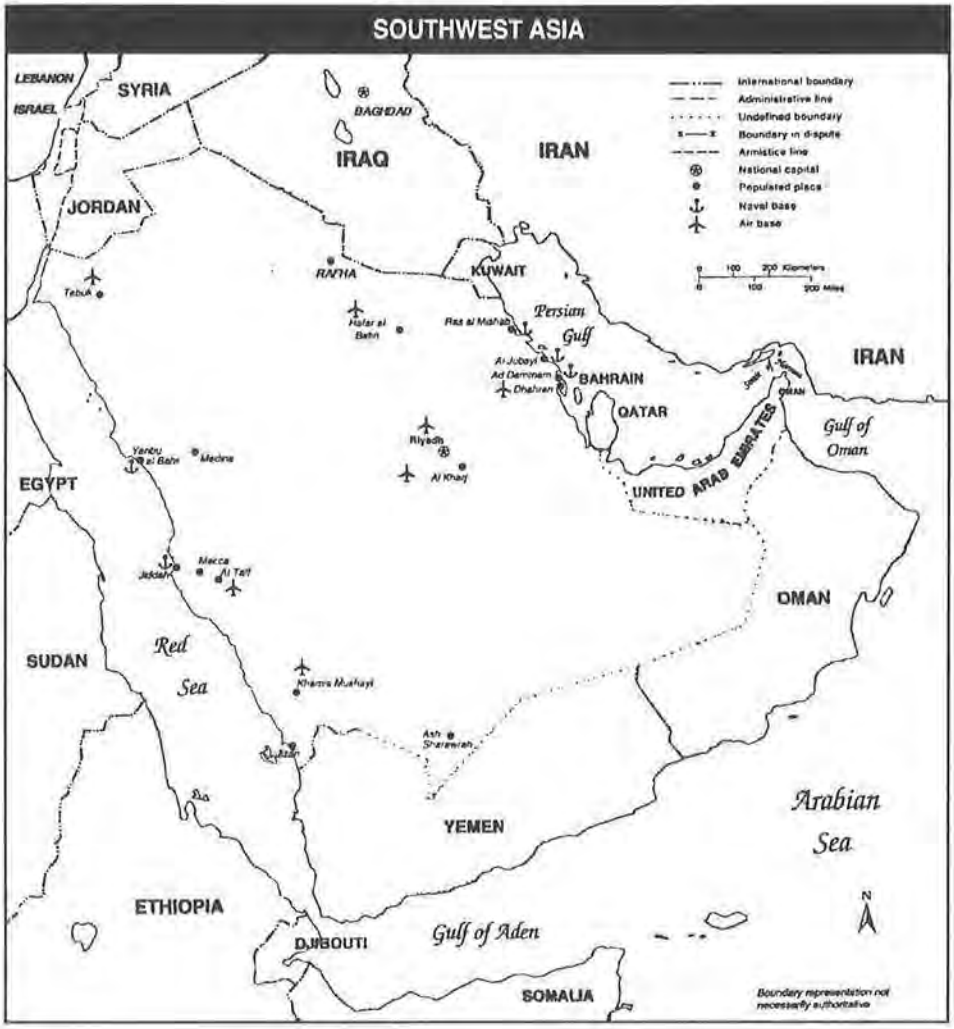
Another point of Iraqi contention was the fact that Kuwait administered the islands of Bubiyan and Al Warba, which control led the entrance to the Iraqi port of Umm Qasr on the Persian Gulf. Iraqi-bound oil tankers navigate narrow waters around those islands.

In 1990, Iraq told Kuwait to cede its portion of the Rumaila oil field to Iraq, demanded $2.5 billion in compensation for the oil removed from it "illegally", along with another $14 billion in lost Iraqi revenues due alleged to quota violations. Iraq also insisted on cancellation of $12 billion in Iraqi loans made to them by Kuwait during the long Iran-Iraq War. When Kuwait refused, Iraq began massing troops in July 1990 as a means of forcing Kuwait to the negotiation table. [2]

The author of Iraq's intimidation of Kuwait was Saddam Hussein. Born into a peasant family in 1937, Saddam Hussein joined the Ba'th political party at age 20 and quickly rose to a position of political importance. Remaining active in the Ba'th party for almost two decades, Hussein still never filled his lifelong desire to don an officer's uniform. Finally in 1976, the number two man in the Iraqi leadership, President Ahmad Hassan Al-Bakr, bestowed the rank of general on him. By July 1979, Hussein had assumed power from President Bakr, maintaining his appointed general's rank. With no military training, Hussein led the Iraqi invasion against Kuwait which ended in Iraq's expulsion in one of the most humiliating military defeats in modern history.

A major reason for Iraq's behavior was that it was cash-poor as a result of the long war with Iran and running up a postwar debt of over $80 billion. So as not to cause the Iraqi public discontent from a costly war, most of this money had been borrowed from abroad, including Kuwait. Given the unsatisfactory end of the Iran-Iraq War and postwar obligations to repay the debts, while simultaneously reconstructing Iraq, Saddam faced a considerable monetary strain. With the end of the Iran-Iraq War, production of Gulf oil increased, driving down the worldwide price. This compounded Iraq's cash-poor position, leading to Saddam's policy of threatening neighboring countries.[3]

Despite its immense debt, Iraq had emerged from the Iran-Iraq War with its military power intact. In tactical terms, the Iraq appeared to have a huge edge over every regional force except Israel.



Map 39

Kuwait appeared to be only the start of a campaign by Saddam Hussein that would permit Iraq to control a major portion of the world's oil supply. Hussein's control might also extend to Mecca, Islam's holiest place. In addition to financial and military power, control of Mecca would also give the Iraqi leader an ideological lever over the world's 400 million Muslims.

U.S. ARMY INVOLVEMENT IN THE GULF

The U.S. Army acquired an active interest in the Persian Gulf in 1979 after the Shah of Iran fell and a series of unsettling events threatened the world's oil supply. The Ayatollah Khomeini assumed power in Iran and threatened to punish the "Great Satan" for its role in supporting the Shah. Since the Soviets were seeking access to the Indian Ocean through Iranian warm water ports, concerns for the stability of the region increased with the Soviet invasion of Afghanistan that very year.

This series of events led to the establishment of the Carter Doctrine, which declared any invasion in the region would be considered a threat to U.S. interests. To counter any such threat, the Rapid Deployment Joint Task Force was formed and headquartered at MacDill Air Force Base, Florida. The new command had responsibility for the formulation of plans to respond to any possible invasion in the Persian Gulf region and if necessary protect the flow of the world's oil. By 1983, the joint task force had evolved into one of six United States multi-service commands, U.S. Central Command (CENTCOM).[4]

Central Command continued its mission to prepare militarily for any possible conflict threatening the Gulf oil supply. In 1980, Saddam Hussein had launched a surprise attack against neighboring Iran at the same time the Soviet military was preoccupied with the war in Afghanistan. Those protracted conflicts created a temporary stalemate in the region, reducing the immediate possibility of further expansion by either the Soviets or Iran.

The Iran-Iraq war eventually led to some U.S. involvement in the Persian Gulf to ensure the flow of world oil from that region. Late in the war, Iranian attacks against Gulf shipping grew more intense, particularly against Kuwaiti tankers in response to the Emirate's support of Baghdad. The United States responded with Operation Earnest Will, the reflagging and limited escort of Kuwait's tankers in the Persian Gulf, supported by U.S. Army helicopters. Two years later, the United States would again come to Kuwait's assistance, only this time against Saddam Hussein.[5]

INTERNAL LOOK 90

In November 1988, General H. Norman Schwarzkopf became Commander-in-Chief, CENTCOM. With a keen understanding of changing world events, General Schwarzkopf directed CENTCOM to take OPLAN 1002-90, the plan addressing a possible Soviet invasion of Iran and revise it to

reflect an Iraqi invasion of Kuwait and Saudi Arabia. In December, the Joint Chiefs of Staff granted CENTCOM authorization to shift the geographic focus of the biennial Joint Chiefs' war game from Iran to Saudi Arabia.

Central Command rapidly developed Internal Look 90, an exercise that simulated deployment to blunt an Iraqi invasion. The exercise ran concurrently from 23-28 July 1990, at Fort Bragg, North Carolina, and Hurlbert Field, Florida, and provided a sobering view of that very possible scenario. The most important tactical lesson gleaned from the exercise was that, no matter how much Air Force and attack helicopter reinforcement the U.S. forces had, they would have a tough time confronting Iraqi armor formations. From a logistical standpoint, two lessons were reinforced. First, any intervening force in the region would depend on host-nation support for survival. Secondly, and one that had plagued the United States since World War I, was a serious shortage of heavy sealift capability.[6] This shortage posed the greatest single element of risk to the United States' ability to stop an Iraqi invasion of Saudi Arabia. The heavy forces, required to destroy the Iraqi armor had to come over a sea line of communications from 7,000 to nearly 12,000 miles long.[7]

THE IRAQI INVASION

Ironically, the scenario envisioned by General Schwarzkopf unfolded less than a week later in the deserts of Kuwait. At 0200, 2 August 1990, the Hammurabi Armored and the Tawakalna Mechanized Divisions raced across the Kuwaiti border and quickly overran a Kuwaiti brigade deployed along the frontier. Kuwait, equipped only with armored cars, had little hope to check an Iraqi invasion of nearly 1,000 T-72 tanks. Iraq followed the initial mass assault with a rapid ground advance that swept south, capturing most Kuwaiti forces in garrison and reaching Kuwait City by 0500 the same morning. [8]

DESERT SHIELD BEGINS

As soon as the invasion of Kuwait occurred, Chairman of the Joint Chiefs of Staff General Colin Powell assembled the team that would lead the U.S. intervention to stop Iraq. By 0800 EDT, 2 August 1990, 14 hours after the invasion, General Powell and General Schwarzkopf met with the President and members of the National Security Council to discuss military options and analyze intelligence concerning the Iraqi capabilities.[9]

Over the next 48 hours, General Schwarzkopf and Lt. Gen. Thomas W. Kelly worked out details to deploy a defensive force to Saudi Arabia to act as a

Meeting in the Pentagon Gold Room - the usual meeting place of the Joint Chiefs of Staff, August 15, 1990, to discuss the U.S. military response to the Iraqi invasion of Kuwait, are: left to right: National Security Advisor Brent Scowcroft; General H. Norman Schwarzkopf, U.S. Army, Commander-in-Chief U.S. Central Command; Secretary of Defense Dick Cheney; The President of the United States, George Bush; Chairman, Joint Chiefs of Staff, General Colin L. Powell, and Vice Chairman, Joint Chiefs of Staff, Admiral Dave E. Jeremiah.

shield to stop an invasion of Saudi Arabia. On 4 August 1990, with a significant amount of Iraqi armor staged on his country's border, King Fahd of Saudi Arabia asked President Bush for a briefing on the situation from American officials. National Security Advisor Brent Scowcroft, along with Secretary of Defense Dick Cheney, General Schwarzkopf, and Lt. Gen. John J. Yeosock, commander of CENTCOM's Third Army, flew to Saudi Arabia to brief King Fahd on the military situation. Their mission was to show the Saudi King the seriousness of the situation and offer U.S. assistance. Following the briefing, King Fahd issued an invitation for American troops to assist in the defense of Saudi Arabia, and on 8 August 1990, the President announced the commitment of American forces.[10]

Midmorning the following day, seventy-six soldiers and staff officers of the XVIII Airborne Corps assault command post arrived in Saudi Arabia to begin laying the framework for the arrival of lead elements of the corps. Led by

Brig. Gen. Edison Scholes, XVIII Corps Chief of Staff, the assault command post began the dual mission of coordinating host-nation support for follow-on corps forces and preparing the corps' defensive plan of Saudi Arabia.

At Fort Bragg, operations to begin deploying soldiers to the deserts of Saudi Arabia had already begun. The pace at Fort Bragg accelerated as it had numerous times before for both training exercises and real world conflicts. Emergency Operation Centers' (EOCs) telephone lines were busy coordinating deployment support of the rapid deployment forces, a routine ingrained at Fort Bragg.

As the alert phone calls went out across post the evening of 6 August 1990, the 82d Airborne Division's three ready brigades stood at different levels of readiness. The division's 2d Brigade, commanded by Col. Ronald Rokosz, was on division ready brigade one (DRB1) status and stood ready for a no-notice deployment in 18 hours. The units of the brigade on DRB2 status were on field training exercises, and the brigade on DRB3 status had soldiers on leave and in school status. U.S. Forces Command quickly ordered the return of the division to Fort Bragg.

The order to deploy the 82d Airborne Division meant that the Transportation Corps was about to face a major challenge. Transportation units on post began moving personnel and supplies through their predeployment stages. Fort Bragg's air outload facility, Green Ramp, rapidly became the hub of activity as the DRB1 package arrived. At the first deployment briefing that night, no one realized they were about to participate in the largest thirty day deployment of forces in U.S. Army history.[11]

With Saddam Hussein's Republican Guard staged on the Saudi border, time was critical and the U.S. transportation industry responded. The first surge began with the need to put combat power on the ground in Saudi Arabia as quickly as possible. The decision to deploy the 82d's DRB1 meant that U.S. Transportation Command (USTRANSCOM) had to provide the 82d with at least 250 C-141 equivalents, though TRANSCOM could only guarantee 90.

Within hours, C-141 and C-5 aircraft from U.S. bases all over the world were landing at Pope Air Force Base. Because the Air Force was unable to predict either the types of aircraft arriving or the times of their arrival, 1st Corps Support Command (COSCOM) Transportation Corps soldiers were constantly reconfiguring loads based on the type of aircraft and needs to fit tactical exigencies in Saudi Arabia, making for an extremely demanding mission. As aircraft landed, little time was wasted. Aircraft loads were often reconfigured and loaded within minutes of the aircraft touching down.

The first paratroopers from the 82d Airborne Division departed at 1000, 8 August, just 36 hours after the initial alert notice. Despite the overwhelming demand for combat troops to defend Saudi Arabia, the initial force also included a contingent of Transportation Corps personnel from the 403d Transportation Company at Fort Bragg to manage the military operations at the airfield at Dhahran, Saudi Arabia. The move illustrated the importance of deploying throughputters prior to the forces they were throughputting.

As the initial deployment proceeded, the pace quickened. The initial level of combat power needed in the theater immediately, required an unprecedented surge of aircraft. For the first time in history, Stage One of the Civil Reserve Air Fleet (CRAF) Program, was activated, proving, however, to be a double-edged sword.[12]

The CRAF program increased air assets at USTRANSCOM's disposal to support the deployment, but it also compounded an already confused situation at Pope Air Force Base. Not only were military aircraft landing with no notice, but civilian cargo and passenger aircraft were arriving unexpectedly. Military loads, planned for Air Force aircraft, could not be reconfigured to load aboard CRAF aircraft using computer technology, because software was not available. With the introduction of the civilian aircraft fleet, important data such as center of balance and cargo specifications had to be hand-generated. Changes required time delays to ensure cargo was loaded according to civilian aircraft load constraints.

The lack of airflow data was the most significant factor affecting the outload of forces from Fort Bragg.[13] Even without significant amounts of data, the ground liaison officer, Maj. Drew Young, and Green Ramp transportation personnel assigned to the 7th Transportation Battalion, compensated for the uncertainty by reallocating aircraft and reconfiguring loads at a moment's notice. With the requirement to deploy the 82d, aircraft were arriving from airbases around the world. Pope Air Force Base lacked the modern Global Decision Support System (GDSS) that would accommodate that situation. Without that technology, real-time aircraft information was not available and aircraft arrival information during the initial deployment phase was fragmented.

From the standpoint of strategic deployment, the most significant airflow management problem was a changing Time-Phased Force Deployment Data List (TPFDDL), coupled with a data base that could not respond to the changes rapidly. The chaos started as soon as Military Airlift Command was tasked to begin the deployment of combat forces to the Persian Gulf. With the volatile situation on the Saudi border, in which the tactical situation was changing by the

moment, the theater commander wanted combat forces on the ground immediately. Priorities for airlift changed as many as six times a day, forcing aircraft to be diverted, ground crews to be moved, and deploying units left partially deployed in theater.

As the priority of airlift changed, based on the theater commander's changes to the TPFDDL, the Joint Chiefs of Staff, Joint Operation Planning and Execution System (JOPES) could not cope with the constant adjustments in airlift priorities.[14] The JOPES can only work smoothly when the data base is fed from the TPFDDL with accurate airlift requirements in terms of who needs to be moved, how much needs to be moved, what are the points of origin and destination of the airlift, and of course, which unit has first priority.

The inability of JOPES to support such a rapidly changing scenario resulted in a situation where the Military Airlift Command could not tell the supported commander the size and composition of the forces that had been moved. As priorities stabilized, JOPES began to support the deployment more efficiently, but aerial ports of embarkation (APOEs) still had difficulty managing aircraft allocations to deploying units.[15] The difficulty resulted from the Army's inexperience with managing and reporting units by unit line number (ULN).[16] Neither the deploying units from Fort Bragg and other installations nor their immediate headquarters knew their ULN nor were they familiar with the JOPES system.

The inadequate data base had a significant effect on the APOEs as well. Without JOPES visibility over the airflow, more aircraft than the system could handle were scheduled for loading, and aircraft became backlogged at numerous deployment facilities. During one 12-hour period on the third day of the air outload, eight C-5s arrived unannounced at Pope Air Force Base, causing the entire support staff to scramble for equipment loads and personnel to load onto the awaiting aircraft. The XVIII Airborne Corps was under considerable pressure to deploy enough combat power to effectively defend Saudi Arabia, and the tempo of air deployment soon reached a fevered pitch. The transportation community, responsible for the operation of the outload facility, responded. By day 17, all three brigades of the 82d Airborne were deployed. In addition, a significant XVIII Corps slice of more than 12,000 personnel and 13,000 tons of equipment were also deployed to support Operation Desert Shield. Over 650 C-141 equivalents departed Pope Air Force Base in 31 days. The utilization rate exceeded 95 percent, a significant usage rate for cargo aircraft and unheard of in prior air deployments.[17]

With unprecedented levels of air activity, the Commander-in-Chief Central Command (CINCCENT) and the Commander-in-Chief of USTRANSCOM differed significantly over the projected latest arrival dates (LADs) for the 82d Airborne Division.[18] At the start of Desert Shield, CINCCENT expected the 82d to arrive in theater in the following sequence: DRB1 by day 2, DRB2 by day 5, and DRB3 by day 15. However, TRANSCOM set the LAD based on available aircraft and the physical capability of the departure airfield (Pope AFB). Its expectations were the same as the actual force closures with DRB1 by day 6, DRB2 by day 12, and DRB3 by day 17.

The difference sparked a heated debate between planners at the different headquarters, which resulted in FORSCOM directing the key players of the Fort Bragg deployment to form a joint committee to study the deployment in detail. The results of the study were to be briefed to both the USTRANSCOM and the FORSCOM commanders. Undoubtedly the most far-reaching lesson learned from the study was that the CINCCENT LAD expectations were physically impossible, given the size and capability of the existing deployment facility at Fort Bragg and Pope AFB.[19] That revelation sparked a major renovation project to expand and improve the physical plant associated with the outload of forces from Fort Bragg.

The study also reinforced a major transportation lesson learned. The real capability of an existing transportation network had to be understood and taken into consideration when establishing national objectives for a military operation. In Desert Shield, the theater commander was staking the success or failure of a military operation on latest arrival dates of an airborne division that were impossible to achieve.

Despite overloaded facilities, a mix of military and civilian aircraft and faulty LADs, the 82d Airborne Division and its supporting XVIII Corps "slice" deployed to Saudi Arabia rapidly enough to deter the Iraqis from invading. While the XVIII Corps was deploying its initial combat force, the Southwest Asia theater was developing by the hour.

Simultaneous with the 82d Airborne Division's deployment order, the 24th Infantry Division, at Fort Stewart, Georgia, was ordered to move one armored brigade to the port of Savannah in 18 hours. Considering the available intelligence, that Saddam Hussein's forces were poised on the Iraq-Saudi border, General Gary Luck, the XVIII Airborne Corps commander, ordered the division to be prepared to fight immediately on arrival in theater. With the deployment of an airborne division as a rapid means to bolster Saudi Arabia's defense against an Iraqi invasion, the immediate deployment of a heavy force

was critical. If Iraq invaded Saudi Arabia with its armored divisions, the 82d would need the 24th Infantry Division's armor capability to hold critical airheads and ports needed by follow-on forces.

The challenge was to get the 24th loaded and deployed in theater before Saddam Hussein's forces could seize the critical theater aerial and seaports of debarkation in Dhahran and the seaport in al-Jubayl. By the time the first aircraft left Pope AFB, the vehicles of the 2d Brigade, 24th Infantry Division, were at the port, fully stocked with fuel and ammunition and ready to load aboard a Navy fast sealift ship.[20]

The short notice of the alert and rapid deployment of the 24th Infantry to Savannah, its seaport of embarkation, put the Military Traffic Management Command (MTMC) in a dilemma. With a heavy brigade closing on Savannah in less than a day, Col. John Riley, Jr., Commander, 1304th Major Port Command, had to find a way to support the port operations until MTMC could activate a reserve terminal transportation unit. Colonel Riley turned to the civilian staff from his own office and enlisted thirty volunteers to begin the complex task. Immediately, the volunteers began marshaling the 2d Brigade of the 24th Infantry Division and its 7,678 pieces of equipment for deployment to the Southwest Asia. The outload of an entire mechanized infantry division had not been executed in the recent past, and Col. Riley and his team faced a herculean task.

On 16 August, after seven days of 20-hour work shifts and around-the-clock operations, the first of the fast sealift ships departed Savannah with the essential elements of the 24th Infantry Division and arrived in Saudi Arabia on 27 August. After sixteen days of ship-loading operations, Col. Riley and his team watched the last ten ships leave the port of Savannah. In that period, they marshaled, marked, and loaded 1,214,897 square feet of military cargo. When asked to comment on the final sixteenth day of port operations, Col. Riley responded candidly: "Divisions deploy around the world on paper all the time, but no one in recent history has actually pulled together and combat-loaded all those tanks and wheeled vehicles and all that cargo. Until you actually do it, you don't have a real idea of what it takes." [21]

As in every previous war, there was a lack of heavy lift capability. The 24th Infantry Division had the same difficulty with ships at Savannah that the 82d Airborne Division had with aircraft. Because of the difficulty of activating reserve shipping assets, USTRANSCOM could not predict which vessel would be available to transport the 24th Division at a given time. Ready reserve vessels were sent to Savannah as they were activated.

Because it was the first time in recent history that a heavy division had to be combat-loaded, the Navy was uncomfortable with the idea of loading vehicles that were fueled and armed. After some discussion, the Department of Defense waived the peacetime prohibition on combat-loading. Recognizing the Navy's concerns for ship safety, the 24th assigned 100 additional chemical, medical, fire support, and communications specialists aboard each ship. Additionally, the 24th's air defenders placed Vulcan antiaircraft guns and Stinger missiles on the decks of every ship to protect against Iraqi aerial attack during unloading operations.

The shortage of sealift ships forced the Navy to dispatch the fast sealift ship *Antares* to move the 24th Division, even though required maintenance had not been completed. The division's aviation brigade and support command were nonetheless loaded aboard the *Antares.* But while transiting the Atlantic, the *Antares* broke down and drifted for two days in the Atlantic before it was towed to the Azores Islands and then to Rota, Spain. A team of soldiers deployed from Saudi Arabia to Rota and transloaded the cargo from the *Antares* to the *Altair.* The 24th Infantry Division finally received its logistical support and aviation packages on 23 September. Because of the breakdown of the *Antares,* the 24th Division spent nearly three weeks deployed in the deserts of Saudi Arabia without the combat power of its aviation assets or the benefits of an organic maintenance and supply system. That occurred during a time when an invasion of Saudi Arabia by a tank heavy Iraqi force seemed imminent.

Over the next month, the 24th Division's tail caught up with its teeth. Deploying 1,600 armored and 3,500 wheeled vehicles and 90 helicopters on ten ships, the 24th Division's soldiers flew on fifty-seven military and chartered civilian aircraft. Thirty-one days after the initial deployment, two heavy brigades were in field assembly areas en route to their defensive sectors.[22] The division's third brigade, the 197th Infantry Brigade (Mech) from Fort Benning, Georgia, completed its move on 14 September.

In early August 1990, the 101st Airborne Division (Air Assault), the third division of the XVIII Airborne Corps, was alerted to provide the combat power necessary to sustain the corps' forces in the ad-Dammam al-Jubayl area. Providing the necessary attack helicopters to form a lethal covering force, General Luck ordered Maj. Gen. J. H. Binford Peay III, commander of the 101st, to deploy both his aviation brigade and the combat power of the 2d Brigade by Air Force aircraft. During the next thirteen days, in one of the largest global combat deployments by air, the 101st filled 56 C-141s and 49 C-5s to move 117 helicopters, 487 vehicles, 123 equipment pallets, and 2,742 troops to the

theater.[23] Orchestrating the smooth outload operations of this deployment were the transporters of the 372d Transportation Company (Cargo Transfer), Fort Campbell, Kentucky. Their expertise allowed the 101st to deploy a combat brigade to the Southwest Asia theater in enough time to reinforce the coalition's Desert Shield.

The 101st Division's other two brigades went by sea from Jacksonville, Florida. As in other Desert Shield deployments, the operation was plagued by the poor state of repair of vessels from the ready-reserve fleet. The ten ships dedicated to the 101st required an average of twenty-three days to make the voyage from Jacksonville to ad-Dammam. Ironically, some of these ships were the same ones that had taken the 101st to Vietnam more than twenty-five years before. The poor repair and lack of adequate sealift played a significant factor in the speed of the 101st Division's deployment. Had Iraq invaded Saudi Arabia, the absence of the 101st would have been keenly felt.

THE SOUTHWEST ASIA THEATER

Operation Desert Shield forces were predominantly centered in Saudi Arabia, a vast, mostly empty country roughly the size of the United States east of the Mississippi. Saudi Arabia is approximately 1,300 miles north to south and 1,400 miles east to west. The country is mostly desert except for a thinly populated band along the coastal plain. The population lives in small, widely separated towns and villages in the vicinity of the Persian Gulf oil fields and at sources of water along ancient pilgrimage routes.

Populated areas were connected by a system of two-lane asphalt roads. Secondary roads tied the major cities and towns to minor towns and villages with a series of dirt tracks between the smaller villages. Paralleling the trans-Arabian pipeline, just south of the Iraqi border, is Tapline Road, a major east-west roadway. The major north-south artery is the 500-kilometer-long coastal highway that runs from Kuwait, through the length of Saudi Arabia, to Qatar.

Rail facilities were limited, with only one active, standard gauge, single track line that ran from the port of ad-Dammam to Riyadh. Seaports were more extensive, with a total of seven sizable ports. Two, ad-Dammam and al-Jubayl, provided the bulk of the county's 10,000 metric ton capability per day.*

* One metric ton is equivalent to 1.102 short tons

Saudi Arabia also had five secondary ports and seven others scattered along its coasts. The two predominant ports of military significance were the port of ad-Dammam and al-Jubayl. These two modern, high-capacity ports, when operated by U.S. forces, would provide a reception and transshipment capacity equaled only by ports in Europe, Japan, and North America.

Airfields in Saudi Arabia were modern and well-equipped. Two of the largest, Dhahran and Riyadh, were fully capable of accommodating 149 C-141 cargo aircraft and 3,600 short tons of cargo per day and night in all weather. Additional small but well-equipped airfields were scattered throughout the country."[24]

In the early stages of the Southwest Asia Theater buildup, transportation priority went to getting combat units in theater. Few logistical units arrived early, and those that did operated with a small staff organization. Internal Look 90 results indicated that a mature theater required a logistical overhead structure of 120,000 soldiers and that it would take nearly two years to create an infrastructure that large.

Lieutenant General Yeosock, the Third Army commander, could not wait to build an infrastructure of that size. He devised an incremental support plan in which logistical units were called forward and placed in at precisely the time they were needed in country. This action placed a greater burden on the logistical community in theater, and it required a significant amount of host-nation support to implement. Logistical units that did deploy were understaffed and worked 24 hours a day. Almost miraculous accomplishments were required from these units to support the expanding theater. The shortage of logistical units became so critical that Maj. Gen. William "Gus" Pagonis, later commander of the 22d Support Command, contacted the Pentagon to move up the logistical units on the TPFDDL. Once that news reached Riyadh, the tactical planners responded to Pagonis, that they would decide "when the theater had received enough killers, at which point the logisticans would get their seats on the airplanes." [25]

With the severe limitations on aircraft, the logisticians had their work cut out for them. Pagonis, one of the Army's senior logisticians and a Transportation Corps officer, assembled his team in an abandoned movie theater in Dhahran and began immediately to support the arrival of U.S. forces into the theater.[26] Hand picked by Pagonis and sent to the theater by the Army chief of staff, the early team of logistical experts were called on to work miracles in supporting the expanding theater. With the Southwest Asia theater expanding by nearly 4,000 soldiers per day, the logistical support was no small task.[27]

The transportation support to move soldiers and their accompanied baggage to staging areas in the theater rapidly exceeded the capabilities of Pagonis' team. One of the earliest members of the team, Lt. Col. Mike Velten, formed an ad hoc transportation organization to move troops using Saudi contract buses. This infant organization, consisting of Cpt. James A. Pabon of the 7th Transportation Group and about a dozen soldiers, set up shop in a tent, contracted for buses and material handling equipment (MHE), and began moving soldiers and their baggage through the airfield at Dhahran. When the troop arrival rate suddenly exceeded the available transportation, Velten drove the streets of downtown Dhahran contracting every available bus he could find. The initiative of soldiers like Lt. Col. Velten during the early stages of Desert Shield allowed immature theater capabilities to expand at unprecedented rates.

As the size of the theater continued to grow, the required logistical support increased. Overwhelming the initially deployed logistical infrastructure, a new organization was required to manage the logistical support of the ever-increasing combat force. Lacking a reserve call-up, CENTCOM planners were concerned about where the soldiers would come from to staff a theater army area command (TAACOM). On 19 August 1990, Lt. Gen. Yeosock appointed Pagonis commander of the Provisional Support Command, later to emerge as the 22d Support Command.

Over the following days, Pagonis and his staff of fifty-eight soldiers began to develop the initial support network for the theater, establishing the basic systems which would eventually support a two corps force as it prepared for combat.

SEALIFT

During the first few weeks of the Desert Shield buildup, the theater's reception capability centered on airfields, with the predominant one being Dhahran. The short alert notification and the necessity for developing a force structure at the end of a 8,000-mile air and 12,000-mile sea line of communication meant that U.S. airlift was the only immediate transport means available to rapidly bridge this distance. As the operation continued, the sea lines of communication were being established and large oceangoing vessels began to arrive at the ports of Saudi Arabia. On 22 August, the Army pre-positioned ship, the *USS Green Harbor,* completed a 2,700-mile trip from Diego Garcia in the Indian Ocean to discharge its cargo at the port of ad-Dammam.[28] The *USS Green Harbor* was the first of over 700 ships that would carry supplies to or from the Southwest Asia theater.

The massive sealift requirement of putting a two corps army in a theater with its logistical support structure would quickly prove to be the weakest link in the overall operation. Since World War I, the United States had not had adequate sealift to get its combat forces to a theater of operations, and Desert Shield was no exception. With the Military Sealift Command (MSC) in possession of only eight fast sealift ships and sixteen RO/RO vessels, the required sealift to support Desert Shield quickly surpassed the MSC's capabilities. To offset this shortage, the Defense Department activated forty-three of the government's fleet of ninety-six ready reserve ships. In addition to having to comb the unions and retirement records for crews, putting the forty-three ships in service nearly exhausted the nation's supply of qualified merchant marine seamen.[29]

Besides a lack of crews, over 60 percent of the ready reserve fleet could not be activated within required timetables, most because of maintenance, but some due to the previously discussed crew problems. Those problems led the MSC to charter 36 ships from civilian shipping companies. Reliance on the private sector highlighted another weakness in U.S. sealift capabilities. Twenty-seven of the thirty-six chartered ships flew foreign flags and were manned by crews from Panama, Norway, the Bahamas, Japan, Denmark, Greece, and elsewhere. There was even discussions about chartering Soviet sealift ships to support the operation. [30]

The shortage of U.S. sealift had been a recurring strategic deployment problem for over fifty years and, the beginning of Desert Shield proved no different. Fortunately, the United States found itself in the position of being able to count on other nations of the world to provide sealift.

Even with the sealift problem, the arrival of the *USS Green Harbor* marked the beginning of an instrumental segment of the strategic deployment phase of Desert Shield sealift. The huge tonnage moved by sealift, no matter what flag it was flying, would enable the theater to build at an extraordinary rate. Yet, the effectiveness of sealift was dependent on the logistican's ability to receive, unload and push supplies into an unimproved theater.

CHAPTER XIV

Supporting the Storm

"Absolutely an extraordinary move, I can't recall anytime in the annals of military history when this number of forces have moved over this distance to put themselves in a position to attack . . . It was an absolutely gigantic accomplishment, and I can't give credit enough to the logisticians and transporters who were able to pull this off."

General H. Norman Schwarzkopf, 1991

SCHWARZKOPF'S PLAN

With Saddam Hussein's message that Iraq was not going to leave occupied Kuwait peacefully, the buildup of forces in the theater continued. General Schwarzkopf began developing a plan to defeat Iraq and drive Saddam Hussein's forces out of occupied Kuwait. The plan became known as the Great Wheel because of the pivot movement required of the VII and XVIII Corps.

The plan required several weeks of continuous bombing by U.S. Allied Air Forces, after which coalition forces would begin the ground war by conducting two supporting attacks on the flanks of the VII Corps. The Arab forces, in conjunction with the U.S. Marines, would begin the assault east of VII Corps with artillery and naval gunfire preparations, while the 4th Marine Expeditionary Brigade feinted an amphibious landing off the coast of Kuwait. Simultaneously, XVIII Airborne Corps west of the VII Corps would conduct coordinated ground and air assaults deep into Iraq. Twenty-four hours after the supporting attacks began, VII Corps would commence the main assault.

Supporting attacks were essential to the success of the main VII Corps attack for two reasons. First, the Coalition attack into Kuwait and the Marine Corps feint along the coast were designed to deceive the enemy into thinking they constituted the main attack. Secondly, the XVIII Airborne Corps thrust deep into Iraq would prevent the escape of the Iraqi Republican Guard.

In the description of the Army Chief of Staff's official history: "The main attack called for five armored divisions to form a spoke of the Great Wheel. If these divisions were to maintain alignment along the spoke, those near the hub

would have to advance relatively slowly while those near the rim would have to charge very far, very fast. Alignment was very important to avoid piecemeal engagement once contact was made with the Republican Guard. If the rotation went according to plan, all five divisions would turn shoulder to shoulder and slam into the Guard simultaneously in a collision of unprecedented violence and shock effect."[1]

Tactical success was historically related directly to successful logistical support, and Desert Storm was no exception. One of the keys to Schwarzkopf's plan was his appreciation of that need. Desert Shield was an audacious plan and required tremendous amounts of logistical expertise to receive, billet, and sustain the thousands of soldiers, vehicles, and items of equipment necessary to execute and support the ground assault.

In addition to other support requirements, the movement of the two corps into their attack positions would become the largest battlefield movement ever recorded for the time allotted. Once the air campaign commenced, the two corps were shifted west almost 300 miles in a move involving over 64,000 wheeled and tracked vehicles and 255,000 soldiers in 21 days. (See Map 41)

Concurrent with the corps' movement, the 22d Support Command had to create the enormous logistical infrastructure required to support them. Two logistical bases, Charlie and Echo, were constructed, each stocked with a sixty-day supply to support each of the corps. From these logistical bases, the Corps Support Commands would align their Support Groups to provide direct and general support to subordinate divisions. As the war progressed, additional logistical bases were planned to provide forward support to the divisions in order to maintain their required operational tempo.

Theater logisticans formulated a three-phase plan to turn Schwarzkopf's bold concept into reality. Phase I consisted of the reception, onward movement, and sustainment of the combat force. Phase II involved the movement of the two corps into their attack positions, and Phase III was concerned with support of the ground offensive. The most significant challenge involved in each of the phases was the movement of the force and the thousands of tons of supplies to sustain it.

To place the sustainment effort in perspective, in little more than a seven-month period more than 544,000 tons of supplies were airlifted, more than 3.4 million tons of dry cargo, and more than 6.1 million barrels of petroleum products were moved by sea. By comparison, cargo delivered during the Persian Gulf Conflict was greater than the cargo moved across the English Channel to Normandy in support of the D-Day invasion during a comparable seven-month period, and significantly exceeded the more than 2.3 million tons of coal, food,

and medical supplies that had been moved to West Berlin during the Berlin Airlift, Operation Vittles.[2]

An undertaking of this magnitude required the extensive team work of a wide array of Transportation Corps officers, noncommissioned officers, soldiers, and civilians, since every mode of transportation would be needed to make the operation successful. Operating the theater air and sea ports of debarkation and transporting units and sustainment cargo forward, while simultaneously moving a two corps combat force into attack positions, was one of the most significant achievements in the history of the Transportation Corps.

PHASE I-RECEPTION, ONWARD MOVEMENT, AND SUSTAINMENT

PORT OPERATIONS - SAUDI ARABIA

As in many other operations, the Army turned to the Transportation Corps to ensure supplies were moved rapidly through the theater's respective ports and airfields. The 7th Transportation Group, commanded by Col. David A. Whaley, assumed the mission as the only theater-level transportation group performing port operations at ad-Dammam and al-Jubayl. With eight fully loaded fast sealift ships en route to Saudi Arabia by 22 August, the 7th Group was faced with a formidable task.

An advance party of selected officers, noncommissioned officers and 300 soldiers from the 6th, 10th, and 24th Transportation Battalions was deployed from Fort Eustis, Virginia, on 10 August 1990. Personally led by Colonel Whaley, the advance party arrived in theater the following day. As soon as Whaley arrived, Maj. Gen. Pagonis informed him his advance party was needed for a variety of missions.

The 7th Transportation Group officers and soldiers quickly augmented Pagonis' four-man staff, becoming the core of the provisional support command. They also provided traffic control at the airfield and main supply routes and operated the Port of ad-Dammam. Personnel immediately went to work off-loading ships at that port and assisting the 403d Transportation Company in operating the arrival/departure airfield control group at Dhahran Air Base. Others began working at the airfield coordinating with host nation authorities for cargo trucks and buses to move incoming soldiers to their final destinations. Major General Pagonis later stated: "This was the turning point [7th Group's arrival]. I finally had enough people to start playing logistical catch-up."[3]

Port of ad-Dammam

The first port to receive U.S. Army cargo was the King Abdul Aziz port in Dammam. The 7th Group moved the 551st Cargo Transfer Company to the port where personnel immediately began warehousing and shipping the massive amounts of food, equipment, and ammunition that was arriving off pre-positioned ships from Diego Garcia.

One of the first ships was the *American Cormorant* loaded with watercraft, all of which were immediately put to use and remained in operation for the duration of Operations Desert Shield and Desert Storm. By the end of the war, most of the tugs had more than 1,000 missions each and had operated around-the-clock seven days a week.

Unloading ammunition ships dominated the early weeks of port operations. Three lighter aboard ship (LASH) vessels, each laden with more than eighty barges of ammunition, marked the beginning of the theater's massive ammunition build up. With too few terminal services soldiers available in country to effectively discharge the barges, the 7th Group coordinated with the Dammam Port Authority to obtain host nation laborers.[4]

A majority of the contract laborers were third world nationals, spoke little English, and had never worked with ammunition. This presented the Group's

24th Battalion with a challenging supervisory task, since the laborers were oblivious to the extreme hazards inherent in ammunition handling. Before being brought under adequate supervision, they had climbed atop multiple launch rocket system (MLRS) pods and smoked in cargo discharge areas. As the pace of the deployment increased and terminal service units became available, host nation assistance began to evaporate. Many of the contract laborers fled Saudi Arabia as the 15 January deadline neared [5]

With the buildup, dependence on sea lines of communication grew, and queuing at the Port of ad-Dammam became the primary managerial concern. In late September, the first of over 100 Special Middle East Shipping Agreement (SMESA) commercial container vessels, carrying cargo of almost every class of supply, began to arriving in Dammam. Almost daily, arriving units staged hundreds of soldiers in the port to drive the equipment, once off-loaded from the ships. As in Korea and Vietnam, the use of ports for break-bulk distribution points compounded the problem of queuing for arriving ships, because cargo could not be cleared from the ports quickly enough.

Even with the contents verified, the theater's material managers had a difficult time directing the transporters where to ship the cargo. Lacking an effective theater distribution plan, cargo required additional storage and processing time so that material managers could decipher equipment destinations and coordinate with the receiving units' Material Management Center, contributing significantly to a congested port.

Break-bulk cargo was not the only problem. The SMESA containers, arriving in theater, were routinely delivered unmarked or destined for multiple consignees. Questioning the accuracy of the commodity codes on the containers, the Theater Material Management Center directed that all containers be reopened, and the contents verified. This process was both labor and equipment-intensive, and the inefficiency of the operation contributed to the already congested port.[6] Even with the container visibility problems and seemingly insurmountable supply distribution obstacles, the transporters kept the cargo moving to the forward deployed units.

At the beginning of October, Colonel Whaley relinquished command of the 7th Transportation Group to Col. Daniel G. Brown. This was the first change of command for any unit in Saudi Arabia, and the ceremony established the precedent for future changes of command. Colonel Whaley was reassigned to a new Theater Support Command where he used his experience to develop the theater's transportation infrastructure.

Small portion of staging area at Port of ad-Dammam

Building a theater in such a short period was an awesome task that required a massive influx of sustainment cargo. A continuing challenge was to keep the port free of congestion. Consequently, a second port was opened seventy miles north of ad-Dammam at the port city of al-Jubayl. It was shared by U.S. Marines, U.S. Army, and British forces. Until December 1990, the port was used predominantly by the Transportation Corps to move ammunition and the 3d Armored Cavalry Regiment ashore.

On 8 November 1990, President Bush made the decision to deploy VII Corps from Europe to Saudi Arabia. The Support Command and the 7th Transportation Group prepared for the receipt and onward movement of the VII Corps supplies from the sea ports of debarkation (SPOD) to their tactical assembly areas (TAA).

After studying the theater's reception capability and Main Supply Routes, Colonel Brown recommended that both ports, ad-Dammam and al-Jubayl, be used to receive VII Corps. His argument for a two-port reception operation centered on maximizing the throughput of follow-on forces. Multiple aerial ports

of debarkation (APODs),SPODs, and at least two MSRs were needed to achieve the maximum throughput capacity. The key to the plan was allowing units with limited road mobility to debark as close to their tactical assembly areas as possible. Armored units discharged at al-Jubayl, shortening the distance 7th Group's heavy-equipment transporters (HETs) would have to operate. Mobile units, such as Military Police and Aviation units, could arrive in ad-Dammam and transit the longer distances with their own resources.

Every effort was made to avoid the backup of ships awaiting discharge that had occurred in Vietnam. The 7th Group filled the doctrinal role of running a Ship Priority and Destination Board (SPDB). Daily, they evaluated ship operations and projected berthing capabilities for the next five to ten day period. Working closely with the Military Traffic Management Command and the Military Sealift Command, the 7th Group could divert incoming ships to available berths and begin immediate discharge operations.

In all, thirty-five ships were rerouted and no ship ever waited to commence discharge during the deployment. The fact that ships were discharged so rapidly was a credit to the soldiers of both 10th and 24th Transportation Battalions, commanded by Lt. Col. Kinny Black and Lt. Col. Don Parker, respectively, and the Port Support Activities they supervised.[7]

Even with the excellent fixed port facilities at ad-Dammam and al-Jubayl, logistics-over-the-shore operations were still necessary.[8] One LOTS operation was conducted at Ras Al Mishab in support of the U.S. Marine Corps for two and one-half months. First, Marine Corps floating causeways were towed to the site and installed on the beach by Army tugs. Once established, two Army logistic support vessels (LSVs) conducted sixteen missions carrying 16,495 short tons of cargo ashore while six Army Landing Craft Utility (LCUs) conducted eighty missions transporting over 12,000 short tons of cargo in support of the logistics base buildup and subsequent redeployment through Ras Al Mishab.

Another LOTS operation was established to transport humanitarian support ashore through Ash Shaybah, a Kuwaiti port so badly damaged that it was inaccessible by other means. From 1 March through 10 April 1991, 13,200 tons of cargo were transported through the war-torn port. Both LOTS operations demonstrated the potential to support large-scale, long-term combat operations. LOTS operations made a significant contribution in supporting the theater's overall logistical plan, an essential element of the United States' "force projection" Army.

Transportation Corps watercraft played a significant role in the buildup of the theater. Logistic support vessels, developed in the early 1980s, self-deployed

LCM-8 watercraft undergoing overhaul in Dammam. Watercraft were used for port security patrols. These watercraft are having protective sheet steel added around the gun mounts.

from Fort Eustis and ran intratheater missions, transporting primarily tanks and ammunition. Landing craft, mechanized (LCM-8) landing craft served a variety of needs, some of which were extraordinary. In one case, they were used as gunnery platforms for test firing Bradley fighting vehicles and in another they were used for nightly port security.

Four of the Army's new 2000 class LCUs and two 1646 class LCUs, assigned to the 97th Transportation Company (Heavy Boat), shuttled over 300 missions carrying Marine Corps equipment between sites at Ras Al Mishab and the port of al-Jubayl. These missions demonstrated the Army's watercraft versatility and played an integral part in positioning the Marine Corps tracked vehicles prior to the ground offensive. The 2000 class performed intratheater transport by shuttling the 7th Transportation Group's port equipment from ad-Dammam to the heavily damaged industrial port at Kuwait City. These vessels were the first watercraft to enter the harbor after the ground offensive. Upon entering, 7th Group personnel found the blueprints for the minefield in the

port and, after transporting Navy port opening equipment, helped the Navy clear a deep draft channel into the port.

Through their versatility, Army watercraft demonstrated they were necessary for more than LOTS operations. They allowed the Transportation Corps to sustain forward forces using intratheater sea lines of communications (LOC). Army barge Derrick cranes accomplished over 1,500 lifts during the deployment, and tugs moved over 2,500 LASH barges and made eleven offshore tows.

Within a year, 7th Group unloaded and loaded over 700 ships, transporting the majority of two corps and their accompanying forces, drove over 31 million miles, handled over 36,000 containers, discharged and transported 274,000 tons of ammunition, loaded 3,900 railcars, and performed 6,100 intratheater missions with Army watercraft.[9]

By December 1990, the 7th Transportation Group had grown from two battalions to a peak strength of nine, consisting of fifty-two companies with 9,200 soldiers (see Chart 17). The force structure included two terminal battalions, whose four Cargo Transfer Companies and five Terminal Service Companies provided the theater's port operations capability. The remainder of the group's transportation assets provided theater truck transport, which supported the movement of both corps to their attack positions and moved sustainment cargo to corps supply points.

With the arrival of the VII Corps in the theater, 7th Group port operations resumed a hectic pace. Discharge of sustainment cargo and critical ammunition kept ship discharge operations as the top theater priority throughout the entire Desert Shield buildup. At the commencement of combat operations, transportation soldiers throughout the theater had successfully accomplished their mission. Stockage levels of critical classes of supply had all met or exceeded the theater commander's objectives in record time.

When on 28 February 1991, the ground war ended and Kuwait had been liberated, the Transportation Corps' job was not completed. Sustainment convoys continued to run and ships continued to be discharged with needed spare parts and force modernization equipment. Only seven days after the ground war started, the 10th Transportation Battalion, 7th Transportation Group, entered Kuwait City. Within two weeks the port was cleared of ordnance, a path was made through mine fields, and the Group's dive detachments salvaged Iraqi attack boats sunk at pierside. Army watercraft were the first allied vessels to enter Kuwait since the Iraqi invasion. During the next two months, 7th Group soldiers delivered humanitarian assistance supplies to Kuwait using both trucks

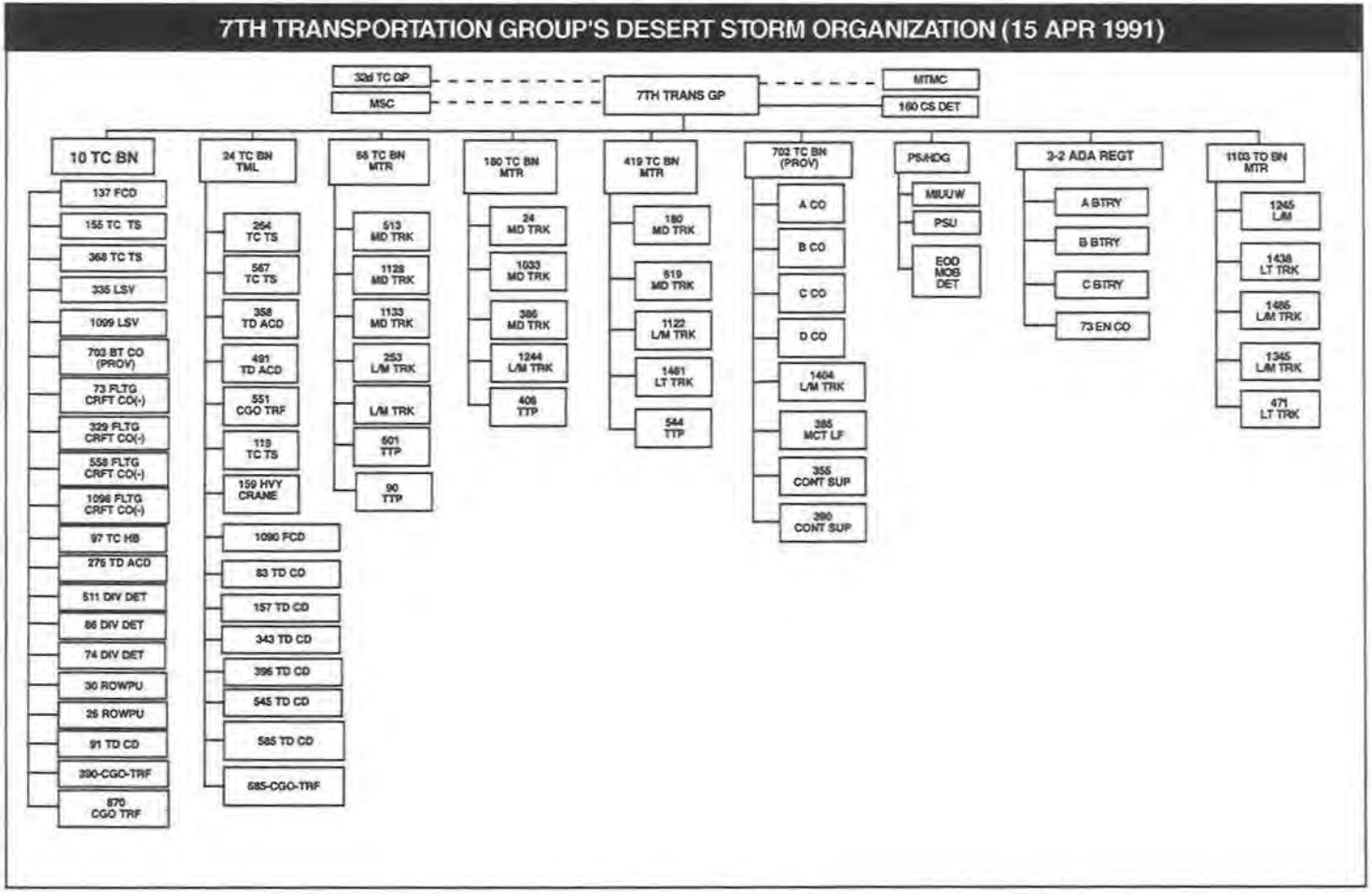

7TH TRANSPORTATION GROUP'S DESERT STORM ORGANIZATION (15 APR 1991)
32d TC GP
MSC
7TH TRANS GP
MTMC
160 CS DET
10 TC BN
137 FCD
155 TC TS
368 TC TS
335 LSV
1099 LSV
703 BT CO (PROV)
73 FLTG CRFT CO(-)
329 FLTG CRFT CO(-)
558 FLTG CRFT CO(-)
1096 FLTG CRFT CO(-)
97 TC HB
275 TD ACD
511 DIV DET
86 DIV DET
74 DIV DET
30 ROWPU
25 ROWPU
91 TD CD
390-CGO-TRF
870 CGO TRF
24 TC BN TML
264 TC TS
567 TC TS
358 TD ACD
491 TD ACD
551 CGO TRF
119 TC TS
159 HVY CRANE
1090 FCD
83 TD CD
157 TD CD
343 TD CD
396 TD CD
545 TD CD
585 TD CD
685-CGO-TRF
55 TC BN MTR
513 MD TRK
1128 MD TRK
1133 MD TRK
253 L/M TRK
L/M TRK
501 TTP
90 TTP
180 TC BN MTR
24 MD TRK
1033 MD TRK
386 MD TRK
1244 L/M TRK
406 TTP
419 TC BN MTR
180 MD TRK
619 MD TRK
1122 L/M TRK
1481 LT TRK
544 TTP
702 TC BN (PROV)
A CO
B CO
C CO
D CO
1404 L/M TRK
385 MCT LF
355 CONT SUP
390 CONT SUP
PS/HDG
MIUUW
PSU
EOD MOB DET
3-2 ADA REGT
A BTRY
B BTRY
C BTRY
73 EN CO
1103 TD BN MTR
1245 L/M
1438 LT TRK
1486 L/M TRK
1345 L/M TRK
471 LT TRK

Chart 17

and watercraft. They transported thousands of enemy prisoners of war, ran an Arrival/ Departure Airfield Control Group at the Kuwait International Airport, and redeployed a large segment of U.S. Marine Corps tanks that were used to liberate Kuwait.[10]

AIR LINES OF COMMUNICATION

As United States strategic deployment capabilities shifted into high gear, the colossal task of deploying troops and equipment as far forward as possible in the Southwest Asia theater had begun. As many as 5,000 soldiers per day were arriving at Dhahran Air Base. As they debarked, they were put in personnel holding areas to wait for transportation to their unit staging areas. Sustainment cargo arrived through the ports of ad-Dammam and al-Jubayl as well as Dhahran Air Base, the theater's primary aerial port of debarkation.

The bulk of air cargo was palletized on Air Force 463L pallets. Wooden and 463L pallets, which were used successfully in the Vietnam War, served as the primary means of moving air cargo during Desert Shield and Desert Storm. Heavy reliance on 463L pallets also meant a significant requirement for forklifts and other handling equipment. Air Force or Civil Reserve Air Fleet aircraft arrived at Dhahran Air Base with as many as 500 to 700 pallets of cargo per day.

Pallets were off-loaded by Air Force K-loaders and shuttled to the theater pallet yard, a large area of sand at the end of the Dhahran air strip. The yard, operated by the 403d Transportation Company, had two distinct functions. It segregated incoming pallets into either the pallet yard or to the break-bulk yard. Pallets destined for a single customer (consignee) were taken and aligned with that consignee's servicing supply support activity (SSA). Pallets with multiple consignees (multipack), were sent to the break-bulk yard where they were broken down and stored break-bulk by SSA until enough cargo existed to build a pallet for that SSA.

Moving theater sustainment cargo through this process should have been fairly simple, but it was complicated by pallet construction and marking in the United States, by weather, and by the theater's inability to develop an effective supply distribution plan.

Depots in the United States received tons of sustainment cargo daily from multiple sources for dispatch to the forces in Saudi Arabia. Concerned with maximizing the use of the airlift resources, depots built pallets to the height restrictions of the different aircraft.[11] If a depot built a pallet and there was no other cargo for the consignee, they simply loaded cargo for other consignees onto that pallet. Eventually, the pallet arrived at the Dhahran Air Base pallet yard with cargo for different units, some hundreds of miles apart. Since the 403d

7th Transportation Group 100 ton crane raising a
destroyed Iraqi patrol boat in the Kuwait port of Ash Shaybah

Transportation Company was the only available Cargo Transfer Company, it was required to break down the pallet, sort the cargo, and ship it to each of the individual unit's SSAs.

To further exacerbate the problem, depots and other supply agencies routinely identified the ultimate consignee for most pallets as Department of Defense Activity Address Code (DODAAC) "W81LTC", the 403d Transportation Company. Simply put, a majority of the sustainment cargo arriving by air for the 403d Transportation Company was without any instructions for onward movement. That left the task of identifying the owner of each pallet to the few material management personnel at the airfield, a time and labor intensive task.

By building pallets in this fashion, the cargo could be rapidly moved through the stateside depots while efficiently using sustainment aircraft. However, this procedure placed a significant labor-intensive burden on the Southwest Asia Theater's consolidated reception point. As the theater matured and logisticans elevated these concerns, the practice of multipacking pallets was minimized.

The second and probably most significant impact on the ability of the Transportation Corps to move sustainment cargo into the theater was the inability of the theater to develop an effective supply distribution system. Effective supply distribution had been a problem that has plagued the Army Logisticians since World War I. Their inability to get supplies from the port of debarkation to forward supply points was a reoccurring problem, with Operations Desert Shield and Desert Storm as no exception.

During the buildup phase, the supply distribution problem was compounded by the fact that the list of units scheduled for deployment to Saudi Arabia changed daily. Materiel Management Centers (MMCs) had a considerable task in trying to align deployed units with theater supply support activities. New units arriving in theater had push packages waiting for them with no SSA to send the cargo to. Cargo sat in the 403d's pallet yard long after units moved to their assembly areas.

The distribution problem was also compounded by the ever changing locations of units in a theater where communication assets were scarce. Units would be aligned with one SSA for a short period of time and then realigned to another after relocating to a remote forward position, with neither SSA being notified. The problem was created because units were frequently task-organized at the time of the unit's arrival and then again once the theater matured, each time changing its SSA. The task organization problem was compounded by the lack of communications between units. Transportation resources were wasted as supplies were routinely routed to incorrect SSAs or to old unit locations.

Despite the ineffective theater supply distribution system, hard work and attention to detail by countless material managers and Transportation Corps soldiers ensured the theater's sustainment cargo kept moving through the APOD. It was not uncommon for three to four convoys of fifty trucks each to leave the pallet yard en route to several different SSAs daily. Even at that pace, the pallet yard routinely ran a backlog of 100 to 200 pallets a day awaiting transportation.

Actually, two factors hampered the ability to push sustainment cargo into the theater. One was the lack of an effective supply distribution system, and the other was the lack of trucks. Every available truck was tasked to support the clearance mission for both the airfields and ports, as well as for the movement of units to their forward staging areas. The shortage of trucks resulted from the policy of developing the theater by deploying combat units first, and flowing logistical units in at the last possible moment.

As in World War II and Vietnam, problems with transporting critical repair parts from the depot to the ultimate customer were solved by circumventing the theater distribution system. First used in World War II, a Red Ball Express was used to move critical repair parts through France in 1944. During the Vietnam War, similar distribution problems resulted in another Red Ball Express to move critical repair parts from the United States to Cam Rahn Bay. Once again in the deserts of Saudi Arabia, history repeated itself with the "Desert Express."

With stockpiles of sustainment cargo and mail backlogged at the primary APOD, a system had to be devised to push critical repair parts into theater to allow combat units to increase their readiness rates. Planners looked to a special ALOC that were completely autonomous from established procedures to solve the problem. Colonel Steve Koons, 1st Area Support Group Commander, Dhahran, was instrumental in using his transportation expertise to devise and implement such an operation.

Working with the Military Airlift Command and various U.S. Army Transportation Corps units, Col. Koons developed a system similar to Federal Express services.[12] Daily, one C-141 aircraft was designated to transport up to thirteen 463L pallets of relatively small, high priority, critical cargo to Operation Desert Shield and Desert Storm. Beginning 30 October 1990, Desert Express consisted of one flight daily leaving Charleston Air Force Base destined for Dhahran. Each service was allocated a portion of the weight delivered. The Army's daily allocation was 15,000 to 18,000 pounds. Upon landing at Dhahran, Desert Express aircraft were staged at the parking ramp close to the theater pallet yard. Special cargo handlers transloaded the high priority cargo onto waiting

trucks or helicopters, after which it was delivered directly to the respective units. As high priority requisitions increased, a second daily flight was added on 13 February 1991. With the arrival of the VII Corps on 8 December 1990, a European Desert Express was added to move high priority cargo from Rhein-Main Air base, Germany. Over a six-month period, Desert Express had flown over 5.1 million pounds of cargo from the United States and 1.3 million pounds from Europe, servicing predominantly Army and Air Force units.[13] The Desert Express was a major factor in maintaining the combat readiness of theater units.

THE NEED FOR MOVEMENT CONTROL

As the level of force structure and its supporting sustainment cargo grew, the need to effectively manage the theater's scarce transportation resources became an urgent priority. In the initial stages of deployment, much of the transportation management function was accomplished by the respective commands. Support Command (SUPCOM) managed its assets using personnel borrowed from the 7th Transportation Group, while the XVIII Airborne Corps managed its early arriving transportation assets through the few personnel from the 330th Movement Control Center (MCC).

As troops and supplies poured into the theater, it was evident that a movement control organization was needed. Since none was available, SUPCOM built a provisional movement control battalion out of movement teams that had already arrived. Commanded by Lt. Col. Bruce Laferrerie, the 1st Movements Battalion (Provisional) was formed and assumed the mission as the SUPCOM movements control organization responsible for movement control until the 318th Movement Control Agency (MCA) arrived.

The 318th MCA, commanded by Col. Peter C. Langenus, was a reserve unit based in Jamaica, New York. Organized and staffed to operate the theater's entire movement control network, it would by plan have been deployed immediately but did not arrive in theater until C+80 because combat units had priority during the early phases of Desert Shield. Plagued by a late start and insufficient communications assets, the 318th had to struggle to establish an effective movements control program.

The 318th's effectiveness was also hampered by the level to which it was assigned in theater. By doctrine, the MCA was assigned to the theater army. In Operations Desert Shield and Desert Storm, the MCA was assigned to the SUPCOM. Policies affecting movement control were issued by the SUPCOM commander, not the theater commander. The chief of staff of the 318th MCA put it bluntly: "The

placement of the MCA at the SUPCOM level resulted in a loss of visibility of interservice requirements and priorities, a lack of definitive transportation priorities based upon accurate current tactical/logistical situation, a lack of adherence to transportation policies by major commands, and the absence of transportation allocation plans."[14]

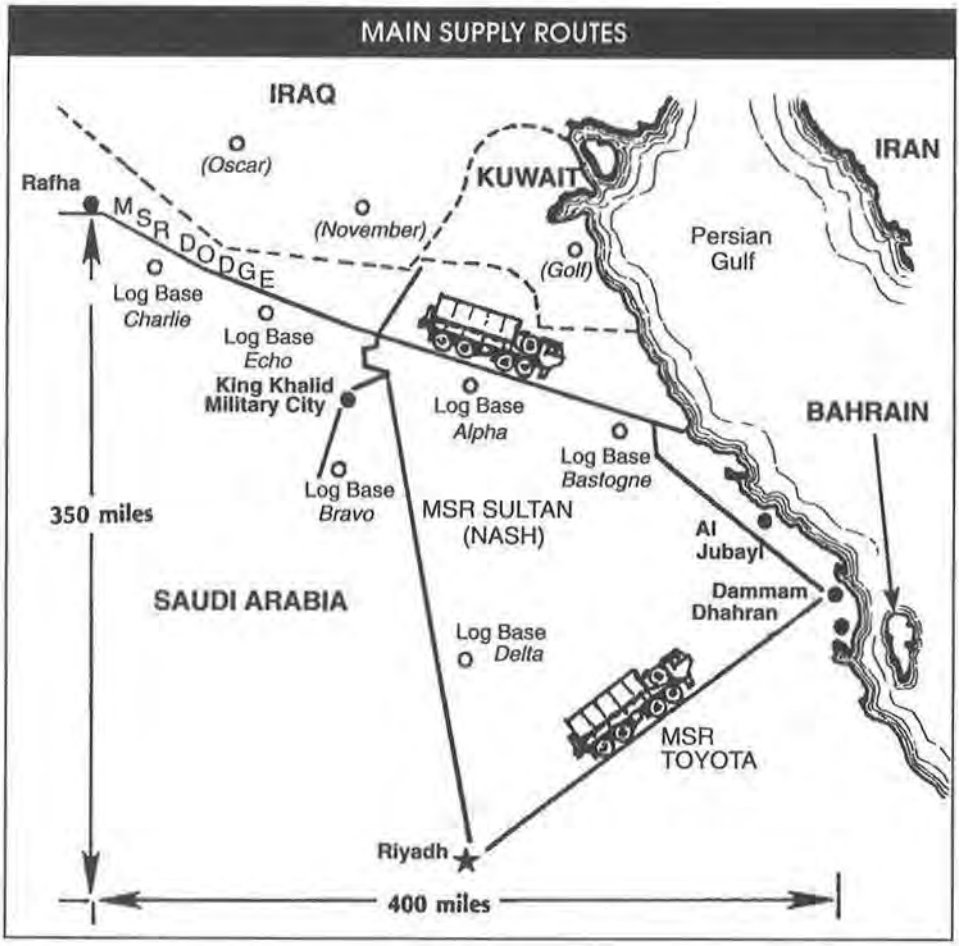
Despite the numerous obstacles, the 318th MCA, in conjunction with the movement control centers of the VII and XVIII Corps, contributed significantly to the overall transportation successes achieved during Operation Desert Shield and Desert Storm. Its ability to perform, despite shortages in personnel and equipment, was a tribute to its sense of mission accomplishment. With the lack of communications, movement control personnel were needed at every major hub of transportation activity, not only to control movements but also to provide effective movements data to the transportation managers at the respective movement control organizations.

BUILDING THE GROUND TRANSPORTATION NETWORK

Even with the benefits of Desert Express, the theater lacked the resources to build an comprehensive transportation system in a short time. Major General Pagonis turned to Colonel Whaley, the 7th Transportation Group's outgoing commander and Brigadier general selectee, for assistance and appointed him his transportation czar with the complex mission of developing an efficient system to move material from the ports to forward deployed units.[15]

Colonel Whaley first had to analyze the problems facing him. Although Saudi Arabia had some of the world's best ports, its highway network was well below the United States standards. The road network, as illustrated in Map 40, consisted of two main supply routes that led from the ports of ad-Dammam and al-Jubayl to the logistical bases and corps tactical assembly areas.

The northern route began outside Dhahran, and was named "MSR Audi". It was a four-lane highway that stretched the 85 miles from Dhahran to the north of al-Jubayl. Outside al-Jubayl, the road, named "MSR Dodge" or Tapline Road turned into a narrow two-lane road that ran 250 miles into the interior through Hafar al-Batin and then onward through Rafha and across Saudi Arabia. The second route ran in a southwesterly direction, from outside Dhahran to Riyadh and was dubbed "MSR Toyota." It was an excellent multilane highway, running about 225 miles through Riyadh until it narrowed to two lanes. The next stretch, MSR Nash, began outside of Riyadh and ran northward approximately 300 miles to Hafar al-Batin, where MSR Nash joined MSR Dodge. Although the northern and southern routes were different in length (334 miles versus 528 miles), the



Map 40

difference in travel time was minimal because of the contrasting quality of the roads.

Some of these roads were well-surfaced multilane highways comparable to the U.S. interstate network, while others, like MSR Dodge, were two-lane roads that were not designed to handle the military traffic necessary to support the coalition forces. Main supply route Dodge, known more informally as "Death Alley", was considered the most dangerous road in the world. "Winding through the desert, MSR Dodge had no lights, dividing lines, or shoulders, and only enough width for two HETs to barely pass. Traffic was so intense with military vehicles on MSR Dodge that a traffic survey revealed a soldier standing on the side of the road would have seen seventeen vehicles pass every 60 seconds."[16]

The distances traveled were considerable. The long haul from the port of ad-Dammam to the logistical bases at King Khalid Military City (KKMC) was over 334 miles along the northern route. With the staggering number of support vehicles using the northern MSR, it was not uncommon for multiple convoys to jam the two-lane MSRs. Along the northern route, it was a common sight to see large trucks breaking off from the two-lane road and carving additional passing lanes through the sands of the desert.

With a long LOC over generally poor roads, Colonel Whaley was faced with the task of creating a transportation network capable of supporting Desert Shield objectives. As the Deputy Commanding General (DCG), Transportation, Support Command, Colonel Whaley began by establishing a series of convoy support centers to increase the road network efficiency. According to the Army chief of staff's official history, "These centers resembled huge truck stops in the desert, and like all truck stops, operated 24-hours a day, providing fuel, latrines, food, sleeping tents, and limited vehicle repair facilities. The convoy support centers quickly became welcomed oases for overworked and exhausted long-haul truck drivers."[17]

The support centers actually contributed much to the overall safety and success of the logistical support mission. The turnaround time from the theater's main ports of embarkation to the logistical bases averaged between three to four days. The southeast support centers provided life support for missions of this duration.

Convoy support centers were often confused with trailer transfer points (TTP). While both supported the movement of cargo, they had two distinctly different missions. The support centers provided technical service and life support to sustain all movements conducted on the theater MSRs, while the TTP focused specifically on the transfer of trailers between units and provided limited maintenance, fuel, and life support to drivers.

The sheer distance traveled, coupled with demanding road conditions, forced transportation planners to increase the required number of truck drivers just to support the theater's transportation network. Early on, it was decided to assign assistant drivers to all line-haul missions. By doctrine all transportation truck companies, except HET companies, were authorized one driver per truck. An all out effort had to be initiated to bring as many truck drivers into the theater as possible. The theater decided to use available personnel from almost any military occupational speciality (MOS) for assistant drivers. The responsibility to train those soldiers fell to 7th Transportation Group, which established a driver's training program in Dhahran. The program trained over 4,000 drivers

Commercial HET assigned to the 702d Transportation Battalion moving Bradley Fighting Vehicles to the front.

and was instrumental in alleviating the driver shortage. With two drivers in every cab, truck companies were able to support sustained operations.

In addition to its driver training program, the 7th Transportation Group created a provisional truck battalion to bolster its local and line-haul capabilities. Its personnel structure began with a small nucleus of U.S. military and drivers from foreign countries. Later, the provisional battalion's foreign-national drivers were augmented by 800 soldiers from the Berlin Brigade, bringing the battalion's strength to over 1,400 personnel.

The shortage of HET and lowboy trailers also affected transportation capabilities in the theater.[18] Transportation planners conducted an intensive effort to get as many heavy lift assets into the theater as quickly as possible. Not only was there a significant demand for heavy-lift assets to move unit equipment arriving in the sea ports of debarkation, but the anticipated relocation of two corps to their attack positions had planners concerned about supporting the move with available assets.

The heavy-lift assets in the Army inventory were unable to support both the SPOD and the simultaneous unit moves into their attack positions. Every effort was made to obtain additional assets from across the world. Other countries, including Egypt, Germany, and Italy, were contacted to help out. By February 1991, Italy, Czechoslovakia, Germany, Egypt, and Saudi Arabia responded by providing 714 HETs. Added to the 497 HETs belonging to the U.S. military and the 99 commercially contracted ones, the borrowed HETs brought the theater total to 1,310.[19] Even with this influx, the shortage of HETs and lowboys was so significant that both were intensively managed by a general officer on a daily basis.

Heavy-equipment transporters were true combat multipliers relocating M1 tanks to forward positions. By saving needless wear and tear on the tanks, HETs greatly increased the M1 mission readiness rate and made a direct contribution to the tactical victory. The HET was one of the most valuable commodities of the war and played a crucial role in the overall plan. Since the M1 tank was the primary ground weapon system for the defeat of Iraq's tank-heavy Army, the key to success was getting combat-ready M1s to the battlefield. By reducing the time tanks had to operate under their own power, the HETs greatly increased the M1s mission readiness rate.

To cope with the long distances of the road network and maximize the use of scarce transportation resources, planners established the trailer transfer point system. Modeled on the system used by U.S. forces in Germany, the first TTPs were established in the vicinity of ad-Dammam and Riyadh.

Planners sought to follow doctrine by establishing the points at 90-mile intervals to allow trucks to make two trips between TTPs per 20-hour operating day. Unfortunately, the number of TTPs available in theater was limited, and two TTPs had to be combined to form one transfer point large enough to accommodate the projected traffic flow. Eventually, four TTPs were positioned along the 525 mile southern route (ad-Dammam-Riyadh-Hafar al-Batin). A fifth was eventually established along the northern route in the vicinity of the corps' logistics bases. The system enhanced driver safety and maximized cargo-hauling capabilities.

Though a majority of the sustainment cargo was moved in theater by truck assets, rail operations did provide some transport capability. A rail line was used between ad-Dammam and Riyadh to move sustainment cargo. Because of the expenditure of time and personnel to brace equipment, the decision was made to only move containers by rail since they could be easily uploaded and off-loaded from the railcars. The rail line gave the theater the capability of moving 150

Rough-terrain container handler (RTCH) with a 20ft container.

40-foot containers per day on two trains consisting of seventy-five gondola cars each. Once the containers arrived in Riyadh, they were loaded on contracted trucks and transported some 300 miles along the southern route to KKMC and the newly formed logistical bases.[20]

As the development of the theater's road network began to take shape and additional truck assets arrived in theater, attention shifted to the effort to support the buildup of supplies in the northern corps logistical bases in support of future operations. Priority of movement went to Class I (subsistence), Class III (packaged and bulk POL), Class V (ammunition), and water. Once these stockage objectives were established, the speed at which the objectives could be met was dependent not only on trucks but on the entire cargo distribution system.

Consequently, the limited quantities of materials-handling equipment (MHE) available in theater became a major factor in the speed with which the

transportation network could support the establishment of the new logistical bases. Rough-terrain container handlers (RTCHs) were extremely scarce, and maintenance problems slowed container upload and download across the theater. As an example, the XVIII Corps only had eight RTCHs to service an entire corps-size force. With containers being transported down to the subordinate divisions, the few RTCHs were quickly overwhelmed. Rough-terrain forklifts of 4,000 and 10,000-pound capacity were also critical to the logistical base buildup. Those assets were assigned to a majority of the same logistical units already involved with the reception of supplies at the theater ports of debarkation. Though not in short supply in the ports, MHE was a scarce commodity in the forward logistical bases. Moving the equipment from the Dhahran or ad-Dammam ports to build logistical bases in the north did very little to improve the theater's shortage of MHE.

Innovative systems were used to offset the shortages. One included the development of provisional theater MHE companies and positioning forklifts on lowboy trailers in the rear of certain convoys. The provisional companies provided logistical commanders with the flexibility to direct MHE support to possible bottlenecks or priority cargo. While transport of the equipment in sustainment cargo convoys was a temporary fix to a larger problem, it guaranteed transporters that their cargo would be off-loaded at its destination without excessive turnaround time.

On numerous occasions, truck drivers arrived at remote sites where the customer had failed to coordinate for materials handling equipment. With no equipment available and the truck needed for another mission, drivers found unique ways to unload their cargo. One way was to use a sand dune as a temporary ramp. For pallets, drivers connected the pallet to a fixed structure and slowly pulled away. Both methods were a little rough on the cargo, but they did the job.

The MHE shortage remained a critical problem throughout Operations Desert Shield and Desert Storm. Temporary fixes were created, but the lack of such equipment in corps and theater logistical units remained a significant problem.

THEATER TRUCK ASSETS

During most of the reception and buildup phase, 7th Transportation Group was the only theater transportation group providing both port and line-haul capabilities. To support the theater, 7th Group controlled two terminal service battalions and seven truck battalions which operated 1,300 military cargo and 700 commercial trucks.

Not since World War II had line-haul transportation been so critical to both sustainment and tactical operations. Forces were deployed to field locations that had little to no life support facilities. Fuel, water, shelter, repair parts, and a multitude of other commodities all had to be transported by truck.[21]

To support the forward deployed forces over thousands of square miles of desert, the 7th Group staged its truck battalions along key portions of the theater's transportation network. The 419th Transportation Battalion, commanded by Lt. Col. John Gannon, a reserve unit from Illinois, was positioned in ad-Dammam and was responsible for transporting unit equipment and sustainment cargo from the port. The 68th Transportation Battalion, commanded by Lt. Col. Rick Ross, was located on a camel racetrack. As an active component unit from Fort Carson, Colorado, the unit was augmented with Reserve and National Guard truck companies and assigned the mission of ensuring trailers were shuttled between TTPs along the southern route (ad-Dammam-Riyadh-Hafer al-Batin). The 68th was also responsible for moving trailers north to their final destination. The 180th Transportation Battalion, commanded by Lt. Col. Bill Jones, was an active component unit from Fort Hood, Texas, consisting of three medium truck companies, one light/medium truck company, and the 406th TTP. The 180th was emplaced at the end of the MSR and supported the movement of cargo along the route.

The 702d Transportation Battalion (Provisional), commanded by Lt. Col. Coyd M. "Bud" Vance was organized in October of 1990 and based in ad-Dammam. Originally organized with a small cadre of U.S. Army transporters and civilian contract drivers, the battalion expanded and served as a melting pot for drivers from several nationalities and soldiers from the Berlin Brigade. At its peak strength, the 702d consisted of 800 soldiers and 750 civilian truck drivers. The 702d could be seen along the MSRs operating trucks from numerous countries.

In January 1991, the 7th Transportation Group's line-haul capability was enhanced from an unusual source. When the 3d Battalion, 2d Air Defense Artillery (ADA) Regiment, commanded by Lt. Col. Pete Deperro, was converted to a truck battalion, its soldiers trained as drivers at the 7th Group Drivers Training Program. The new drivers were assigned to the Czechoslovakian TATRA heavy-equipment transporter, which soon became infamous for its obsolete steering and brake systems and poor reliability. By the time the war was over, the drivers of Deperro's battalion had developed a keen appreciation for U.S. automotive technology.

As the movement of corps phase neared, the 369th Transportation Battalion (HET), commanded by Lt. Col. Francis Kairson, arrived from New York City as did the 1103d Transportation Battalion (HET) from Alabama, commanded by Lt. Col. Ernest McMonagle. Both were assigned to the 7th Group. In the beginning of January, both battalions were reassigned to the 32d Transportation Group but would be reassigned back to the 7th Group upon commencement of retrograde operations. Both units, while assigned to the 7th Group, provided much needed heavy truck capability and were instrumental in the movement of armored divisions from the seaports to their attack positions.

With the reliance on truck transport during the reception and buildup phase, the lack of adequate communications equipment at every level had a significant impact on operations. Transportation unit tables of organization and equipment (TOE) did not authorize radios with the capability to communicate over long distances. The distances between units and the long miles convoys had to travel exceeded the capability of the U.S. Army issued AN/VRC 46-series FM radios. Even so, radios were installed in very few trucks, but mainly in command and control vehicles.

In response, the transportation community relied on cellular telephones, but even these were in short supply and issued only to battalion commanders and above. This shortage did nothing for the commanders and soldiers at company level who had to execute the missions. They solved the problem by purchasing inexpensive citizens band (CB) radios that gave drivers the capability of communicating with other trucks in the convoy and, over limited distances, to communicate with their base. Still, no real solution evolved to provide dedicated communications to the transportation network.

Cellular phones and CB radios helped, but they were little more than local stopgap measures. Even the movement control agency at SUPCOM lacked sufficient communications equipment, especially for long distances in a fluid situation. That shortage denied the commander effective control over his transportation assets and, had the war lasted longer, would have caused severe disruption in the flow of supplies forward. Drivers resupplying the forward logistical bases at times required a five-day turnaround time to transit the road network. On several occasions, mission or priority changes could not be relayed to the trucks while they were on the road. Transportation managers had to wait until trucks arrived at destination to redirect the assets, usually wasting critical blocks of time.

The lack of communications directly contributed to enemy capture of the Transportation Corps' only two prisoners of war (POWs) during Operations

Desert Shield and Desert Storm. As Specialist Melissa A. Rathbun-Nealy and Specialist David Lockett of the 233d Transportation Company were driving their HET from a mission at Dhahran Air Base, they became disoriented and got off the MSR. Proceeding along the coast of Saudi Arabia towards Kuwait, the soldiers were unable to reestablish their correct direction. Without any communications capability, they were unable to communicate with higher headquarters for additional guidance and mistakenly drove into occupied Kuwait.

The fielding of the Global Positioning System (GPS), later nicknamed the "Slugger", gave transportation units the much needed capability to know where they were in a featureless desert.[22] Without the GPS, trying to locate a supply point in the desert at night was like searching for the proverbial needle in a haystack. Trying to find the owner or consignee of the cargo without adequate communications or GPS equipment was a complete waste of scarce transportation resources. It was also unsafe on a battlefield of featureless terrain. The Global Positioning System helped eliminate these inefficiencies, but very few GPS units were issued to each transportation battalion.

The 32d Transportation Group, commanded by Col. Mike Gaw and aligned as the theater's second organic transportation group, arrived in theater towards the end of the buildup phase. Its mission was support of the movement of corps phase that was ready to commence. The 32d Transportation Group planners participated in planning the movement of the XVIII Airborne Corps into its attack position.

As the planning began, the 32d Group planners tried to task organize the 32d so it could lift an entire division in one move. Constrained by the lack of heavy- lift assets, they quickly revised their plans to movement of one entire brigade package in one lift. The XVIII Airborne Corps was pleased with the concept of placing an entire transportation group with organic command and control in support of its relocation and approved the plan.

The untiring efforts of Transportation Corps units throughout the theater ensured that sustainment cargo flowed to logistical bases Alpha, Bravo, Delta, and Echo, which were established to support VII and XVIII Corps in their attack positions. Over the previous months, truck drivers had moved thousands of tons of critical classes of supply to these forward bases almost nonstop. For example, Class V (ammunition) alone required hundreds of trucks a day to carry loads to forward logistical bases. Fifty truck ammunition convoys from the 7th Transportation Group departed the port of ad-Dammam every six hours in support of this buildup.

Reserve units, like the 424th Transportation Company (Medium Truck) from Galax, Virginia, were instrumental in the success of the logistical buildup and subsequent support of the ground offensive. Commanded by Capt. Arthur K. Davis, the 424th amassed over 1.1 million accident-free miles transporting critical supplies throughout the theater. With the beginning of the ground offensive, the 424th found itself hauling sustainment cargo to the advancing coalition forces. Specialist Joseph Parks, a truck driver for the 424th, said, "When we crossed over the Kuwait border, the craters and debris in the road almost always gave us flat tires; as a unit we went through over 500 tires. . . also the sand storms at times would cut our visibility to almost nothing." Specialist Parks' experiences and the 424th's accomplishments were indicative of the conditions the Transportation Corps faced in moving cargo to support the forward deployed combat units.

CENTRALIZED MANAGEMENT AND THE DRY RUN

With the fast pace of the buildup's initial stages and the constantly changing priorities, transporters were compelled to find innovative ways to accomplish their mission. Occasionally, units received vague mission statements or conflicting mission priorities. What prevented the confusion from becoming chaos was transportation doctrine that provided a framework within which to operate. Nonetheless, the senior transportation leadership had concerns. Most of them had served in Vietnam and understood the need for early centralized control to maximize the use of the limited transportation assets in the theater.

Without a movement control agency in theater, Maj. Gen. Gus Pagonis created a logistical planning cell that brought logistics planners and subject matter experts together to ensure plans were properly supported and to troubleshoot the theater's logistical problems.

The creation of the logistical planning cell in the Support Command took transportation planning to a new level. With the second phase of Desert Shield, movement of the corps, rapidly approaching, the Provisional Support Command set up a two-day logistics exercise (LOGEX) to prepare the SUPCOM staff and key leaders for simultaneously supporting the movement of two corps into their attack positions. Participants in this LOGEX included SUPCOM commanders and their staffs to the battalion level, command sergeants major, key commanders and staff officers from the corps, and key officers from the Army Central Command staff (Third Army). The LOGEX began with the SUPCOM commander's theater overview of the concept for providing theater logistics

support for the upcoming Desert Storm. Over the next 24 hours, commanders and staff officers from every level coordinated and finalized every detail of the logistical plan for the future operations.[23]

The LOGEX was concluded after every SUPCOM colonel and lieutenant colonel had briefed their detailed plans for supporting the operation. Decisions and staff coordination were made at the LOGEX, and personnel were not released until proper coordination had been completed. By the end of the exercise, every key player knew exactly what other players were scheduled to do in support of the overall plan. The LOGEX paid big dividends. Effective coordination was essential if both corps were to move without clogging the road network or allowing one corps to exhaust the available assets. The LOGEX is an outstanding example of how an exercise could serve to rehearse a complex logistical operation.

VII CORPS DEPLOYS FROM GERMANY

As soon as President Bush announced on 8 November 1990 that he was doubling the size of the force in the desert, the Transportation Corps prepared to help deploy VII Corps from Germany. On 12 November, the 2d Squadron, 2d ACR at Bamberg was loaded on railcars and moved to the European ports of embarkation. It was only the beginning of the massive deployment of a heavy corps, augmented by an infantry division from the United States. The VII Corps contingent from United States Army Europe (USAREUR), as reconfigured for the Persian Gulf deployment, consisted of 73,369 soldiers from the 1st and 3d Armored Divisions, 2d Cavalry Regiment; the VII Corps' combat service and combat service support units; and the 2d Corps Support Command with its five subordinate support groups.

Transportation planners from USAREUR arranged 465 trains, 119 truck convoys, and 312 barges to move the VII Corps soldiers to their ports of embarkation. From the Rhein Main aerial port of embarkation, 435 aircraft deployed most of the corps' soldiers to the Saudi Arabian desert. However, additional time was required to deploy the 48,600 pieces of corps equipment. One hundred nine ships transported it in a move plagued by breakdowns and delays. It eventually took ninety-seven days to deploy the entire corps.[24]

When it deployed from Germany, the 1st Infantry Division at Fort Riley, Kansas was ordered to "round out" the VII Corps. The 1st Infantry deployed a two-brigade task force from its own resources, along with 166 Reserve and National Guard units to furnish the required troops. Transportation planners in the United States had to get these assets to their ports of embarkation quickly.[25]

37th Transportation Group's convoy operations in the Federal Republic of Germany.

Over 49,000 U.S.-based soldiers, which included some 19,900 Reservists and National Guard troops, and their equipment, deployed on 143 aircraft and 31 ships. [26]

As troops and equipment from the United States and Germany closed on the theater, the transportation community finalized reception plans to disembark VII Corps and move it as quickly as possible to its staging areas. With war

imminent, time was critical. VII Corps implemented several programs to expedite processing personnel and equipment through the ports. The VII Corps had an ad hoc port support activity (PSA) headquartered at its "Hotel California" Dhahran, Saudi Arabia. The port support activity was responsible for monitoring the arrival of passengers at the King Abdul Aziz Air Base and at King Fahd International Airport, the arrival of equipment and supplies at the ports of ad-Dammam and al-Jubayl, and coordinating with movement control personnel for the forward movement of troops and equipment to their TAAs.[27]

VII Corps soldiers could not move into the desert without equipment, so the plan was to have them wait in warehouses at the ports for two to three days until their equipment arrived. Unfortunately, the plan did not go according to schedule. Air transport of the VII Corps into theater worked very efficiently and the troops arrived on schedule; however, the lack of sealift, and the numerous ship repairs delayed arrival of the equipment. Some units had to wait more than two weeks. At times there were more than 30,000 soldiers in a port waiting area originally built for a maximum of 17,000.[28]

As if the problem of synchronizing the sea and air flow was not enough, ship-loading operations at the ports of embarkation emphasized maximizing deck space rather than loading to maintain unit integrity. From a macro level, it made sense to use every bit of a limited sealift capability, but from the combat commander's perspective, the lack of unit integrity caused significant operational problems. It increased the time a unit needs to close in theater. An analysis of nineteen randomly selected combat arms and combat support battalions indicated that on average a battalion's equipment arrived on seven different vessels over a period of twenty-six days. Further analysis of six randomly selected combat service support (CSS) battalions indicated a greater dispersion. The average CSS battalion arrived on seventeen different ships over a period of thirty-seven days.[29] Personnel of the 3d Squadron, 5th Cavalry Regiment, 3d Armor Division, arrived in theater between 28 December and 1 January 1991 but did not clear the port until 9 February. Its equipment arrived on seventeen different ships.[30]

The population of the VII Corps reception camps exceeded the planned capacity of 17,000 soldiers in two weeks. By 9 January 1991, the camps had a population of 35,000 soldiers, raising concerns about sanitation, hygiene, and security.

The VII Corps guidance stated that a battalion could not sustain itself with less than 70 percent of its assigned equipment, which meant that units with 90

Intermediate staging base (ISB) housing soldiers waiting for equipment by ship.

percent of their assigned personnel had to wait as their equipment arrived piecemeal on multiple vessels.

The decision to ship on the basis of effective use of deck space had been made after a careful analysis and was chosen as the lesser of two evils. The main factor influencing the decision was the critical shortage of sealift assets. With adequate sealift available, shipping by unit would have been a viable alternative, but with severely limited resources, it was not. Other variables which influenced the decision were the marshaling and terminal operations at the sea ports of embarkation, the heavy reliance on breakbulk ships, and the lack of complete units ready at the ports of embarkation.

When VII Corps equipment finally began to arrive, transporters were faced with two additional problems. First, there were not enough HETs to carry the VII Corps armor to the tactical assembly area (TAA) in large unit lifts. The second problem was that the theater depended on a single road to transport the VII Corps to its jumpoff destination. Thus as the massive amount of VII Corps armor arrived and was off-loaded at the ports of debarkation, the capacity of the theater's heavy-lift capability was quickly reached. One of the few trucks in theater capable of transporting an M1 tank was the U.S. Army's HET.

As earlier noted, the United States acquired additional heavy-lift trucks from other countries, but most of the contracted trucks were unable to transport the M1A1 tank. Even the HETs had problems carrying them. During the midday heat, HETs had to stop often to keep their tires from exploding in the desert heat. The M747 trailer towed by the M911 HET had a rated capacity of 60 tons, while the cargo, the M1A1, weighed in excess of 70 tons. Those factors also contributed to the backup of VII Corps armor in the ports. The 1st and 3d Armor Divisions, under pressure to close on their tactical assembly areas, began road marching select units from the port to their TAA.

Initial plans called for echelon above corps HETs to move brigade-size combat units to the attack positions. With the shortage of heavy-lift assets, however, transporters quickly realized that moving by brigade or battalion-size lifts was impossible. Instead, movement was by company increment, which dramatically slowed the projected movement timeline.

The second problem was that the overwhelming portion of the VII Corps movement depended on a single Line of Communications, which was a two-lane, hard-surfaced road known as Tapline (Trans-Arabian Pipeline) Road or MSR Dodge. The traffic on Tapline Road was nonstop. Deploying units moved troops and equipment, while corps transportation units simultaneously moved sustainment and unit cargo day and night. The VII Corps deployment to its TAA thus competed directly with the other commands using the MSR. Even though VII Corps had movement priority on the MSR, sustainment cargo still had to go through to the respective logistics bases. General Frederick M. Franks Jr., VII Corps commander, best summarized the snags in the deployment process by stating that "these problems were certainly not caused by anybody's lack of motivation or unwillingness to do what was required. It was just the enormity—the size—of the operation"[31]

Throughout the deployment, theater and corps support commands were continuously called on to perform what sometimes seemed impossible. They disembarked the VII Corps through the ports of ad-Dammam and al-Jubayl, while simultaneously moving normal theater cargo through the same ports. Over 110,000 soldiers and the equipment of a heavy corps moved to their assembly areas in time to conduct field training in preparation for the ground offensive.

PHASE II - THE MOVEMENT OF THE TWO CORPS

Phase II, the movement of XVIII Airborne and VII Corps westward from the ports and coastal areas of Saudi Arabia was a significant chapter in transportation history. No U.S. Army force of its size had been moved in so short a time.

The initial guidance called for the two corps to start a simultaneous movement to coincide with the start of the air campaign, and the movement must have been completed within a 14-day period. The VII Corps would conduct a cross-country tactical movement using only its organic heavy-lift assets. The much longer XVIII Airborne Corps movement would be conducted over the highway and require considerable augmentation from echelons above corps (EAC) transportation assets.[32]

While the two corps were moving, as noted, sustainment cargo, had to continue to flow to the four logistical bases established in the early stages of the operation. Planners, however, felt strongly that a fifth logistical base was needed, and established Logistical Base Charlie in the extreme northwest portion of Saudi Arabia to provide logistical support to the XVIII Airborne Corps. When the Army component to Central Command (ARCENT) and 22d SUPCOM planners briefed General Schwarzkopf, his opposition to the fifth logistical base was clear. In order to mask the movement of the XVIII Corps to its final attack positions, no movement of forces in that area could be allowed before initiation of the air campaign, in order not to betray the movement of the two corps.

The transportation planning to support the move was intense. Of special concern was the ability of the theater to support the move of the XVIII Corps in fourteen days. However, after much analysis of different aspects of the move, transportation planners concluded that the entire corps could not be relocated in the fourteen-day time frame.

An alternate plan was devised, to move the XVIII Corps in 21 days and it was briefed to the theater commander in chief. Not wishing to see his plan delayed too long, General Schwarzkopf wanted to ensure the move would indeed be completed in twenty-one days and required the 22d SUPCOM commander to sign a document guaranteeing it. Schwarzkopf saw it as absolutely essential that the ground forces launch their offensive as soon as the air campaign concluded.[33]

The XVIII Corps move was massive. With an estimated 28,419 vehicles to move, the majority had to move under their own power. But lift requirements were still significant with, in all, 535 HET lifts, 1,793 lowboy lifts, and 2,815 flatbed lifts. These requirements exceeded the organic capability of the corps. Concern was expressed that the corps external lift requirements were so great because they included more than the doctrinal three days of supplies. The 22d SUPCOM plan called for SUPCOM to provide 280 HETs, 280 lowboys, and 500 flatbeds for a period of twenty-one days against the corps movement requirements.[34]

The movement plan called for the heavy-lift assets to use the northern MSR and for the lighter wheeled vehicles to use the longer southern route. The length of the MSRs meant that trucks needed three to four days to make a turnaround on the road network. Complicating the movement was the fact that both the northern and southern routes intersected at Hafar al-Batin and fed into a two-lane MSR for the remainder of the westward movement.

To ensure the smooth flow of traffic, movement control planners at the 318th MCA and SUPCOM staff used block times to control movements on the different MSRs.[35] Block times ensured that the VII Corps had adequate time to laterally cross the heavily used MSRs. Block times also allowed sustainment cargo to move along the MSRs to support the buildup of Logistics Base Charlie. Additionally, block times were essential to allow the engineers to repair the roads, especially the northern route.

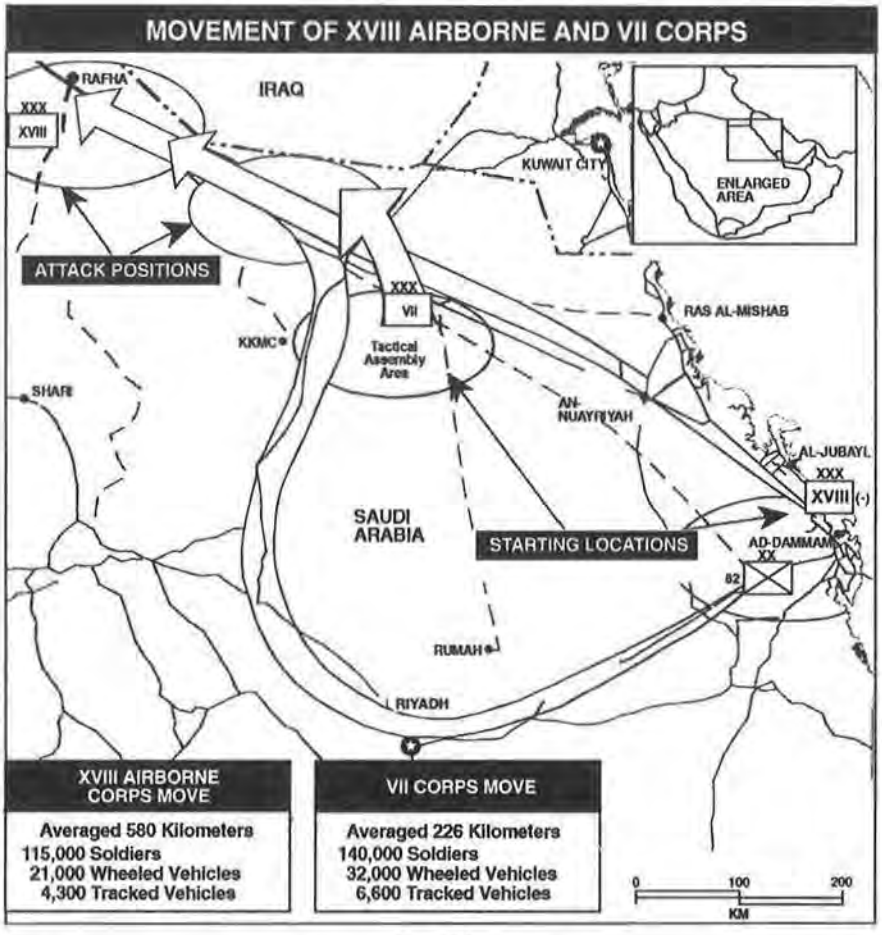
The 318th allocated the XVIII Airborne Corps sixteen consecutive hours per day on the northern route and two eight-hour blocks on the southern route. The corps movement control centers were tasked to ensure that corps movement plans supported the theater movement schedule. Transporters at all levels were briefed on the plan; then XVIII Airborne Corps conducted a movement exercise using a scaled board model and miniature vehicles, walking the different staff agencies through the entire movement. The MCC also did a practice run on paper. Like the 22d Support Command LOGEX, the movement exercise provided the key to success.

By 15 January 1991, it was obvious that Iraq intended to ignore United Nations Resolution 678, which called for an unconditional Iraqi withdrawal from Kuwait. After that date, the resolution authorized U.N. members "to use all necessary means" to bring about the Iraqi withdrawal.

At 0050, 17 January 1991, local time, coalition aircraft took off from multiple locations to commence the bombing of Iraq. Concurrently, President Bush addressed the nation and stated: "The liberation of Kuwait has begun....We will not fail."

In the early morning hours of 17 January, the two corps movement to jump-off position began. With the VII Corps shifting to attack positions and the XVIII Airborne beginning their road march up MSR Dodge, the road network was packed with moving vehicles. (see Map 41).

In the lead elements of the XVIII Airborne Corps were Transportation Corps soldiers assigned to both corps headquarters and the 1st Corps Support Command (COSCOM). A 7th Transportation Battalion advance party,



Map 41

commanded by Maj. Victor L. Nelson, was positioned in the lead element of the XVIII Corps movement forward.

Once XVIII Corps was on the Iraqi border, the 7th Transportation Battalion transported the corps' ammunition from its stockage area in King Khalid Military City (KKMC) to the newly established Logistical Base Charlie. As the movement continued, transportation units from throughout 1st COSCOM moved critical sustainment cargo to build Logistical Base Charlie into an installation capable of sustaining over 100,000 soldiers in combat.

By 7 February, the movement was complete. The Transportation Corps and the units it supported moved over 250,000 soldiers, 53,000 wheeled vehicles, and 10,900 tracked vehicles over 400 kilometers.[37] The success of this movement was due to three factors. First, the air campaign established air

supremacy and allowed the MSRs to remain free of interdiction, which meant a continuous flow of personnel and equipment to their objective sites. Next, the establishment of convoy support centers significantly enhanced the ability of the Transportation Corps to marshal and support the large convoys moving along the MSRs. Last, but not least, the spirit and determination of personnel engaged, particularly the truck drivers, provided the key to success.

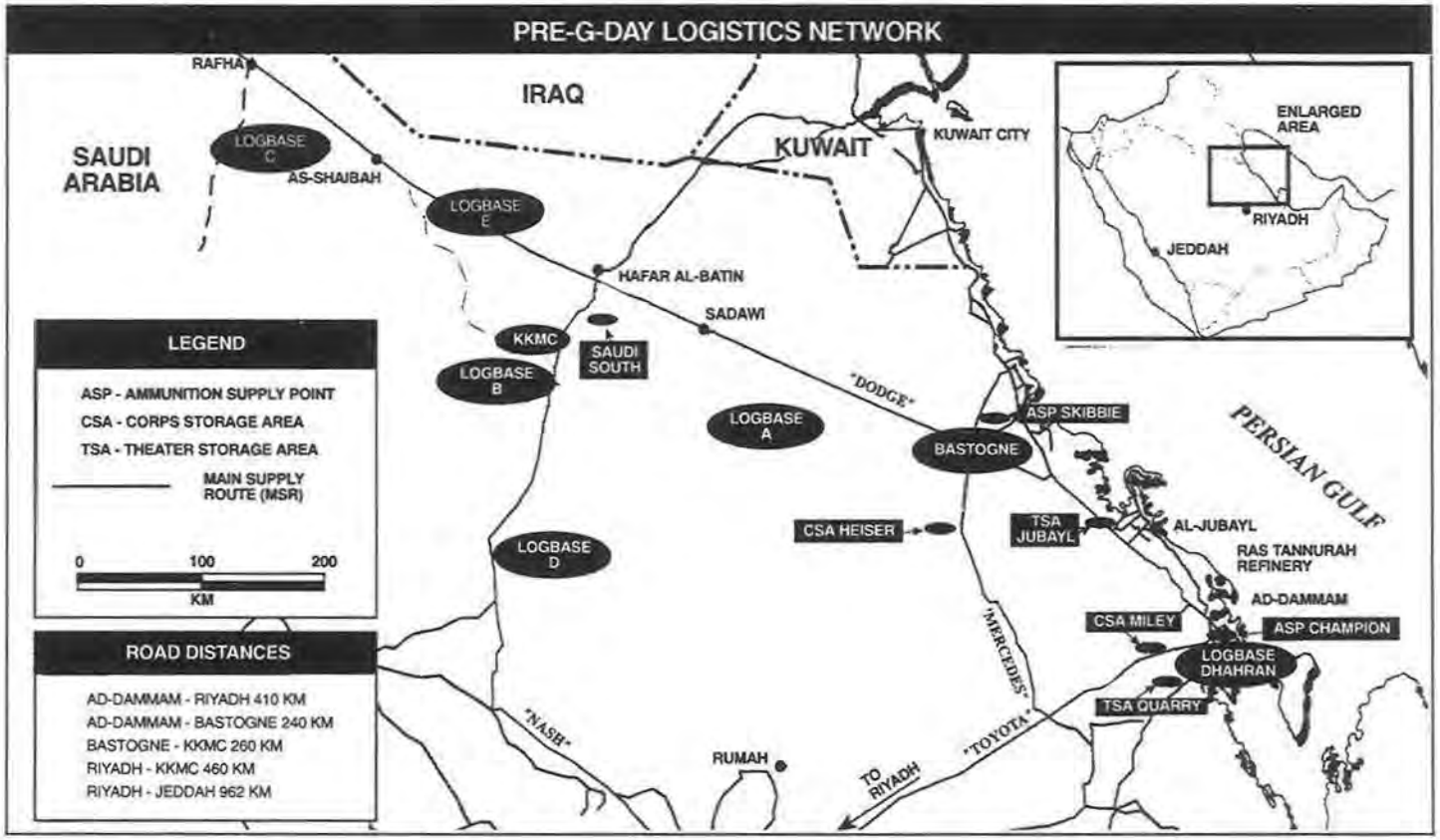
FINAL PREPARATIONS FOR THE GROUND OFFENSIVE

Arrival at their forward positions did not mean the corps were ready to engage the enemy. Critical supplies had to be brought forward to logistics bases to build up stockage levels before the initiation of the ground offensive. Theater and corps truck units, which moved day and night to transport the two corps into their positions, continued the tempo, hauling sustainment cargo to logistical bases. (See Map 42).

At theater level, 7th Transportation Group focused on the continued movement of sustainment cargo along the southern route, while the 32d Transportation Group hauled cargo along the northern half of the system. XVIII Airborne Corps trucks, assigned to the 1st COSCOM, continued to move supplies from XVIII Corps stockage areas in KKMC to Log Base Charlie. A large portion of this effort was devoted to moving the XVIII Corps' forty-five-day supply of ammunition. Around-the-clock transportation units from 1st COSCOM moved ammunition undetected up to the Log Base Charlie ammunition supply point just inside the Iraqi border. VII Corps trucks essentially performed the same mission for the VII Corps, moving critical supplies from KKMC to Log Base Echo.

The development of a forward landing strip (FLS) in the center of Log Base Charlie augmented the overburdened road network. Supporting the build up of the XVIII Airborne Corps logistics base, a one-mile portion of Tapline Road (MSR Dodge) was closed off and converted to a landing strip for C-130 aircraft. With the assistance of the XVIII Corps engineers, an MSR bypass road was cut out of the desert, allowing traffic to continue to flow around the flightline operations. The engineers also built an addition to the airstrip on the desert sand, which allowed waiting aircraft to park or position themselves for uploading or downloading.

The XVIII Airborne Corps FLS, operated by the 403d Transportation Company, had the mission of establishing a critical cargo transfer operation in support of a C-130 aircraft shuttle from Dhahran Air Base to the Forward Landing Strip during daylight hours. Soldiers from the 403d performed a unique


PRE-G-DAY LOGISTICS NETWORK
RAFHA
IRAQ
SAUDI ARABIA
LOGBASE C
AS-SHAIBAH
KUWAIT
KUWAIT CITY
LOGBASE E
HAFAR AL-BATIN
SADAWI
KKMC
SAUDI SOUTH
LOGBASE B
"DODGE"
LOGBASE A
ASP SKIBBIE
BASTOGNE
PERSIAN GULF
CSA HEISER
TSA JUBAYL
AL-JUBAYL
RAS TANNURAH REFINERY
LOGBASE D
AD-DAMMAM
CSA MILEY
ASP CHAMPION
"MERCEDES"
LOGBASE DHAHRAN
TSA QUARRY
"NASH"
RUMAH
TO RIYADH
"TOYOTA"
ENLARGED AREA
RIYADH
JEDDAH
LEGEND
ASP - AMMUNITION SUPPLY POINT
CSA - CORPS STORAGE AREA
TSA - THEATER STORAGE AREA
MAIN SUPPLY ROUTE (MSR)
0
100
200
KM
ROAD DISTANCES
AD-DAMMAM - RIYADH 410 KM
AD-DAMMAM - BASTOGNE 240 KM
BASTOGNE - KKMC 260 KM
RIYADH - KKMC 460 KM
RIYADH - JEDDAH 962 KM

Map 42

View of Tapline Road landing strip from a C-130 on final approach.

mission by actually staging incoming aircraft and downloading them with organic 10,000 pound capacity forklifts. Although these were both Air Force missions, the shortage of Air Force support personnel compelled the Army transporters to pick up the slack and run the flight strip. Once downloaded, cargo was staged in either the FLS pallet yard or break-bulk point. Segregated by major unit, the cargo spent very little time on the ground. Pallets destined for one unit or consignee were either put in the pallet yard or loaded immediately on 507th Transportation Group trucks. Pallets with multiple consignees were broken down at the break-bulk point and shipped either break-bulk or palletized to their final destination.

As the FLS operation continued, the flow of cargo intensified. Daily, more than 100 pallets of cargo were shipped from the FLS to final destination. Additionally, as the theater began pushing throughput cargo to the XVIII Corps, containers for single and multiple consignees began arriving by truck at the FLS. At this point, the 403d was operating a container yard in addition to downloading a continuous flow of aircraft.

Containers with a single consignee were then transported to the respective division support area (DSA). There, the DSA picked up the responsibility to unload the containers and push the cargo into the division. Containers in the DSA brought questions concerning how far forward containers should be shipped, and if the DSA was the ultimate delivery point, then where were they

going to get their container handling equipment. Neither of those questions were answered during Desert Shield/Desert Storm. As of the writing of this book, the problem was under analysis by the U.S. Army Transportation Center and School and the Combined Arms Support Command.

The Forward Landing Strip also served as a means to push emergency resupply of fuel into the area of operations. C-130s, loaded with 250-gallon fuel bladders filled with JP1, flew into the FLS. There the fuel was pumped into waiting heavy expanded mobility tactical truck (HEMMT) tankers and 5,000-gallon trailers staged beside the flightline. Fuel handlers coupled hoses from the C-130 wings to the waiting fuel trucks. As the trucks departed to carry the fuel forward, the aircraft returned for more fuel. Though effective for emergencies, this method could not have supported a major resupply to the two corps.

In retrospect, the XVIII Airborne Corps forward landing strip was a complete success. During its six weeks of operations, nearly 1,000 sorties were flown with an average ground time of twelve minutes. More than 9,000 short tons of supplies, 250,000 gallons of fuel, and 900 passengers were off-loaded. Additionally, the FLS was expanded to become an air medical evacuation point, mortuary affairs site, and a container drop point for host nation drivers.[38]

MASSING TRANSPORTATION ASSETS

One of the many success stories of Operations Desert Shield and Desert Storm was the massing of transportation assets to move large forces and significant amounts of supplies. With severe limitations on command and control due to the scarcity of communications equipment, transporters looked for innovative ways to support the movement of entire divisions into their attack positions. The concept was the transportation consolidation center (TCC).

The TCC concept was built around an ad hoc organization that commanded and controlled truck companies from several different commands, and that was collocated to facilitate control and centralize the support requirements of a Transportation organization of major size.

During Operations Desert Shield and Desert Storm, the TCC concept was used on three different occasions. (see Map 43). A TCC supported the relocation of the 1st Cavalry Division from its location near Pulaski Barracks to its tactical assembly area at KKMC. A second TCC was established to support the movement of the XVIII Airborne Corps from its Desert Shield locations to its TAAs in western Saudi Arabia. The concept was used for the third time to

support the redeployment of the XVIII Airborne Corps from the TAAs to the redeployment assembly areas (RAA) after the cessation of hostilities.

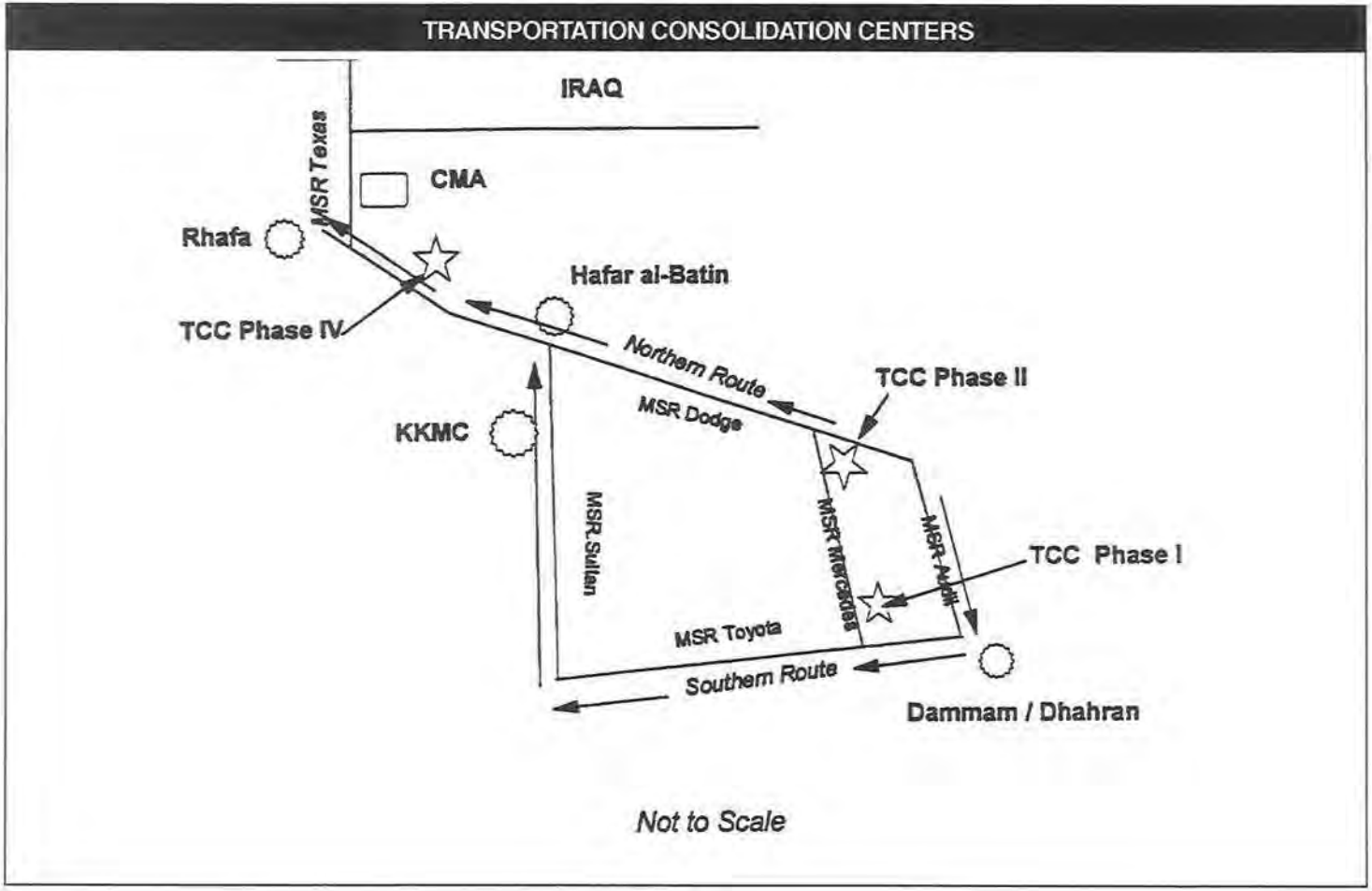
The 330th Movement Control Center, commanded by Lt. Col. John C. Race, set up and operated the Transportation Consolidation Center to move the 1st Cavalry Division, using its own organic personnel assets. Operating on little notice, the MCC brought together the leadership and expertise to orchestrate the move of over 6,740 vehicles. Included in that number were the 787 HETs and 1,259 tractor/trailer combinations that had been task organized to form the TCC.

According to Lieutenant Colonel Race, two significant lessons were learned from this operation. First, was the need for a formal command and control structure to run a TCC. Task organizing from limited personnel resources was taxing on existing organizations. Second, the lack of communications significantly impacted on the MCC's capability to control movements and pass on critical information.

Near the conclusion of the 1st Cavalry Division's move to King Khalid Military City, the TCC was told to begin the movement of the 3d Armored Cavalry Regiment, which was not part of the 1st Cavalry Division. Hampered by a lack of communications and the need to move two major units at the same time, weaknesses in the operation began to show. Trucks initially sent to the 3d ACR area never arrived, a circumstance never fully explained. Compounding the problem was the increased amount of truck turnaround time caused by the additional distance to the 3d ACR. The demand for trucks exceeded the supply, and the 29th Transportation Battalion, commanded by Lt. Col. Joel L. McGrady, was called in to provide not only the battalion's vehicles, but also the battalion headquarters to run the TCC operations. Upon arrival of the 29th, the 330th MCC returned to movement control activities.

The assignment was a tough task for the 29th. Like the 330th MCC, they were simultaneously involved with other operations and lacked the depth of personnel to adequately staff the TCC. With the MCC managing movement control and the 29th Transportation Battalion Headquarters controlling the TCC, the operation began to smooth out, and the 29th was able to get positive control of the numerous Saudi and French HETs. Unfortunately, communications still was a problem.

As if inadequate communications were not enough, the XVIII Airborne Corps priority of movement changed almost by the hour. The situation deteriorated to the point that the corps chief of staff had to approve personally changes to the movement plan. Unit requests for transport were made to the movement control team (MCT) at the transportation consolidation center. A


TRANSPORTATION CONSOLIDATION CENTERS
IRAQ
MSR Texas
CMA
Rhafa
Hafar al-Batin
TCC Phase IV
Northern Route
TCC Phase II
KKMC
MSR Dodge
MSR Sultan
MSR Toyota
TCC Phase I
Southern Route
Dammam / Dhahran
Not to Scale

Map 43

request was then transmitted to the movement control center and reported to the corps headquarters. Based on the impact of the change, the corps chief of staff would approve or disapprove the request. Even with these problems, the TCC effectively controlled the XVIII Corps move.

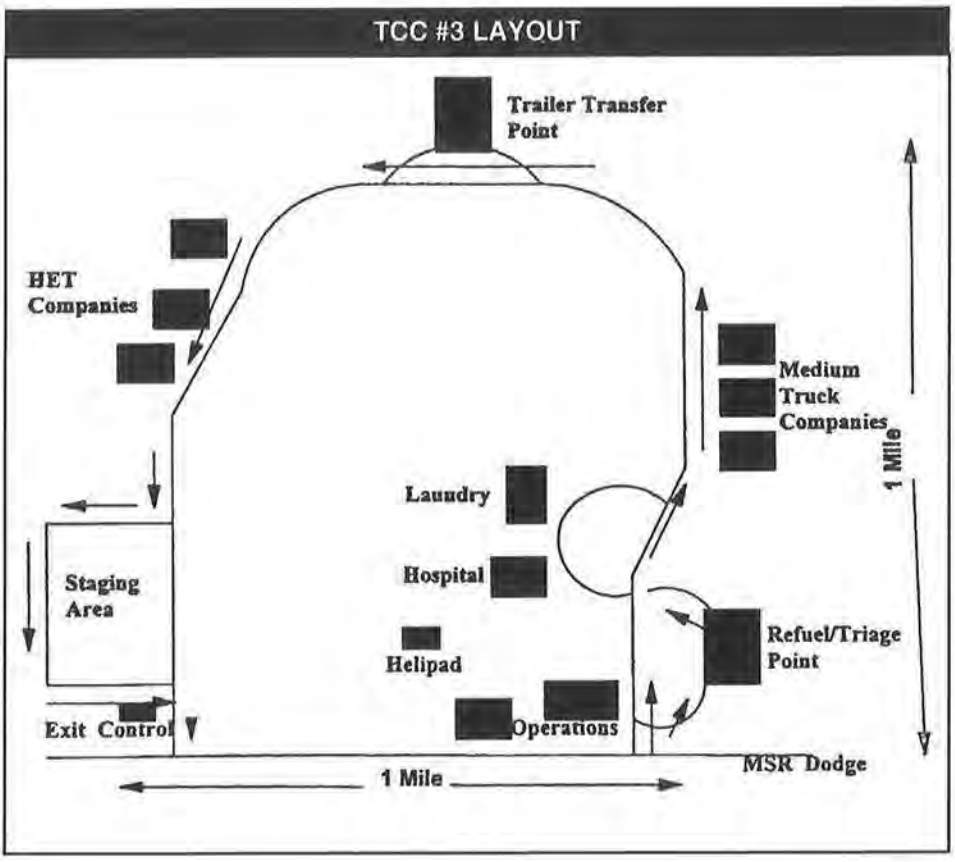
This initial success led transportation planners to use the concept for the XVIII Corps' redeployment to its redeployment assembly areas. The TCC took the XVIII Corps transportation truck assets and consolidated them with the 32d Transportation Group's echelons above corps truck assets, as closely as possible to the geographical center of the XVIII Corps tactical assembly areas. Run by the 7th Transportation Battalion, commanded by Lt. Col. Fredrick C. Perkins, the TCC was staffed by members of the 330th MCC, 507th, and 32d Transportation Group, and the 7th Battalion's organic staff.

In the middle of the desert, the TCC operated a self-contained, centralized truck motor pool, staffed with over 2,500 soldiers and twenty-two truck companies. It also had a Provisional Bus Company, which was established using host nation and U.S. soldiers to transport redeploying units to their departure airfields.

Drawing on the lessons of the previous two TCC operations, the 7th Transportation Battalion was given satellite, landline, and radio communications systems to coordinate with its customers. The 7th Transportation Battalion also studied the way it would lay out the TCC. Previous TCCs centralized the maintenance capability, but the 7th kept the maintenance capability at the company level. Like companies were colocated so the maintenance sections could coordinate their efforts. Each company was laid out identically, so visitors would know how to find the maintenance or operations center of any company assigned to the TCC. (see Map 44).

Taskings to move XVIII Corps equipment and personnel came from forward movement control teams or division transportation officers to the 330th MCC cell at the TCC. The corps MCC then prioritized taskings and passed them on to the TCC operations center, which had total visibility of truck assets and could task the appropriate unit with the mission. As shown in Map 44, fuel, repair parts, limited maintenance, recovery support, and life support were all centrally located within the TCC.

By centrally locating the transportation units and all required support in one area, the shortfalls associated with communications were minimized. At night, the TCC operations center conducted coordination meetings to ensure smooth operation the following day. Division commanders or their



Map 44

representatives could also stop at one central location for a briefing on the status of their move. The TCC concept meant the corps' movement was executed smoothly. In a three-week period, the entire XVIII Corps moved 30,000 vehicles and 1,200 containers over a distance of 350 miles. Transportation units assigned to the TCC amassed over 6 million accident-free miles in the relocation process.

"A TRAILER IS A TRAILER"

One of the most significant challenges for the theater during the preparation for the ground offensive was maintaining an adequate supply of M872 trailers at each of the key logistical sites to move sustainment cargo. With the sheer magnitude of the sustainment cargo movements, there was a general consensus that if enough trailers were available, the system would be self-sustaining. In other words "A trailer is a trailer." No matter who it belonged to, any truck driver could use it regardless of unit designation.

Unfortunately, this theory of loose control failed to consider human nature and the shortage of materials handling equipment. As the trailers moved cargo forward to the logistics bases, receiving units lacked the capability to unload the trailers. Combat units, expecting the movement requirements of the upcoming ground war, kept a majority of their supplies on these loaded trailers. Corps units stockpiled hundreds of U.S. Army trailers loaded with critical supplies. Two weeks before the ground war began, the 7th Transportation Group was missing nearly 2,000 trailers that had not been returned to the system. By early February, the shortage was about to bring the movement of sustainment cargo to a complete stop.

The theater's trailer problem was compounded by the lack of yard tractors assigned to the trailer transfer points. With the magnitude of ammunition moving throughout the theater, TTPs were routinely assigned to support a corps storage area (CSA) or ammunition supply point (ASP). The yard tractors policed empty trailers in the CSA or ASP and returned them to the TTP for maintenance. Moving the heavy volume of ammunition with an inadequate number of yard tractors meant the TTPs fell behind in trailer maintenance. Often, drivers who were told to bring back an empty trailer selected any trailer available, which meant that trailers with flat tires, unserviceable brakes, or no landing legs were hauled away only to be abandoned later. It was not uncommon to see unserviceable trailers scattered along the MSR. Instead of fixing flat tires, drivers simply unhooked their trailers and found the next serviceable one.

There was no way for the truck driver to tell the difference between a theater trailer or one that belonged to a corps, unless he or she could identify the trailer number and knew where that unit was located. To make matters worse, some units acquired trailers by painting over the original bumper numbers and adding their own. At the end of the war, supply sergeants and company commanders stationed at the theater redeployment reception points checked the serial numbers of trailers desperately trying to reestablish property accountability prior to redeploying.

The problem was perplexing, and transportation planners tried several different solutions. First, movement control teams were tasked with how to find out what was moving through the logistics bases. First destination reporting points (FDRPs) were set up at the entrance and exits of all logistics bases. Staffed by the Theater Materiel Management Center (TMMC) and augmented by military police, the FDRPs launched an all-out effort to account for the trailers moving in and out. Despite a significant effort, the FDRPs failed to solve the trailer problem. Lack of movements personnel, convoy control, multiple

destinations of trucks within convoys, and uneven turnaround times made it impossible to keep a detailed account of the trailers.

The next proposed solution to the trailer shortage problem was a theater movement program, which transportation planners called an apportionment plan. Essentially the plan identified all EAC transportation assets, the requirements those assets were committed against, the percentage of assets committed to various requirements, and the objective tonnage by unit to be moved.

The apportionment plan provided complete visibility over what was moving throughout the transportation network. Movement control teams tracked convoys from their point of origin to their final destination. Upon arrival at final destination, the convoy commander was required to report to the Movement Control Team/FDRP to find out if priorities or the status for the next mission had changed.

The apportionment plan provided commanders at all levels with the increased visibility needed to control the flow of supplies, change priorities and mass assets for a priority move. The only problem was that the development and implementation of this plan came too late. By the time the plan was implemented, the theater had lost control of over 50 percent of its trailers, and without them, an effective apportionment plan could not be implemented. The trailers had to be located and recovered. Teams of officers and senior noncommissioned officers were formed to hunt for the trailers. They flew over the corps area with video cameras trying to locate them. To no one's surprise, hundreds of trailers uploaded with ammunition were found in the corps sectors. Although the trailers were found, any large scale recovery was prevented by the start of the ground offensive.

Despite the problems encountered during the buildup of the logistics bases and the movement of two corps, over 300,000 tons of supplies were moved forward to the logistic bases. The ultimate test of how well the Transportation Corps performed its mission was decided by how well the combat soldier was supplied when the ground offensive started.

PHASE III - GROUND OFFENSIVE

By 24 February 1991, the U.S. Air Force had performed the lion's share of the single most intensive air campaign in history. Flying over 94,000 sorties, Coalition forces prepared the battlefield for what would be a lighting fast ground offensive against one of the largest armies in the world.

As the U.S. Army chief of staff's official history states: "At 0400 local time, G-Day, 24 February, two artillerymen hundreds of miles apart pulled the

lanyards on their howitzers to begin Operation Desert Storm. Across the CENTCOM front, 620,000 soldiers, marines, and airmen from more than 37 nations attacked an Iraqi force then estimated at 545,000 men. Offshore in the Gulf, Marine amphibious forces threatened a seaborne landing as the Arab joint forces command (JFC-East), a Saudi-led combined Arab force, attacked up the Khafji-Kuwait City highway. On their western flank, Lt. Gen. Walt Boomer's 1st and 2d Marine Divisions crossed the border to breach Fortress Kuwait. The Tiger Brigade, with its newly issued M1A1s, provided punch for the more lightly equipped marines.

Once the Marines cleared a lane through the Iraqi defenses, the Tiger Brigade took on the Iraqi armored reserves. Farther west, Arab JFC-North and VII Corps' 1st Infantry Division attacked the Iraqi security zone to clear out forward reconnaissance elements and artillery observation posts in preparation for the next day's attack against the main line of resistance. On the extreme western flank almost 400 kilometers from the coast, XVIII Airborne Corps attacked northward to seal off the theater."[41]

A new method of controlling the forward flow of logistical units was developed to ensure the combat success of the XVIII Airborne Corps. The corps marshalling area (CMA), offered a centralized facility from which to stage convoys, feed and billet drivers, and provide fuel and maintenance support to vehicles. The 507th Rear Corps Support Group, subordinate to the 1st COSCOM, assigned the CMA mission to the 7th Transportation Battalion. Located on MSR Texas, right on the Iraqi border, the CMA was capable of staging forty march units of twenty-four vehicles each. With thirty refuel on the move sites and numerous contact crews, the CMA released 99.9 percent of the staged vehicles into Iraq.

The CMA also had a significant impact on driver morale. Because of delays in clearing MSR Texas, some drivers had to to spend 24 hours in the CMA waiting movement clearance. While there, drivers were able to get hot meals, latrine facilities, and a place to sleep, so they could rest before their advance into Iraq. [42]

One factor that contributed greatly to the success of the ground war was the abundant stockpile of critical supplies that allowed combat forces to move rapidly during the ground offensive. Stocks established at the logistical bases before the ground offensive included roughly a 29-day of supply of food and water, a 5.2-day supply of fuel, and a 45-day supply of ammunition.[43]

The challenge facing the Transportation Corps was how to support the advancing combat forces during the ground offensive. The VII Corps needed

9,000 tons of ammunition and 2.4 million gallons of fuel per day. The XVIII Airborne Corps planned daily consumption rates that included 5,000 tons of ammunition and 2.1 million gallons of fuel. Transportation planners estimated that more than 1,700 trucks were needed to provide this level of support on a daily basis.[44]

The consumption rates, coupled with the long Line of Communications, exceeded the U.S. ability to resupply the combat forces. Consequently, planners proposed constructing three provisional supply bases (Golf, November, and Oscar), which were never needed. Behind the two advancing corps, engineers built roads which were essential to the resupply mission because the majority of the line-haul trucks were commercial type M915 tractors, which could not transport supplies cross-country. To augment ground transportation, the 7th Transportation Group developed a plan to operate a logistics-over-the-shore operation if a Kuwaiti port could not be taken and used.[45]

To support these plans, theater transportation planners assigned echelons above corps assets to support the advancing corps. The 766th Transportation Battalion, with its six medium truck companies, was in direct support of the VII Corps. The 185th Transportation Battalion, with its five medium truck companies, would support the XVIII Corps. In addition, the 369th Transportation Battalion with five HET companies and an Egyptian HET Battalion with 100 HETs were centrally located to respond to any heavy-lift requirements.

The theater assets, in direct support of the two corps, fell under operational control of the 32d Transportation Group. The other theater transportation group, the 7th Group, continued to move sustainment cargo along the theater's road network to ensure that the logistical bases maintained their critical program level of supply.

In addition to a road network, the XVIII Corps had envisioned the use of forward landing strips to fly critical supplies as far forward as possible. Transportation soldiers uploaded airfield packages and remained on standby throughout the entire ground offensive, should they become necessary.

When the ground offensive met with unexpectedly rapid success, the requirement for a mature transportation network deep in Iraq never materialized. But despite the short duration of the ground offensive, it was still necessary to keep the ground forces supplied. Trucks carrying critical supplies during the ground offensive and thereafter were greeted with heavy rains that quickly turned soil into quagmires. Despite the limited cross country capability of the M915 tractor, transporters were able to deliver their cargo. Not a single combat

Convoys returning from Kuwait with enemy prisoners of war.

operation was hampered for lack of supplies, a tribute to the Transportation Corps.

The overwhelming victory achieved by the coalition brought a new set of transportation challenges. Tens of thousands of surrendering enemy prisoners of war (EPWs) required transportation to be moved to collection points and eventually to EPW camps. Transportation planners had anticipated a rather high number of prisoners and had planned to transport them on returning ammunition trucks. However, because the ground offensive ended so quickly, most ammunition trucks were never downloaded. Transportation planners had to marshal all types of vehicles to move EPWs: buses, circus trucks and a variety of military trucks.[46]

The concept of providing dedicated echelons above corps transportation assets to each corps was extremely effective. The 32d Transportation Group, concentrated solely on the dedicated support of the two corps, and the dedicated truck battalions were very responsive to the corps movement requests. The 7th Group was allowed to focus solely on ensuring theater sustainment cargo moved from the theater ports to the forward logistical bases.

As the ground offensive came to a swift conclusion, the corps were left with gigantic stockpiles of unused supplies. Of the 300,000 tons of stockpiled

supplies, only a very small portion was ever used. More than 157,000 tons of ammunition had to be retrograded.[47]

REDEPLOYMENT CEASE-FIRE TALKS AT SAFWAN

The Central Command also tasked the Transportation Corps to transport the resources necessary to establish a facility to conduct the cease-fire talks, once it realized the war would end shortly. The 594th Transportation Company was tasked to transport the tents, tables, chairs, and a multitude of other ancillary items. With the main battle area littered with destroyed Iraqi equipment and the MSRs blocked, the 594th could not complete its mission by road. The 594th transported the supplies to the Kuwait International Airport, where Capt. David Koleda, operations officer for 1st Area Support Group, supervised the transfer of necessary items to CH-47 helicopters, which flew them to Safwan.

On 3 March 1991, General Schwarzkopf landed at Safwan airfield to conduct the cease-fire talks with Iraq. In addition to Lt. Gen. Fredrick Franks and other combat arms leaders, logisticians were also represented. The senior logistics commander, Maj. Gen. Pagonis, was present representing the importance that logistics played in the swift victory of the coalition forces. After negotiations, Schwarzkopf announced that Iraq had accepted all of the ceasefire terms and that Coalition prisoners would be repatriated in the next several days.[48]

With the rapid conclusion of the ground war to liberate Kuwait, the Transportation Corps found itself quickly inundated with the tasks both of retrograde of surrendering Iraqi soldiers and the support of the forward deployed forces in Iraq and Kuwait.

REDEPLOYMENT

Prior to the cease-fire talks, CENTCOM issued ARCENT initial redeployment orders. By the redeployment plan, it would take at least ten months to get U.S. forces out of Saudi Arabia. According to General Schwarzkopf's policy of "first-in, first-out," the XVIII Airborne Corps led the redeployment back to the United States, so that it could resume its worldwide contingency support mission. VII Corps forces relieved XVIII Corps until the final U.N. accords were complete. On 23 March 1991, VII Corps officially assumed the occupation mission in Iraq, allowing Lt. Gen. Gary Luck to begin redeploying XVIII Airborne Corps forces.

The ARCENT established five redeployment assembly areas near the major ports of embarkation in Saudi Arabia: at King Khalid Military City, Dhahran, King Fahd International Airport, al-Jubayl, and Doha, Kuwait. The assembly areas were used to support units while they prepared their equipment for storage or shipment and processed their soldiers for flights back to the United States and Europe. Each area had wash sites and provisional units to assist with cleaning and repairing equipment. Once the equipment was ready, U.S. Agriculture Department and U.S. Customs inspectors certified that the equipment could be processed for redeployment.[49]

The Transportation Corps mission was to move U.S. units from their tactical assembly areas to the redeployment assembly areas as rapidly as possible. Even though the two corps moved in sequence rather than simultaneously, the transportation support to line haul the units back to their RAAs was as intense as the initial movement to the ground offensive.

To speed the redeployment, the missions of the theater's two transportation groups changed. The 32d Transportation Group assumed the entire line-haul mission to provide lift support to the redeploying corps, while simultaneously moving the retrograde sustainment cargo back to the ports. It assumed control of all EAC truck assets on 1 April 1991, while the 7th Transportation Group focused on terminal operations.

As XVIII Corps redeployed from its TAAs, theater transportation planners were busy formulating a plan to move the massive amounts of sustainment cargo left in the logistic bases. They assembled representatives from the theater and corps MMC, MCC, Theater Army Movement Control Agency (TAMCA), mode operators, and various staff sections to identify the movement requirements and what EAC assets were available to their movement. They found that the trailer problem had actually gotten worse, and that only 20 percent of the EAC trailers could be accounted for. Also, not all the material managers were present, so that some of the movement requirements could not be identified.

Instead of creating a movements program, the theater created the Theater Distribution Center (TDC). Its purpose was to centralize the material management and transportation functions under one roof. The TDC had a material management section, a movements control section, and a mode operators section. All theater movement requirements were funneled through and coordinated by the TDC. Overwhelming trailer problems and the speed in which the entire redeployment process occurred, precluded the TDC concept from ever being fully implemented.

The theater's trailer situation worsened. The massive number of trailers uploaded before the ground war had been subsequently used to support the advancing corps. Trailers were hauled either cross country over the rough Iraqi terrain or along damaged MSRs in order to keep the two corps sustained. The net effect was a trailer fleet that was showing the strains of months of continuous operations. Most of the trailers that could be accounted for, were in questionable condition. The trailer maintenance program, developed by the theater in the early stages of Desert Shield, was never fully implemented or enforced, and the result was a trailer system that could not effectively support redeployment operations.

One reason the trailer maintenance system never worked was there was no pride of ownership or accountability. The trailers were not in a centralized trailer fleet, but belonged to the corps to which they were assigned. Without the ability to rapidly identify trailers, no one was held accountable for maintenance. Several units did a superb job maintaining the trailers they managed to control, but few units managed to control their own trailers, and they were only maintained by the units which owned them. The understaffed and overworked trailer transfer points were unable to pick up the slack.

In the redeployment as in the buildup, poorly maintained trailers littered the sides of the MSRs, and no one could really tell whose trailers they were without close examination. A color coding system assigned identifying colors to each group's trailers was proposed. The color painted along the headboard of each trailers would allow them to be identified easily. Unfortunately, this simple and, one would think, effective proposal was never implemented on a large scale.

The severity of the trailer problem was exemplified by the numerous mode operators who lost confidence in the TTP system. Drivers bypassed the TTPs to make deliveries to the final destination just to ensure they got their original trailer back. In one instance, an EAC convoy was forced to stop on the MSR by an officer who ordered the drivers to give him the trailers they were pulling. The trailer problem was never resolved and remained a problem for future transporters to solve.[50]

As the XVIII Corps redeployed, its organic transportation units deployed with it. With the corps redeployment, the EAC transportation units also drew down and redeployed. The final objective was to turn over the entire linehaul mission to contractors by 1 July 1991. To provide command and control of the contractors, a small cadre of transporters was left to operate the provisional 702d Battalion and its four truck companies. Unit equipment and retrograde sustainment cargo arrived at ports in Saudi and Kuwait, and the 7th

Transportation Group shifted into high gear to load it for redeployment to the United States.

When the 82d and 101st Divisions arrived at their assigned redeployment assembly areas, problems appeared. Without clear movement plans, units arrived at the RAAs as quickly as they could move from their tactical assembly areas. The uncontrolled flow of troops and equipment quickly inundated the washing and inspection facilities, resulting in additional confusion. Applying inconsistent standards, Department of Agriculture inspectors contributed to the confusion. When the Department of Agriculture finally did begin certification on 24 March 1991, two weeks after redeployment began, some inspectors certified equipment for shipment one day, only to have different inspectors reject the same equipment the next day.[51]

Redeployment loading procedures were significantly more stringent than those for deployment. During the deployment of equipment to Saudi Arabia, the Department of Defense had granted a waiver to combat load the vessels destined for the Southwest Asia theater. With the end of hostilities, that waiver was no longer in effect. USTRANSCOM reimposed peacetime requirements for loading equipment on the ships supporting the redeployment. Military Traffic Management Command and terminal service battalions loaded ships in order to maximize the use of space, rather than ensure unit integrity. As a result, some critical equipment, particularly things packed in shipping containers, did not arrive back at home station for months. These factors slowed the return of units to full combat readiness.[52]

Regardless of the constraints it experienced, the Transportation Corps demonstrated its ability to support a massive redeployment operation. Transportation planners estimated 400 ships were needed to move the large stockpile of equipment and retrograde supplies back to their points of origin in the United States and Europe. In total, over 1,386,308 short tons of cargo were redeployed including: 103,124 wheeled vehicles, 1,224 aircraft, 12,447 tracked vehicles and 26,062 containers. By any standard the quantities were staggering. With the theater's ship load capability, transportation planners allocated 10 months to redeploy the theater's supplies.[53]

Simultaneously, transportation units redeployed nearly 5,000 soldiers a day from the theater's aerial ports. In total it took 2,126 flights to support such a lift. Aircraft eventually moved over 300,000 personnel and 115,466 short tons of cargo. The Military Airlift Command provided the bulk of the airlift resources with 343 aircraft while the CRAF program accounted for another 117. Foreign aircraft accounted for an additional 113.[54]

There can be no doubt that transportation was the linch pin for the success of Desert Shield and Desert Storm. The Transportation Corps drove more than 50 million miles (over 196,000 per day), participated in the reception and discharge of over 8,860 aircraft, and discharged over 500 ships with 5,700,000 metric tons of cargo. The fact that the Transportation Corps was able to accomplish this in the face of equipment shortages, organizational shortfalls, and the chaos of a wartime environment in a hostile climate is a tribute to the corps well-trained and highly motivated officers, noncommissioned officers, and soldiers.

CHAPTER XV

The Evolution of Movement Control

Movement control, a wartime command function, is exercised to maximize the use of limited transportation capacities to accomplish the assigned mission within command priorities. It comprises the policies and procedures to plan, schedule, route and control the capacity of transportation resources to move people and material over lines of communication. Movement control is exercised to balance competing requirements against scarce resources, with cost considerations secondary. In peacetime, and in those wartime situations where transportation was adequate to meet requirements, the commercial term "traffic management" applies because the orientation of the function is on cost.[1]

The effectiveness of movement control is highly dependent on the capabilities of consignees in the lines of communication to receive and unload cargo promptly, a function of their manning, equipment, training, and ability to identify the contents of shipments. Therefore, movement control is inextricably linked with asset intransit visibility. It helped logistical operators unload cargo promptly, release transportation assets for reuse, and reduce duplicate requisitioning and shipping of items that were on hand but not identifiable for issue, a situation which generated excess cargo and wastes transportation resources.

HISTORY OF MOVEMENT CONTROL OPERATIONS AND DOCTRINE

Army movement control doctrine is a product of over sixty years of evolution. Begun in 1932, it was refined during World War II and in numerous other conflicts. In every one, transportation requirements exceeded capabilities, requiring centralized control of available transportation resources.

In the United States during World War II, the Chief of Transportation exercised movement control for the Commander, Army Service Forces, by closely controlling passenger and freight movements. All movements of forty or

more passengers (one coach load) or one carload of freight had to be cleared with the Traffic Control Division. Oversea movements of troops and equipment were cleared with the Movements Division. These divisions provided shipment routing and scheduling releases while other controls were exercised over small export and express shipments, and oversized loads. As the war progressed, the Chief of Transportation delegated release authority for selected movements to zone and post transportation officers. He also established holding and reconsignment points and personnel staging areas to serve as surge tanks for the ports, reinforce releases, and take care of emergency congestion of ports of embarkation. Controls were exercised to prevent the congestion of overseas ports, based on information from the theaters. Other measures were implemented such as consolidating small shipments into carload or truckload lots, and programs that increased the average size of a carload from 24 tons in 1941, to 30 tons in 1945, improving the capacity of available transportation. Movement control operations in the zone of interior did not solve all the problems engendered by shortages of transportation capacity, but did a remarkable job in supporting the theaters and maximizing the use of transportation assets.[2]

Because they did not want to conflict with the existing British movement system, U.S. Army forces, that were deployed to the United Kingdom in 1942 modeled their organization on the British system of movement control. It was a logical choice. Britain was already at war and its transportation system was strained, but the British system worked. Eventually, that system became the base line for future U.S. movement control doctrine.

The British assigned responsibility for military movement control to a directorate of the Quartermaster General's office that operated at the same level as the general staff sections of operations and logistics with the same authority. British doctrine stressed the importance of adhering to a Movements Program, published by the theater Army logistical commander. The program allocated specific transportation capacity to principal shippers of people and cargo for a specified period of an operation, and precluded use of transportation capacity for unprogrammed movements. Standardized procedures, augmented by periodic directives, gave British movement control officials authority to use all measures necessary to implement the movement program.

The U.S. model for operations on the Continent kept responsibility for control of shipping under the Communications Zone G4, and decentralized control of most transportation operations to subordinate sections which exercised movement control within their assigned areas. The decentralization of movement control did not end until 1 January 1945, when the first movement program was

prepared by the Chief of Transportation and issued by the G4, following the success of allocating capacities of the Red Ball Express on a daily basis in August 1944. The lack of centralized control of all transportation capacity for long hauls was a major weakness of transportation operations on the Continent.[3]

The adoption of British movements control concepts was not universally accepted by U.S. commanders and headquarters. Too many commanders felt it was a limitation of their authority to control their own resources. Inevitably, these concerns led to friction which undermined the effectiveness of efforts to plan, execute, and control movement in the theater. In some cases, there were serious repercussions. During the invasion of France, bad weather threatened to cancel the entire operation. The situation cleared, but the English Channel remained too rough for some of the smaller craft. This eventuality was foreseen by the planners who issued an alternate plan reflecting the reduced lift capacity. Unfortunately, many commanders afraid of being left behind, adhered to the original plan, refusing to consider the revised one. They accepted neither directions nor advice from movement control officials, and moved their units into the concentration and staging areas without authorization. They inundated processing facilities to the point that entire units unable to move were sleeping in their vehicles parked along city streets. In a frantic effort to unscramble the congestion, hundreds of combat troops and vehicles were embarked for France without regard to proper documentation, priority, or beach destination.

For the first few days of the invasion, the Joint British-American Buildup Control Organization attempted to implement the invasion embarkation program but was overwhelmed by units ignoring plans, and tactical commanders in France changing priorities. Many units on the French shore could not be identified, so the commander of the invading forces sent a special team back to England to sort out which units had deployed and which had not.[4]

The unwillingness of field commanders to support movement control stemmed from their lack of understanding of the concept and the fact that the Transportation Corps was so new it did not have the prestige to enforce a movement plan. The armies on the Continent were provided sufficient transportation support by the sheer volume of resources and by the innovations and dedication of transportation operators. Transportation support operations would have been much more efficient if full authority over all linehaul transportation capacity had been established from the outset.

Organizational changes in the Army following World War II also have had a significant effect on movement control. During the war, The Oversea Supply Divisions (OSD) and the staging areas of the ports of embarkation were under

the operational control of the Chief of Transportation. Additionally, the Army controlled a significant portion of military ocean shipping assets.

After the war, the OSD and the staging areas were transferred from the CofT to the Army G4 and G1, respectively. The Army Air Force, which had controlled the aerial ports and airlift resources during the war was, now "de facto" a separate service. Additionally, there was a move to inactivate the Transportation Corps at the end of the war as had been done after World War I. Fortunately, the Transportation Corps was not inactivated, but it was not made a permanent branch of the Army until 1950. The Army G4, Movements Branch, was dissolved and its functions transferred to the Chief of Transportation in May 1950. Other changes within the Army after World War II also affected movements management. The Army Transport Service (ATS) was transferred to the Navy, where it became the Military Sea Transport Service (MSTS) and the Military Air Transport Service (MATS) became a subordinate command of the new U.S. Air Force. Both are forerunners of today's U.S. Transportation Command. These changes significantly affected the procedures the Army followed to obtain transportation lift.

THE KOREAN WAR

With the beginning of the Korean War and the rapidly increasing demand for overseas shipping, the loss of the deep water shipping capability to the Navy complicated the Department of the Army's movement planning, since it now had to coordinate with several agencies to strategically deploy its own forces. This shifting of assets and realignment of transportation organizations, previously under the Transportation Corps, accentuated the need for effective movement control procedures.

Many of the shortcomings of World War II were also apparent in Korea. The Japan Logistical Command (JLC) served as the Korean "communications zone" by processing all supply requisitions to the United States and controlling movement of shipping to Korea. In Korea, the 2d Logistical Command (also known as the Pusan Base Section or Korean Base Section) was the only logistics support section with responsibility for movement control behind the 8th Army rear boundary. Eighth Army G4, and assigned logistical units operated as the equivalent of an advance section. The Korean Communications Zone (KCOMZ) was activated in August 1952 with boundaries contiguous with those of the 2d Logistical Command, and administered prisoner of war, civil affairs and Military Railway Service (MRS) subordinate commands. The 2d Logistical Command continued to process requisitions to JLC through technical service depots;

however, KCOMZ activated the 425th Transportation Traffic Regulating Group with field transportation movement offices to execute the Korean theater movement control programs.

At the port of Pusan, early in the war, ship discharge often exceeded the capacity of land transportation, particularly rail, to move people and cargo out of the port. The resulting backlog was moved to the appropriate technical service depots, established to store theater stocks. The depots were located around Pusan Harbor where clearance was by barge, truck, and rail. The depots were unable to receive cargo as fast as the ports could clear it because of the lack of intransit asset visibility. Simply put, there were not enough people, material handling equipment, or storage space to allow the depots to sort, catalog, and store the cargo in the time allowed. Congestion quickly resembled that at the port. The backlog of ordnance stocks was so overwhelming that the depot relocated and started a new operation elsewhere, leaving stocks to be identified and sorted later.[5]

Combat units stationed "expediters" at the port and depots to ensure needed supplies moved forward, a practice also common in World War II, Vietnam, and again in Desert Shield and Desert Storm.

Operation of the ports was also hampered by the lack of control of the Military Railway Service resources. Rail was used not only to move supplies directly from port areas to combat zone railheads, but also for clearance of cargo to main depots in the vicinity of Pusan and Ascom City between Inchon and Seoul.[6]

Slow unloading of rail cars in the forward areas depleted their availability to the point that port clearance and forward movements were severely constrained. The 2d Logistical Command put into effect a policy requiring a car to be unloaded in the forward areas for each car loaded at the ports or depots. That command also developed a new freight movement program which was issued in December 1951, improving the efficiency of rail usage.[7]

Nevertheless, periodic shortages of railcars delayed forward movement of classes I, III, and V, which were the most frequent items shipped directly from the ports. Once again, port congestion could only be relieved by clearing cargo to local depots, already congested from the buildup and storage of theater stocks. As combat operations stabilized and requirements became less volatile, rail capacities also increased and were generally able to meet movement requirements.[8]

Until the establishment of the KCOMZ, no agency in the Korean theater was authorized to develop a comprehensive theater movements plan. More

importantly, there was not an agency to support overall theater transportation needs or coordinate use of the transportation assets of subordinate commands. Instead, each commander was responsible for movement control in his respective areas and maintained control over his organic transportation assets. Routinely, these commanders prioritized their own transportation needs above all others, thus reducing the assets available for theater-wide use.

The problem of centralized control was not solved during the war. As late as 1957, movements doctrine had the Transportation Corps Officer of each headquarters under the G4.[9]

The Transportation Corps officer was responsible for planning and controlling movements performed by any mode of transportation made available to that command. The doctrine had movement control commanders responsible for the command and administration of their soldiers, while operational control fell under field transportation officers. Therefore, movement control personnel would answer to two chains of command which might have different priorities. These problems, coupled with the lack of centralized control of transportation assets, served as the impetus for the Transportation Corps Combat Developments Group study titled, "A Study for the Establishment of Doctrine, Procedures, and Techniques for Future Operations", conducted during late 1956 to early 1957. The study highlighted numerous movements control problems and provided recommendations that served as a foundation for modern movements doctrine.

It recommended the control of movements be realigned to and centralized at the highest level possible within the Field Army, and included a Field Army Support Command responsible for the centralized control of transportation assets for the theater (Field Army). These changes were eventually incorporated into the Army's movement doctrine. By 1965, the Field Army consisted of up to three Corps with four divisions each, with the responsibility for movement control assigned to the Army headquarters. The Field Army movements control assets included a movement control center (MCC) and up to seventeen transportation movements offices (TMO).

The MCC was assigned to the Transportation Brigade in the Field Army Support Command (FASCOM) but operated in conjunction with the Transportation Branch of the FASCOM Assistant Chief of Services to manage the movement of personnel, materiel, and supplies in the Field Army area.[10]

The TMO, a subordinate unit of the MCC, was a small unit staffed in accordance with its mission. TMO "A" was the largest of the four types, with two officers and seven enlisted men. They were assigned to the Corps Support

Brigade Headquarters or the Field Army rear area. Transportation movement offices "B" through "D" were progressively smaller with "D" having only four enlisted personnel. The TMOs were strategically located to cover all critical transportation points within the Field Army sector.

VIETNAM

The 1957 combat developments group study recommendations were essentially the doctrine the Army used in South Vietnam once movement control was in place. Until September 1965, no coordinated movement control agency existed, and air transportation was managed at the local level by individual Air Traffic Coordinating Offices, located at various aerial ports. Water transport requirements were sent directly to the MSTS Far East, and highway transport needs were met by local support elements. Localized and decentralized traffic management wasted transportation resources and prevented the most efficient use of theater transportation assets.[11]

In September 1965, Commander, U.S. Military Assistance Command, Vietnam (MACV), established a joint Traffic Management Agency (TMA) under the staff supervision of the J-4, which became operational in early 1966. By 1968, the TMA had an operational strength of 400 personnel and was organized with a directorate staff and five movements regions. The TMA communicated directly with numerous agencies to effect the shipment of cargo from CONUS to Vietnam. Additionally, they managed common user asset capacities in-country to assure optimum use. The TMA received transportation requests from units in the theater and compared assets with requirements. If a shortfall existed, they worked to solve it.

The effectiveness of the TMA improved as the theater stabilized, but a study by the Department of the Army and U.S. Army Pacific Transportation Command in February 1968, revealed that there was limited overall movements management of Army owned transportation assets. There was no control at the level at which total capability could be matched to priority for movement. In practice, the MACV Component Services each managed their own resources. The study concluded that a movements control system could be established if the theater assigned movement control organizations according to doctrine (e.g., Movements Control Agency at the 1st Logistical Command level and subordinate movement control centers at the two other major support commands, Qui Nhon and Cam Rahn Bay). These recommendations were never implemented and the theater continued to lack an effective Movements Control System.[12] Nevertheless, the compartmentalization of operational areas

in Vietnam and the general adequacy of transportation lift offset the weakness of the movement control system.

By 1970, many of the lessons of the early period of the war in Vietnam were included in Army movements doctrine.[13] The Transportation Movement Control Agency (MCA) evolved and was designed to operate the Theater Army Support Command (TASCOM) MCA. The MCA was to provide movements management within the communications zone (COMMZ) and between the COMMZ and the Field Army. After a restructuring of the Army, movement control centers were made organic to the Corps Support Brigades. In the late 1970s, the Army developed the Army 86 designs - to further evolve as the Army of Excellence in 1983, and developed its Active Defense doctrine in 1976. In 1982, a new doctrine known as AirLand Battle, permanently changed the perception of the modern battlefield, which became wider, higher, and deeper.

In the early 1970s, the field army was eliminated, and the corps became the Army's largest organizational unit capable of indefinitely sustained tactical operations. Changes in the movement control arena reflected evolving theater organizational concepts.

The MCA was assigned directly to the echelons above corps, or theater army, commander, and became responsible for all movements in the COMMZ. Subordinate Regional Movement Control Teams (RMCT) performed missions similar to those of the TMO. No other movement control assets were assigned at the theater level. In the combat zone, movement control responsibilities were assigned to the corps. All movements within the corps sector were managed by a Movement Control Center (MCC) located in the COSCOM. Both heavy and light divisions had a movements control officer (MCO) assigned to the division transportation office to oversee movements in the division sector and coordinate with the MCC for external lift assets when requirements exceeded organic transportation capability. The MCC was also assigned movement control teams (MCT) to oversee transportation operations at key transportation points and act as local points of contact for subordinate units with external lift requirements. The teams served as the MCC's eyes and ears for the transportation network throughout the corps area.

After the early-1980s, operational doctrine evolved rapidly from Active Defense to AirLand Battle to force projection, but movement control doctrine changed little since it was adequate to meet the needs of the Army, regardless of the operational requirements. On the ground, however, there was never enough communications equipment or trained personnel for it to be implemented adequately.

DESERT SHIELD/DESERT STORM

During the Gulf War, movement control units lacked the appropriate type of communications equipment to control movements on a widely dispersed battlefield. Their few organic FM radios lacked the range to communicate along 500 mile main supply routes. The most serious deficiency was the unwillingness of theater planners to place the MCA in the theater's highest headquarters where it could effectively control transportation theater-wide. In Operations Desert Shield and Desert Storm, the MCA was assigned to the 22d Support Command (SUPCOM) instead of theater headquarters. This was similar to the organization in Vietnam and had a far reaching negative impact on the effectiveness of the theater's transportation network. Movement programs were not promulgated at theater level. Transportation policies published by the MCA were routinely not followed by corps and major subordinate commands at echelon above corps (EAC). Definitive transportation priorities based on current tactical and logistical situations were not established.[14]

The experience in Southwest Asia proved that an MCA assigned to a support command did not have the authority of one assigned to a theater headquarters. Movement directives issued by a commander junior to corps commanders, instead of by the theater commander, did not have the same authority, and the effectiveness of the movements program suffered. When assigned to the support command, the MCA was unable to control all the transportation assets in the theater. It lacked "jurisdiction" and became caught up in the routine operations of the support command itself. One of the results, prevalent in World War II, was the perception of tactical commanders that if movement control were inconvenient, it could be ignored.

The assignment of the theater MCA to the 22d SUPCOM, the lack of adherence to movements doctrine, and insufficient communications resulted in movements control not being practiced at theater level. In a geographically dispersed theater with a significant shortage of transportation assets, an effective movements control system was essential for the theater to capitalize on its transportation resources. The only reason the theater did not suffer from this oversight was the massive quantities of transportation capacity made available, the resourcefulness of the transportation community, and the short duration of combat operations.

The need for movement control did not end with hostilities; it continued to be necessary. When the Desert Storm ground offensive abruptly ended, no theater movements program existed to redeploy combat units from their

northern attack positions. Without clear guidance, units gathered available transportation assets and redeployed to their designated redeployment assembly areas (RAA), overwhelming both the main supply routes and support infrastructure.[15] The situation was not unlike the confusion caused during the initial Overlord assault on France in 1944.

Coinciding with corps movements to their RAA, were theater actions to retrograde excess sustainment cargo. The 22d SUPCOM, aware of previous movement control shortfalls, held a coordination meeting between the material and transportation managers as well as the mode operators to develop an apportionment (movement) program. Plagued by poor theater trailer accountability, which precluded reasonable estimates of transportation capacities, planners could not develop a movement program.

Instead, planners created a new organization, the Theater Distribution Center, to facilitate communications between the material and transportation managers. The new organization performed a mission similar to that of already existing units, but put material managers, movements personnel, and mode operators under one roof, with the intent of fixing an inefficient movement control system and ensuring effective communications among all the key players. The poor signal equipment available for communications between managers and operators in the field, and the material managers' difficulties in identifying lift requirements, severely limited the effectiveness of the new organization.[16] The Theater Distribution Center was a temporary fix to a systemic problem. The need for a strong theater movement control agency, with state of the art communications assets was never so obvious.

In spite of the shortfalls in movement control, the Army conducted battlefield movement of major dimensions, just prior to Desert Storm. After the war, U.S. forces redeployed to their home bases in record time. These successes were a tribute to resourceful transporters who were not afraid to innovate to accomplish the mission.

The movement control function is one of the most important aspects of U.S. Army and Department of Defense transportation operations. Despite the fact that movement control increases mobility, the essential ingredient to the success of any military operation, the concept remains neither well known nor understood outside professional transportation circles. The downsizing of the Army in the 1990s and the increase of U.S. based strategic deployment forces makes the movement control function even more critical because it is the only way to maximize U.S. military transportation resources. In the multi-service environment in which Army forces would be deployed throughout the world, the

exercise of movement control became, a joint function, making it even more crucial than it was in the past. Movement control is managed by the Secretary of Defense and the Joint Chiefs of Staff, or a joint theater commander, under Department of Defense directives and regulations, such as Transportation and Traffic Management, and Standard Transportation and Movement procedures.[17]

Movement Control might be exercised by an allied combined command, with added coordination complications. Most U.S. transportation assets for force deployment were in the 1990s controlled jointly. There is only one "transportation system" to support all the services, since no one service has the capability to control all the transportation resources needed to execute assigned missions.[18]

Movement control has been a "lesson learned" in every conflict in which the U.S. Army has been involved in the since the 1940s and has been quickly forgotten as soon as the conflict ended. It is a lesson that needs to be taught to every officer and NCO, regardless of branch. Transportation is the single most critical combat support asset on the battlefield and there are never enough assets to do everything at once. The only way to maximize this scarce resource is through movement control. In future conflicts, movement control units must be adequately staffed and provided with the right equipment to accomplish their missions. The movement control agency must be located at a level at which it has the authority to program and control theater transportation assets while providing the senior commander with up-to-date transportation guidance. Without adequate movement control measures, it will be difficult for the Total Force to win against a determined adversary.

CHAPTER XVI

Challenges for the Future

OVERVIEW

After more than 200 years of outstanding service to their country, U.S. Army transporters can take justifiable pride in their accomplishments. From the Revolution to World War I, the War Department and the Quartermaster Department (QMD) were forced to create a transportation corps from whole cloth every time the nation went to war. In 1918, the War Department established a Transportation Corps because it realized that the nation could neither defend itself nor project its power beyond its shores without an existing corps of trained transportation specialists who knew how to mobilize troops, equipment, and supplies, transport them to the combat arena, and then get them home when the war was over. Unfortunately, the Transportation Corps created in 1918 lasted only two years and was not resurrected until 1942 when the United States found itself involved in the largest, most widespread war in history. Despite the Corps' achievements in World War II, some still considered it a temporary organization. It is a tribute to Congress and President Truman that they realized the value of a permanent Transportation Corps and made it a fact in 1950. Thereafter, it exceeded even the considerable accomplishments of its predecessors.

"War is chaos" is a familiar adage and a fact evident to whomever participates in war. Although no military element can do more than abate the chaos of war, it is the mission of the Transportation Corps to turn that chaos into useful order. One only has to look at Tampa Bay in 1898 and Operation Desert Shield in 1990 to throw the requirement for a Transportation Corps into sharp focus.

At Tampa in 1898, chaos reigned. The port was selected for its proximity to Cuba, not for its capacity to embark troops, equipment, and supplies. Trains arrived without bills of lading or manifests, and no one knew which units were assigned to which ships. The commanding general had to set up his office on a packing crate at the only pier in the port and use combat troops to straighten out

the mess because no Quartermaster troops were available and a Transportation Corps did not exist. The debarkation in Cuba was little better.

In Operations Desert Shield and Desert Storm chaos existed but did not reign. Intransit visibility was limited and movement control was only marginally effective, but the trained members of the Transportation Corps made the difference. They cleared backlogs, expedited shipments, and rapidly forwarded critical cargoes. The redeployment phase of The Gulf War occurred with too little notice and staff planners were unable to react with alacrity. But trained transporters stepped in to facilitate the redeployment of units to U.S. Army Europe and to the United States in a way that won them high praise.

As evidenced by the difference between Tampa and the Arabian Desert, training, organization, mission orientation, and the use of new technology have made the Transportation Corps a war winner. But, regardless of new technology and organizations which have evolved over the years, the Transportation Corps faces issues that have been transportation concerns since the War for Independence. They exist regardless of technology and are only mitigated by the performance of trained transporters. Such issues are personnel, equipment, intransit asset visibility, movement control, and leadership.

PERSONNEL

There have never been enough trained transporters and transportation specialists in wartime. It a simple and telling fact that in every war from the Revolution to Desert Storm, with the exception of Vietnam, combat soldiers had to be trained as transporters to make up for the lack of transportation personnel. In addition, specialists were drafted from civilian life and contractors hired to make up for shortages. The 18th and early 19th century attitude that commercial carriers could take care of all the Army's movement needs proved fallacious. Even farsighted planners like Quartermaster General James O'Hara, who understood the limits of the contracting system of the late 18th Century, found himself disappointed by the unnecessarily slow response after the contractors were paid. In the end, soldiers had to be used as stevedores, teamsters, and clerks to ensure supplies and equipment were transported to the correct destination. The advantage of military control of transportation assets was admirably demonstrated by Thomas S. Jessup, who was Quartermaster General from 1818 to 1860, and his successor, Montgomery Meigs who served from 1861 to 1882. These two brilliant organizers controlled transportation from the Seminole War to the last stages of the Indian Wars, but even they had problems with the contracting system. Meigs was able to make the system work

during the Civil War. Military officials were responsible to oversee transportation from the national level down to the division. Thousands of troops were called upon to perform transportation- related duties, including building, repairing, and running railroads in occupied areas.

After the Civil War, the Quartermaster Department was reduced along with the rest of the Army, and transportation responsibility was passed on to regimental quartermasters who were regimental officers for whom supply and transportation were one detail. The system was workable only in a static situation involving small forces. The Spanish-American War demonstrated the fallacy of neglecting transportation and reducing its capability. In the debacle of the loadout at Tampa Bay, Secretary of War Alger's simplistic view that the problem could be solved by using 20,000 men was indicative of that neglect. In the campaigns in Cuba and the Philippines, soldiers with mule-skinner and teamster experience were taken from combat units for transportation duties. Fortunately, the deficiencies of operating without transportation expertise, as observed by the Dodge Commission, helped establish a permanent transportation infrastructure in the Quartermaster Department. World War I would demonstrate beyond any question that transportation expertise and trained transporters were necessary in the conduct of war in the 20th century. Throughout that war, there was a critical shortage of stevedores, teamsters, railroad men, and later, truck drivers. The need for transporters in World War II was even more critical than in World War I. Training truck drivers was a major priority throughout the war, and drastic conversions of units were necessary to meet the need. Stevedores were constantly in short supply, and in many cases port operations would have been curtailed had it not been for available civilian labor. Railroad men were lacking, though the Railroad Affiliation Program saved the day by providing huge numbers of trained railroad men to the Army. But that antidote had its price, since both the Army and the railroads had to draw their expertise from the same pool of trained men.

In Korea, the story was a reprise of World War II. There were inadequate numbers of truck drivers and rail and terminal service personnel. The price was paid in port congestion and late shipments. In Operations Desert Shield and Desert Storm, the transportation infrastructure was strained to the limit. An air defense battalion and an infantry battalion were converted to truck battalions, and civilian drivers were hired worldwide, still with a shortage of drivers. Some stevedore units in the Gulf War operated with 50 percent of their authorized personnel, and only the extreme dedication of the crews of Army watercraft and tugboats allowed them to operate at maximum capacity day in and day out.

Coalition sea and air superiority prevented combat losses to these vital units. Any loss would have had a severe impact on the theater because there were no readily available replacements.

In nearly a century of projecting power across the oceans of the world, United States armed forces have experienced repeated incidents of confusion in movement and supply at ports of embarkation, ports of debarkation, and assault landing sites because Transportation Corps units were relegated to the second or third waves of deployment. At the same time, the number of transportation units in the force structure has steadily declined. The impact on deployments is predictable. Confusion begets ad hoc units to deal with transportation problems in the theater. Trained transportation units arrive to clear backlogs and bottlenecks and catch up. Most of these problems could be brought under control early in a deployment if sufficient transporters and adequate equipment were available early. In an age of long-distance rapid deployment, when days and sometimes hours are critical, having the right Transportation units in the theater very early will pay handsome dividends.

EQUIPMENT

In every war the United States has fought, there have been equipment shortages. In the 18th and 19th centuries, equipment shortage was the result of the philosophy that contractors could fill the gaps in military support. There was seldom an awareness of the critical need for transportation equipment in time of peace. Ships, watercraft, railroad rolling stock, trucks, and handling equipment are expensive items. In 1990, a rough terrain container handler (RTCH) cost approximately $300,000. Today, too, Congress is loath to spend money on military hardware. But funding and requirements alone do not explain the neglectful attitude toward military transportation evidenced through most of the nation's history. In 1895, the War Department sold all of the Army's wagons on the premise that the Indian Wars were over and commercial transportation could fill the need. Three years later, at the outbreak of the Spanish American War, the government paid premium prices for the wagons it could get. Even then, a shortage of shipping prevented the wagons from reaching the war zones. Fifty-four years later, General Omar Bradley testified before Congress that U.S. armed forces no longer needed landing craft because there would be no more amphibious assaults. Only nine months after his testimony, General MacArthur conducted the landing at Inchon with former Navy LSTs leased from the Japanese contractors who had purchased them at bargain prices after World War II.

Ever since the United States' first requirement to project power across an ocean during the Spanish-American War, shipping has been a critical component of United States power, and it has always been in short supply. There were not enough ships in 1898. In 1917, U.S. soldiers shipped to war in confiscated German liners. They redeployed on the same liners, on leased ships, and on warships converted to troopships. Vessels carrying U.S. cargo in World War I were mostly British. In the early stages of World War II, U.S soldiers were transported to Great Britain on the converted liners *Queen Elizabeth* and *Queen Mary,* and other foreign flag vessels because there was no other way to get large numbers of troops to the theater quickly. From the start, the shortage of shipping affected every aspect of the war effort and dictated the "Europe first" policy of Roosevelt and Churchill. Even at the height of U.S. vessel production, invasion planners felt compelled to load ships involved in amphibious operations by maximizing cargo space rather than loading for rapid off-load. In the Vietnam war, there was once again a shortage of both cargo and troopships. The buildup in Vietnam was so slow that the shortage of transport was not immediately evident. Transportation of replacement personnel to the theater by air also obscured the fact of the ship shortage. In Operations Desert Shield and Desert Storm, the dearth of ships was again evident. Foreign flag vessels were used and once again, ships were loaded to maximize cargo space, rather than to facilitate combat debarkation.

In Desert Storm as in Vietnam, Korea, and the later stages of the two World Wars, the United States was fortunate to possess control of the sea and air. The sea lanes to the combat zones were relatively safe, and it was relatively easy to charter commercial shipping. That situation can not be guaranteed in the future. In an era when even small nations possess sophisticated and very powerful weapons, some interdiction of sea routes can be expected. In addition, though the United States possesses a number of reserve ships, their performance in the buildup for Desert Shield/Desert Storm had in many cases been disappointing. To project its power across the ocean, the United States needs ships readily available. Prepositioned ships, Naval assault ships, and the Army's LSVs are steps in the right direction, but are not sufficient to move large forces and sustain them. In an environment of constrained resources, a balance must be struck between naval combat ships and the ships needed to project power across oceans.

In the 20th century, land transportation was never as critically short as oceangoing vessels, but the U.S. Army has never had the transport vehicles it needed. In the Spanish-American War, wagons ordered at the start of the war

never reached the front. In World War I, the railroads in the zone of the interior performed extremely well, but land transportation in the AEF was a problem. There were never enough animals to pull guns or supply wagons. Rolling stock was also a problem. Locomotives had to be obtained from the Belgians, and necessary cars were never delivered. When trucks became a viable form of transportation, the lack of vehicle standardization caused difficulties.

In World War II, rail was still the most economical form of transportation both in the continental United States and overseas. But in the early stages of the war, there were shortages in rolling stock and planners had to decide whether to keep locomotives at home or send them to England. Nor could rail be used to its full potential in France because of the massive destruction of the European rail net by the retreating Nazis and Allied bombing.

The truck came into its own in World War II because automotive design had reached a high degree of sophistication and rail support was not available in many parts of the world. There were not enough vehicles to support the breakout from St. Lo and trucks had to be stripped from combat units to form the Redball Express. While that expedient became a legend because of the determination of the drivers to accomplish the mission, it was the predictable result of inadequate transportation assets in the invasion force structure. Fortunately, there was little enemy air activity on Express routes, but massive attrition from accidents and poorly maintained equipment was the price paid.

In the Pacific war, trucks were not needed in large numbers unless the area to be invaded was extensive enough to warrant line-haul operations. Even so, not enough trucks were available. In the invasion of Saipan, corps headquarters stole trucks from 27th Division, the only unit in the invasion astute enough to bring part of its transportation company with it. Amphibious craft were also a cause of concern. They were in such short supply that General Mark Clark became involved personally when over forty DUKWs were damaged during a training exercise prior to the Anzio invasion. They could only be replaced by stripping DUKWs from divisions not involved in the invasion.

In Korea, truck pools similar to the Redball Express had to be formed to support major corps-level operations. Again, the shortage continued to the end of the war. Rail equipment in Korea was not sufficient and was in constant need of repair. In Vietnam, land transportation was augmented by cargo helicopter companies which performed invaluable service. Rail was not a significant factor in Vietnam, and rail transport lost importance in the spectrum of transportation planning, a deficiency that continues to this day.

The latest chapter in transportation shortages occurred in Operations Desert Shield and Desert Storm. Initially there was such a shortage of trucks that the Army not only had to train over 4,800 drivers to fill the void, but also had to strip drivers from combat units, accept foreign vehicles, and rely heavily on contract transportation.

In addition to the obvious shortages of ships, railcars and trucks, the Transportation Corps also suffered shortages in watercraft, material handling equipment, and communications equipment. The shortages severely affected its intermodal capabilities, one of the crucial missions of the Corps. The difficulties caused by equipment shortage were often overlooked because of the willingness of transporters to make up for them and by the fact that the deficiencies in transportation were forgotten in the tide of victory.

INTRANSIT ASSET VISIBILITY

Intransit asset visibility presents perhaps the most difficult transportation issue to resolve because it is directly related to the shortages of transportation personnel and equipment. Intransit visibility did not become an issue until the Spanish-American War. Until then, the Army moved with all its basic equipment. Supplies were shipped break-bulk so they were easily identified at the destination. In 1898, the troops at the ports received equipment and supplies in mass from places they had never seen. Many supplies were crated and arrived without documentation, creating the chaotic situation at Tampa. In World War I, the situation was often as bad. Despite all efforts to control shipments by creating powerful agencies to oversee both land and ocean traffic, reports of units not receiving food or clothing were rife. One unit awaiting clothing received a shipment of infants' underwear slated for a department store in Boston. Units arriving in theater were sometimes unable to locate equipment for months.

A similar situation existed in World War II. Despite attempts at providing advanced manifests by transatlantic cable or by aircraft, vessels still arrived in theater without manifests or known destinations for their cargo. In some cases, officials did not even know to which ports the ships should be assigned when they arrived off the English coast. Once equipment arrived the situation was no better. The TORCH invasion was nearly canceled because critical unit equipment was lost in the depots in England. The situation in Korea was little better. The depots in Pusan Harbor were noted for their lack of organization and, in Vietnam, the warehouses at Cam Rahn Bay were combed by expediting teams from the various divisions trying to discover what was in them.

Despite reliance on up-to-date communication equipment and satellite hook-ups, the situation in Saudi Arabia 1990-1991 showed little improvement. Vessels arrived without manifests or shipping documents, and unknown cargoes awaited transshipment. The only difference from other wars was the greater amount of cargo that arrived in theater by air. In many cases, the only documentation cited was the single transportation company tasked with the receipt and forwarding of air shipments in the theater, rather than the ultimate consignee. Once received, no one knew where the cargo was supposed to go.

Intransit visibility is even more critical in a rapid deployment environment. Operations Desert Shield and Desert Storm demonstrated that rapid deployment of forces is necessary in the post-Cold War world. Units cannot delay and search for their equipment at terminals or depots or wait for replacement equipment to arrive. As General William G.T. Tuttle stated in March 1993, "We in the Department of Defense should be ashamed of ourselves for allowing that situation to continue in the twenty years between Vietnam and Desert Storm and into Somalia." For such reasons, the Transportation Corps has championed the development of electronic methods of tracking cargo from the manufacturer to the ultimate consignee. Continuing attention to intransit asset visibility is essential, and research must continue for systems that can maintain the visibility of cargo to the ultimate consignee and effect routing changes where applicable. Once such a system is in place, the need for trained transportation specialist operators will be even more vital.

MOVEMENT CONTROL

Movement control has been a Transportation issue since the Spanish-American War, although it was not recognized as such at the time. The serious study of movement control began in 1932 and has evolved through a series of refinements ever since. The adoption of British movement control doctrine in World War II was not universally accepted at the time and is little understood outside the Transportation community. Lack of appreciation of its function has led to numerous misunderstandings during combat operations from World War II to the present. Concern for movement control has been an active issue with the Transportation Corps since the mid 1980s when Maj. Gen. Fred Elam, then Chief of Transportation, bluntly asked his combat developers: "Is movement control broke?" An analysis of movement control showed the doctrine was sound, but not always applied the best way.

Desert Shield and Desert Storm unfortunately proved the analysis correct. The 318th Theater Movement Control Agency arrived in country too late to

control operations from the start. The 318th never had enough personnel for its Movement Control Teams or enough radios to communicate with transportation units across the theater. The results of this combination of shortages were the loss of trailer control and distribution management. In future operations, many of the movement control problems experienced from World War II to the Gulf War could be alleviated if the Movement Control Agency were made a part of the initial deployment, given the resources necessary to fulfill its mission.

LEADERSHIP

Undoubtedly, one of the most positive resources of the Transportation Corps is its leadership. From the time of the first Transportation Corps in 1918, the Corps has been fortunate to have as Chiefs of Transportation leaders of remarkable vision and talent, beginning with Maj. Gen. Charles P. Gross the first Chief of Transportation.

Transporters who have led transportation commands and units have also made significant contributions to the Army and the nation beyond the transportation community. Secretary of Defense Robert MacNamara selected Gen. Frank S. Besson, Jr., the first four-star general in U.S. logistics history, to head the newly formed Army Materiel Command (AMC) in 1962. Gen. William G. T. Tuttle, another four-star general who, after commanding AMC, became president of the Department of Defense, Logistics Management Institute. Lt. Gen. Nathaniel R. Thompson, Jr. became the Inspector General of the Army after he commanded U.S Army Europe's largest logistical command, the 21st Support Command. Lieutenant Generals Richard D. Meyer, Oren E. DeHaven, and Edward Honor all were assigned as J-4 of the Joint Chiefs of Staff, and Lt. Gen. Samuel N. Wakefield commanded the U.S. Army Combined Arms Support Command. In Vietnam, Transportation Corps major generals dominated the top logistics job in the Military Assistance Command, Vietnam (MACV) staff - John D. Crowley, Raymond C. Conroy, Jack C. Fuson, and John E. Murray. Prior to the cease fire in 1973, all four support commands in Vietnam were commanded by Transportation Corps generals - Arthur Hurow, Darrie H. Richards, Henry L. Del Mar, and James W. Gunn. Following the cease-fire, Maj. Gen. John E. Murray assumed responsibilities for military materiel support of Republic of Vietnam forces as head of the Defense Attache Office. During the Desert Shield/Desert Storm Operations, Transportation Corps generals were in key positions throughout the chain of command: Lt. Gen. Jimmy D. Ross was the DA DCSLOG (and later was promoted to General and commanded AMC); General Tuttle commanded AMC at that time; and Maj. Gen. (later Lt. Gen.)

William P. Pagonis was Deputy Commanding General for Logistics and later assumed command of the 22d Support Command, which was responsible for all logistics support of the theater.

The above list demonstrates a prominence in Corps leadership that has seen the Transportation Corps through times of great challenge since its birth in 1942. Combat arms officers who led major commands fully appreciate the Corps as the technical service that overcame obstacles to mobility to move the Army's people and goods to accomplish difficult missions.

The Corps must continue to provide its future leaders with the broad-based education, training, and career development programs that have made Transportation Corps officers outstanding Transporters and logisticians in the past. Only superlative transportation leadership will convincingly articulate the justification for the future transportation resources needed by the Army and the Department of the Defense.

While no one can predict future events, it is imperative that the Transportation Corps continue the high quality support that has been its hallmark in the past. It can do that by maintaining its high standards of leadership and training, and by using the lessons of past experience to demonstrate the necessity of adequate transportation in a viable national defense posture.

Soldiers of the Transportation Corps faced the challenges of Operations Desert Shield and Desert Storm the way their predecessors faced similar challenges in previous wars - with determination and commitment to succeed. Once again they proved "nothing happens until something moves."

APPENDIX A

Chiefs of the Transportation Corps

Brigadier General Frank T. Hines
1919 - 1922

Major General Charles P. Gross
July 1942 - November 1945

Major General Edmond H. Leavey
December 1945 - June 1948

Major General Frank A. Heileman
June 1948 - March 1953

Chiefs of the Transportation Corps

Major General Paul F. Yount
April 1953 - January 1958

General Frank S. Besson, Jr.
March 1958 - March 1962

Major General Rush B. Lincoln, Jr.
March 1962 - June 1963

Major General Edward W. Sawyer
June 1963 - July 1964

Chiefs of the Transportation Corps

Colonel Richard K. Hutson
August 1964 - September 1964

Major General William H. Redling
September 1964 - December 1964

Major General Harold I. Small
June 1983 - July 1983*

Major General Aaron L. Lilley
July 1983 - August 1985

*In late 1964 the technical service branch chief positions where phased out until 1983, when these positions were reestablished. Therefore, for almost 19 years, the Transportation Corps did not officially have a Chief of Transportation.

Chiefs of the Transportation Corps

Major General Fred E. Elam
August 1985 - April 1988

Major General Samuel N. Wakefield
April 1988 - January 1992

Major General Kenneth R. Wykle
January 1992 - August 1993

Major General David A. Whaley
August 1993 -

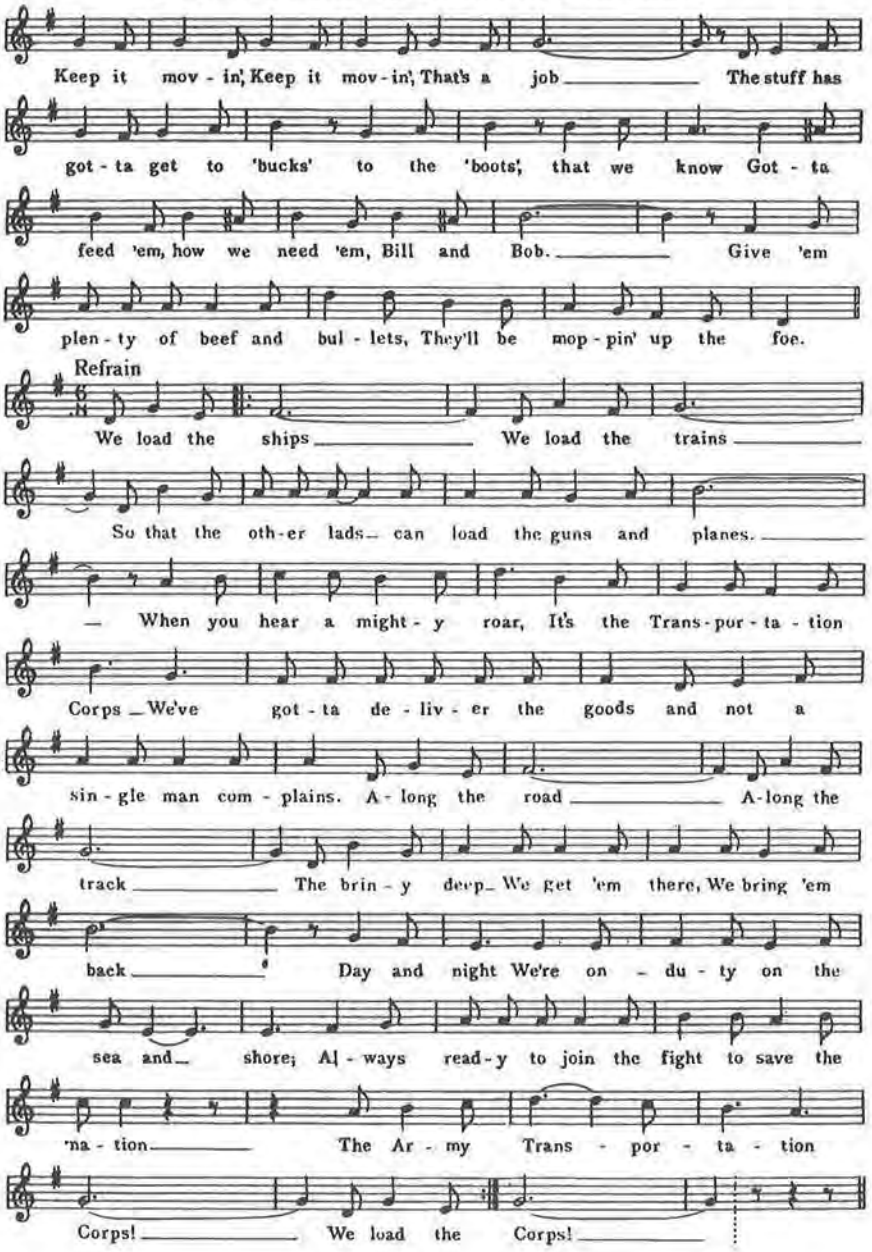
APPENDIX B

The Transportation Song

The Official Song of The Transportation Corps, Army Service Forces

Song of The Army Transportation Corps

Words and Music by HERMAN HUPFELD



APPENDIX C

Escort Wagon 1916

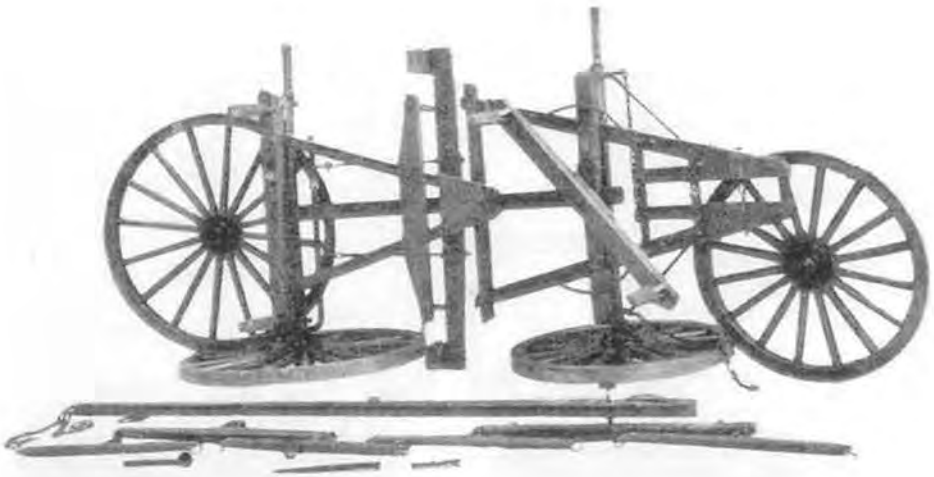
The horse or mule drawn wagon was a primary mode of land transportation for the U.S. Army from 1776 to the 1920s. Although it appeared to be a simple device, the wagon was, in fact, a complex technology that required the skills of wheelwrights, farriers, blacksmiths, and harness makers to keep it in working order. The photographs in this appendix show some of the components, spares and accessories needed to make wagon technology work.

Escort wagon and team.

Escort Wagon 1916

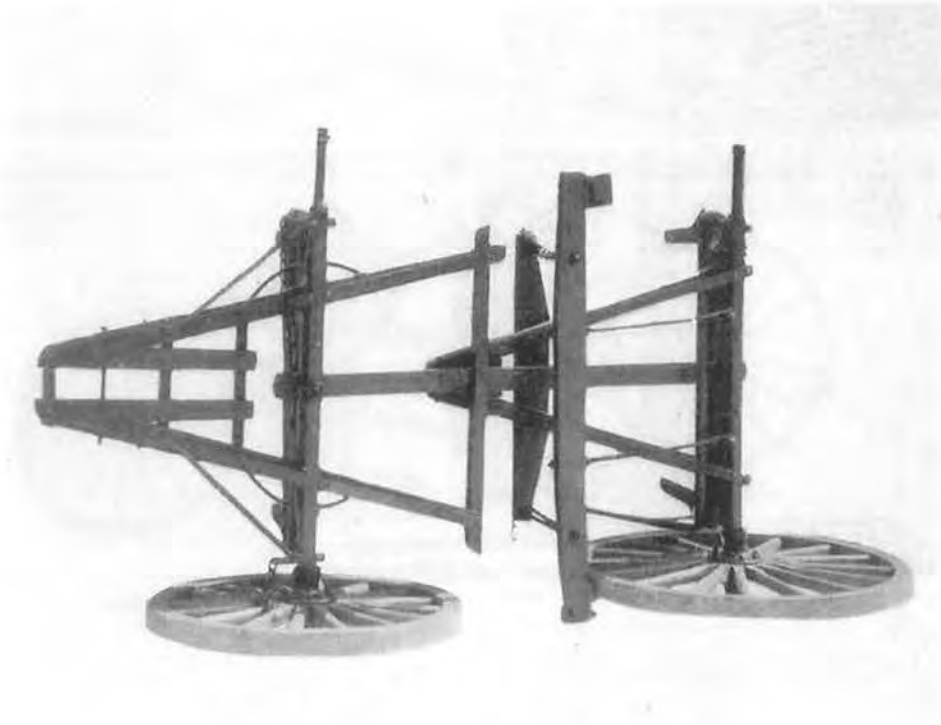
Escort wagon, complete without cover, with spare parts attached, showing front and right side.

Escort Wagon 1916



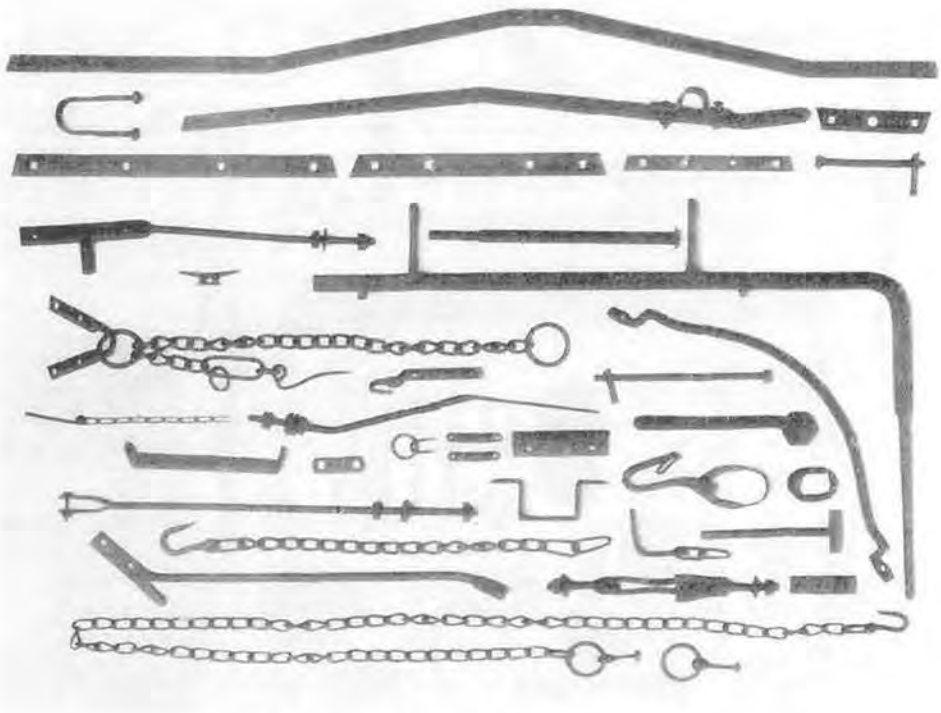
Top view of Escort-Wagon running gear.

Escort Wagon 1916



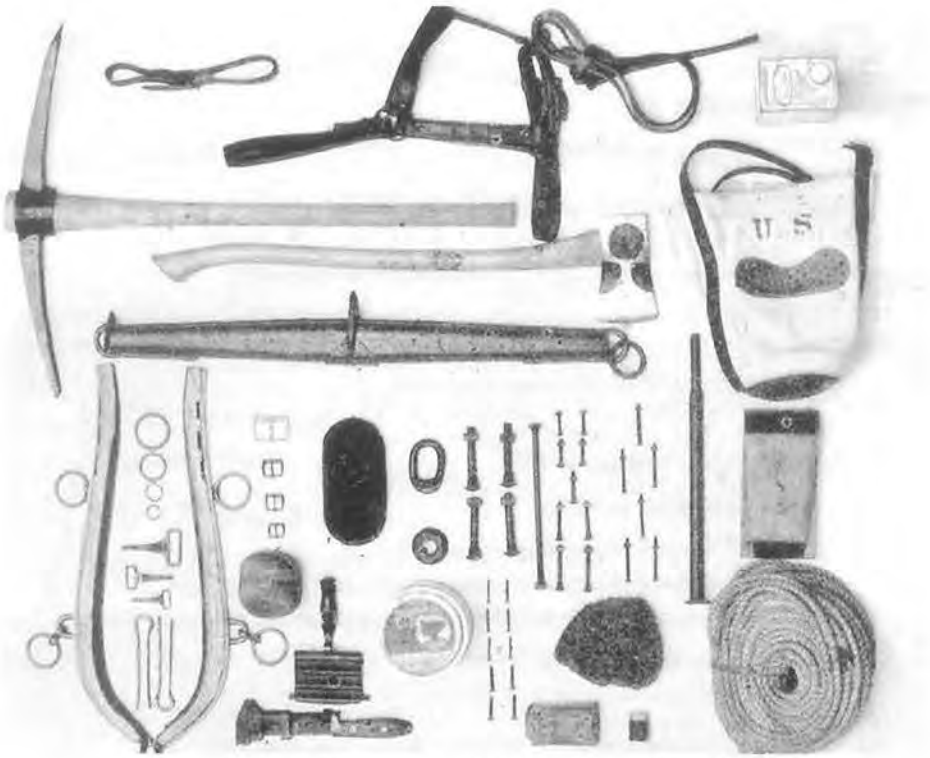
Bottom view of Escort-Wagon running gear.

Escort Wagon 1916



Miscellaneous iron parts of Escort Wagon.

Escort Wagon 1916



Spare parts and accessories carried in tool box of Escort Wagon.

APPENDIX D

Affiliated Railway Units*
WORLD WAR II

UNIT	SPONSOR
Headquarters Military Railway Service	Association of American Railroads
701 Railway Grand Division	New York Central Railroad
702 Railway Grand Division	Union Pacific Railroad
703 Railway Grand Division	Atlantic Coast Line Railroad Company
704 Railway Grand Division	Great Northern Railway
705 Railway Grand Division	Southern Pacific Company
706 Railway Grand Division	Pennsylvania Railroad
707 Railway Grand Division	Southern Railway Company
708 Railway Grand Division	The Baltimore and Ohio Railroad Company
709 Railway Grand Division	Association of American Railroads
710 Railway Grand Division	The Atchison, Topeka and Santa Fe Railway Company
712 Railway Operating Battalion	The Central Railroad Company of New Jersey
713 Railway Operating Battalion	The Atchison, Topeka and Santa Fe Railway Company
714 Railway Operating Battalion	Chicago, St. Paul, Minneapolis and Omaha Railway
715 Railway Operating Battalion	Illinois Central Railroad
716 Railway Operating Battalion	Southern Pacific Company
717 Railway Operating Battalion	Pennsylvania Railroad
718 Railway Operating Battalion	Cleveland, Cincinnati, Chicago and St. Louis Railway
719 Railway Operating Battalion	Texas and New Orleans Railroad Company
720 Railway Operating Battalion	Chicago and North Western Railway
721 Railway Operating Battalion	New York Central Railroad

* Membership as of 7 December 1941. Source: Carl R. Gray, Jr., *Railroading in Eighteen Countries*, New York, Charles Scribner's Sons, 1955, p. 24.

Affiliated Railway Units
WORLD WAR II

UNIT	SPONSOR
722 Railway Operating Battalion	Seaboard Air Line Railroad Company
723 Railway Operating Battalion	Union Pacific Railroad
724 Railway Operating Battalion	Pennsylvania Railroad
725 Railway Operating Battalion	Chicago, Rock Island and Pacific Railroad Company
726 Railway Operating Battalion	Washbash Railroad Company
727 Railway Operating Battalion	Southern Railway Company
728 Railway Operating Battalion	Louisville and Nashville Railroad Company
729 Railway Operating Battalion	The New York, New Haven and Hartford Railroad Company
730 Railway Operating Battalion	Pennsylvania Railroad
731 Railway Operating Battalion	Union Pacific Railroad
732 Railway Operating Battalion	Great Northern Railway
733 Railway Operating Battalion	Central of Georgia Railway Company
734 Railway Operating Battalion	Texas and New Orleans Railroad Company
735 Railway Operating Battalion	Association of American Railroads
736 Railway Operating Battalion	New York Central Railroad
737 Railway Operating Battalion	New York Central Railroad
738 Railway Operating Battalion	Chicago Great Western Railway
739 Railway Operating Battalion	Lehigh Valley Railroad Company
740 Railway Operating Battalion	The Chesapeake and Ohio Railway Company
741 Railway Operating Battalion	Gulf, Mobile and Ohio Railroad
742 Railway Operating Battalion	Pennsylvania Railroad
743 Railway Operating Battalion	Illinois Central Railroad
744 Railway Operating Battalion	Chicago, Milwaukee, St. Paul and Pacific Railroad
745 Railway Operating Battalion	Chicago, Burlington and Quincy Railroad

Affiliated Railway Units
WORLD WAR II

UNIT	SPONSOR
746 Railway Operating Battalion	Missouri-Kansas-Texas Railroad Company
747 Railway Operating Battalion	The Atchison, Topeka and Santa Fe Railway Company
748 Railway Operating Battalion	The Texas and Pacific Railway Company
749 Railway Operating Battalion	The New York, New Haven and Hartford Railroad Company
750 Railway Operating Battalion	St. Louis-San Francisco Railway Company
751 Railway Operating Battalion	The Denver and Rio Grande Western Railroad Company
752 Railway Operating Battalion	Boston and Maine Railroad
759 Railway Operating Battalion	Missouri Pacific Railroad
753 Railway Shop Battalion	Cleveland, Cincinnati, Chicago and St. Louis Railway
754 Railway Shop Battalion	Southern Pacific Company
755 Railway Shop Battalion	Norfolk and Western Railway
756 Railway Shop Battalion	Pennsylvania Railroad
757 Railway Shop Battalion	Chicago, Milwaukee, St. Paul and Pacific Railroad
758 Railway Shop Battalion	The Atchison, Topeka and Santa Fe Railway Company
763 Railway Shop Battalion	The Delaware, Lackawanna and Western Railroad Company and Lehigh Valley Railroad Company
764 Railway Shop Battalion	Boston and Maine Railroad; Central Vermont Railway, Inc.; Boston and Albany Railroad; The Delaware and Hudson Railroad
765 Railway Shop Battalion	Erie Railroad
766 Railway Shop Battalion	Association of American Railroads

Endnotes

CHAPTER ONE

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22. Rouse, *The Great Wagon Road,* p. 166.

23. Risch, *Supplying Washington's Army, p. 70.*

24. Ibid., p. 42.

25. Ibid., p. 75.

26. Huston, *Sinews of War,* p. 85.

27. Carpe, *To Starve the Army,* p. 220.

28. Huston, *Sinews of War,* p. 82.

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30. Erna Risch, *Quartermaster Support of the Army, A History of the Corps 1775-1939,* Washington, D.C., Center of Military History, United States Army, 1989, rep 1962, p. 102.

31. Ibid., p. 108.

32. Ibid., p. 128.

33. Ibid., p. 178.

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1. Erna Risch, *Quartermaster Support of the Army, A History of the Corps 1775-1939,* Washington, D.C., Center of Military History, United States Army, 1989, rep 1962, p. 181.

2. Ibid., p. 183.

3. James A. Huston, *The Sinews of War, Army Logistics 1775-1953,* Washington, D.C., Office of the Chief of Military History, United States Army, 1966, p. 120.

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6. Ibid., p. 145.

7. Ibid., p. 129.

8. Robert Selph Henry, *The Story of the Mexican War,* Indianapolis, Bobbs-Merrill, 1950, p. 122.

9. John S. D. Eisenhower, *So Far From God: the U.S. War with Mexico 1846-1848,* New York, Random House, 1989, p. 241.

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13. Risch, *Quartermaster Support,* p. 261.

14. Ibid., p. 263.

15. Huston, *Sinews of War,* p. 128.

16. Risch, *Quartermaster Support,* p. 277.

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15. Woodworth, *Jefferson Davis*, p. 21.

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39. Mc Pherson, *Battle Cry of Freedom*, p. 324.

40. Risch, *Quartermaster Support*, p. 338.
41. Huston, *Sinews of War*, p. 172.
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63. Wheeler, *Sword Over Richmond*, p. 123.
64. Symonds, *A Battlefield Atlas*, p. 35.
65. Mc Pherson, *Battle Cry of Freedom*, p. 637.
66. Ibid., p. 751.
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68. Symonds, *A Battlefield Atlas*, p. 40.
69. Huston, *Sinews of War*, p. 236.
70. Symonds, *A Battlefield Atlas*, p. 36.
71. Huston, *Sinews of War*, p. 236.
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39. Ibid., p. 302.

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CHAPTER FIVE

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6. Ibid., p. 335.

7. Maj. Gen. James G. Harbord, *The American Army in France 1917-1919*, Boston, Little, Brown, and Company, 1936, p. 27.

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14. Erna Risch, *Quartermaster Support of the Army, A History of the Corps 1775 - 1939*, Washington, D.C., Center of Military History, United States Army, 1962, rep. 1989, p. 612.

15. Ibid., p. 612.

16. Huston, *Sinews of War*, p. 346.

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32. Ibid., Vol. I, p. 26.

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35. Ibid., p. 45.

36. Martin van Creveld, *Supplying War, Logistics from Wallenstein to Patton*, New York, Cambridge University Press, 1980, p. 139.

37. Risch, *Quartermaster Support*, p. 656.

38. Huston, *Sinews of War*, p. 366.

39. Ibid., p. 367.

40. Ibid., p. 367.

41. Risch, *Quartermaster Support*, p. 657.

42. Huston, *Sinews of War*, p. 368.

43. William J. Wilgus, *Transporting the A.E.F. in Western Europe 1917-1919*, New York, Columbia University Press, 1931, p. 64.

44. Haseltine, *Tonnage, Locomotives*, p. 4.

45. Risch, *Quartermaster Support*, p. 661.

46. Pershing, *My Experiences, Vol II*, p. 206.

47. Risch, *Quartermaster Support*, p. 658.

48. Ibid., p. 659.

49. Ibid., p. 661.

50. Ibid., p. 681.

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52. Huston, *Sinews of War*, p. 369.

53. Ibid.

54. Ibid., p. 324.

55. Ibid., p. 325.

56. Risch, *Quartermaster Support*, p. 662.

57. Haseltine, *Tonnage, Locomotives*, p. 5.

58. Huston, *Sinews of War*, p. 369.

59. Ibid., p. 378.

60. Ibid., p. 379.

61. Ibid., p. 385.

62. Ibid., p. 392.

63. Chief of the Transportation Service, *Report of the Chief of the Transportation Service to the Secretary of War, Fiscal Year 1919*, Washington, Government Printing Office, 1919, p. 186. In World War I, The term "Transportation Corps" meant the personnel who were transporters, primarily in the A.E.F. "Transportation Service" meant the organization and the units in the Army as a whole. In 1994, the Transportation Corps encompassed both the personnel and the organizations.

64. Wardlow, *The Transportation Corps: Responsibilities*, p. 35.

CHAPTER SIX

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2. Chester Wardlow, *The U.S. Army in World War II, The Technical Services, the Transportation Corps; Responsibilities, Organization, and Operations*, Washington D.C., Office of the Chief of Military History, Uniited States Army, 1951, p. 37.

3. Ibid., p. 37.

4. Gross and Ross were highly capable officers without whom the Transportation Corps as we know it today might have been less effective. Between WWI and WWII, both attended the principal branch and Army Schools, commanded units, taught in service schools, and had responsible staff assignments. Ross was commissioned through Infantry OCS in 1917, but was sent to France too late to see combat. He was permanently commissioned in 1920. From 1935-38, he commanded the Army's only medium tank unit at Fort Benning before leaving for an assignment to the General Staff G-4. Promoted to Colonel, he was scheduled to command a tank regiment in the 10th Armored Division in 1942, but two days before departure, he was reassigned as Chief of Transportation of the European Theater (ETO). He served in that capacity throughout the war except for a brief interval as Chief of Transportation in North Africa. Irwin Ross, *Ross of the ETO*, Army Transportation Journal, April 1945, p. 32.

Gross not only had combat experience in World War I, but also several higher levels of command and staff since World War I. One of those assignments was supervisor of the Nicaragua Canal Survey for which he received the Presidential Medal of Merit in 1939. He was the District Engineer at Los Angeles and at Rock Island, IL from which he was assigned as General Staff Chief of Transportation. He was promoted to Brigadier General in mid-1941 and sent to Russia in September 1941 with Presidential envoy W. Averill Harriman's Special War Supply Mission to survey transportation problems of the Red Army. In August 1942, he was named Chief of the Transportation Corps as a temporary major general and served in this position through the war. He retired on 30 November 1945, and became Chairman of the NYC Board of Transportation. Later, he was recalled to active duty from 1948- 52 as a result of the Berlin Airlift and served in the Office of the High Commissioner for Germany. *Current Biography, Who's News and Why - 1946,* The H.W. Wilson Company, New York, N.Y., 1947, p. 226.

5. Wardlow, *The Transportation Corps: Responsibilities,* p. 59.

6. Ibid., pp. 28- 94. The principal agencies with which the Transportation Branch and later the Transportation Corps dealt included: Interstate Commerce Commission which regulated all carrier rates except air; the Civil Aeronautics Administration which fostered development of air commerce and associated facilities; the Maritime Commission and later the War Shipping Administration which coordinated with the British Ministry of War Transport; the Highway Traffic Advisory Committee and equivalent state committees which helped coordinate movements to minimize conflict with civilian highway traffic and facilitate mobilization for emergencies; the Army and Navy Munitions Board which had major responsibilities for munitions production and distribution and also coordinated and cleared use of facilities for transportation operations by the two services; the Lend-Lease Administration which managed the acquisition and distribution of foreign aid; the Reconstruction Finance Corporation and Office of Production Management concerning shipping for strategic imports; and the Office of Defense Transportation (ODT) set up by the President in December 1941 with broad powers to coordinate and regulate railway, highway and inland waterway carriers.

7. Ibid., pp. 49, 50.

8. Ibid., p. 52, Chart 1.

9. Ibid., p. 53.

10. Ibid., pp. 54, 55.

11. Ibid., p. 63.

12. Ibid., p. 66.

13. Ibid., pp. 91-94, 394.

14. Wardlow, *The Transportation Corps: Responsibilities*, p. 69, Chart, p. 74, Table 1. On 11 October 1944, an organizational event important to the future of the Transportation Corps occurred with the chartering of the Army Transportation Association (ATA) in Washington, D.C. The association was formed to foster transportation preparedness by interchanging knowledge and forging relationships among Army and civilian industry and with other federal transportation agencies. In July 1949, the ATA was rechartered as the National Defense Transportation Association (NDTA). Its scope broadened to encompass all segments of civilian transportation and all transportation elements of the nation's defense establishment. The organization has continued over the years to foster cooperation between the defense and civilian transportation communities. From the *Army Transportation Journal*, Vol. 1, No. 1, February 1945, p. 1 and Vol. V, No. 3, May-June 1949, p.2.

15. Wardlow, *The Transportation Corps: Responsibilities, p. 104.*

16. Ibid., pp. 95-103 and 102, Chart 3.

17. Ibid., pp. 99, 110, Table 2.

18. Ibid., pp. 111-115, 121, Chart 4. See also Appendices C and D, pp. 424-425 for locations of TZO and subordinate installations.

19. Ibid., p. 122, Table 3.

20. Chester Wardlow, *The U.S. Army in World War II, The Technical Services, The Transportation Corps: Movements, Training and Supply,* Washington D.C., Office of the Chief of Military History, 1956, Chapter VI, Military and Technical Training.

21. Ibid., Chapter VI addresses TC training in depth.

22. Carl R. Gray, Jr., *Railroading in Eighteen Countries, New York, Charles Scribner's Sons, 1955.*

23. Wardlow, *The Transportation Corps: Movements, Training and Supply,* p. 134.

24. Ibid., p. 437, Table 36. The immense numbers of truck units that operated in most theaters under control of transportation staff officers or headquarters such as the Motor Transport Brigade in the ETO retained their QM troop basis identity through the war. General Gross and the theater chiefs of transportation were closely involved in the activation and training in-theater of provisional truck units described in Chapters 8 and 9, following.

25. Ibid., p. 502, Table 40.

26. Ibid., p. 501.

27. Wardlow, The Transportation Corps: Responsibilities, pp. 125, 126.

28. Ibid., p. 135.

29. Ibid., pp. 135-151.

30. Ibid., p. 135.

31. Ibid., p. 175.

32. Ibid., pp. 228-249.

33. Ibid., pp. 255-261.

34. Ibid., pp. 13, 29, 309-311.

35. Wardlow, *The Transportation Corps: Movements, Training and Supply,* pp. 14, 15. The division was headed by Col. William J. Williamson, later Brig. Gen., who had been general traffic manager of a large mail-order house, one of many experts brought into the QM and TC. Colonel Edmund C. R. Lasher was Williamson's deputy and Colonel I. Sewell Morris was Chief, Passenger Branch. Both were promoted to Major General in the 1950's and each later served as Executive Director of the Military Traffic Management Agency.

36. Ibid., p. 33.

37. Ibid., p. 100. See Chapter II, Troop Movements to the Overseas Commands, for details.

38. Ibid., pp. 241, 295, 303, 305. An average of 30 tons of Army freight was shipped on Government Bills of Lading per car by 1945, up from 24 in 1941. Country-wide carloadings reached an average of 40 tons by 1945. The difference was due to the nature of Army freight, much of it with high cube to weight ratios.

39. Ibid., p. 243.

40. Ibid., pp. 305-316 and 310, Table 24.

41. Wardlow, *The Transportation Corps: Responsibilities,* pp. 180, 181.

42. Ibid., pp. 135-136.

43. Ibid., p. 264.

44. Ibid., p. 269, Table.

45. Wardlow, *The Transportation Corps: Movements, Training and Supply,* pp. 376-390, Charts 32 and 33.

46. See p. 126, above for assignment of theater support responsibilities to ZI POE.

47. Ibid., pp. 341-356. See also p. 344, Chart 11 which shows theater support by OSD.

48. Ibid., pp. 392-394.

49. Ibid., pp. 363-365.

50. Ibid., pp. 397-399.

51. Wardlow, *The Transportation Corps: Responsibilities*, p. 280.

CHAPTER SEVEN

1. Joseph Bykofsky and Harold Larson, *The U.S. Army in World War II, the Technical Services, The Transportation Corps: Operations Overseas,* Washington D.C., Office of the Chief Military History, United States Army, 1957, pp. 8-30.

2. Ibid., pp. 9-11.

3. Ibid., pp. 11-12.

4. Ibid., pp. 13.

5. Ibid., pp. 31 and 58, Map 2, Alaska Highway and Connecting Routes.

6. Ibid.

7. H.H. Dunham, *Monograph 11, Transportation and the Greenland Bases,* Washington D.C., Office of the Chief of Transportation, 1945, pp. 22-26. See also Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 14-16.

8. H.H. Dunham, *Office of the Chief of Transportation, Monograph 14, Transportation of US Forces in the Occupation of Greenland,* Washington D.C., Office of the Chief of Transportation, 1945.

9. Ibid., p. 28.

10. Ibid., p. 37

11. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 387-382.

12. H.H. Dunham, *Monograph 25, The Persian Corridor,* Washington, D.C., Office of the Chief of Transportation, 1945, pp. 34-42.

13. Ibid., p. 500.

14. T.H. Vail Motter, *The U.S. Army in World War II, The Middle East Theater, the Persian Corridor And Aid To Russia,* Washington D.C., Office of the Chief Military History, United States Army, 1952, pp. 331-378.

15. Dunham, *Monograph 25,* pp. 6, 115, 187,

16. Ibid., p. 500.

17. Ibid., pp. 223-226.

18. Dunham, *Monograph 25,* pp. 154, 160, 177. Colonel Yount was an engineer officer who became the fourth Chief of Transportation in April 1953. Colonel Frank S. Besson, also an engineer officer, succeeded Col. Yount in May 1944 as GM MRS in Iran. He followed Yount as fifth C of T in March 1958 and later commanded Army Materiel Command with the rank of General. Lieutenant Colonel Thomas W. Rice who commanded the 791st and 730th ROB during his service in Iran later became president of several U.S. railroads, eventually holding the position of Chairman Emeritus of Seaboard Coastline Industries, Inc. Rice continued to serve in the Reserves and retired at the rank of Maj. Gen.

19. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 378, 403-404.

20. Ibid., pp. 192-197.

21. Ibid., pp. 418-423.

22. Ibid., pp. 423-424.

23. James A. Huston, *The Sinews of War, Army Logistics 1775-1953*, Washington D.C., Office of the Chief of Military History, United States Army, 1966, 1966, pp. 545 and 546.

24. Lt. Gen. LeR. Lutes, *Logistics in World War II*, Final Report of the Army Service Forces, Center of Military History, Washington, D.C., 1947, pp. 45-47.

25. *Encyclopedia Americana*, Danbury, CT, Grolier Inc., 1983, p. 521. Until the partition of India into India, East Pakistan and West Pakistan this state covered a large part of the Himalayan Assam Chain.

26. Lutes, *Logistics in World War II*, p. 46.

27. Charles F. Romanus and Riley Sunderland, *The U.S. Army in World War II, The China-Burma-India Theater, Stilwell's Mission to China*, Washington D.C., Office of Chief Military History, United States Army, 1953, pp. 205-207.

28. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 553, 554. At each of the Allied strategic conferences, representatives of the Office of the Chief of Transportation were part of the U.S. delegation. Col. Rush B. Lincoln was a member of several delegations. He reported that in the final days of each conference, Allied transportation experts would work all night analyzing the availability of transportation resources to support proposed strategic and tactical decisions. Final decisions were made only when estimates deemed transportation resources sufficient. Lincoln was later promoted to major general and became the sixth Chief of Transportation. Source: Command Historian interview and biographical program files.

29. Charles F. Romanus and Riley Sunderland, *The U.S. Army in World War II, The China-Burma-India Theater, Stilwell's Command Problems*, Washington D.C., Office of Chief Military History, United States Army, 1955, p. 293.

30. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 554, 555.

31. Charles F. Romanus and Riley Sunderland, *The U.S. Army in World War II, The China-Burma-India Theater, Time Runs Out in the CBI*, Washington D.C., Office of Chief Military History, United States Army, 1959, p. 6.

32. Ibid., p. 40, Chart 1.

33. Ibid., p. 317, Table 4.

34. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 596-603.

35. Creswell G. Blakeney, ed., *Logistical History of NATOUSA/MTOUSA, 11 August 1942 to 30 November 1945*, Naples, Italy, Compiled by G-4, NATOUSA, G. Montantino, 1945, P. 20.

36. Huston, *The Sinews of War*, p. 520, Map 18.

37. Warren Tute, *The North African War*, London/New York, Sidgwick and Jackson - Two Continents, 1976, pp. 204-215

38. Brig. Gen. Vincent J. Esposito, ed., *The West Point Atlas of American Wars, Volume II*, New York, Praeger Publishers, *1959, Map 73.*

39. Huston, The Sinews of War, p. 518.

40. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 165-166.

41. Ibid., pp. 152-161.

42. Ibid., pp. 161-168.

43. Ibid., pp. 168, 176, 177.

44. Ibid., p. 171.

45. Ibid., pp. 171-177.

46. Ibid., pp. 181-183.

47. Alfred M. Beck, Abe Bortz, Charles W. Lynch, Lida Mayo, and Ralph F. Weld, *The U.S. Army in World War II, The Technical Services, The Corps of Engineers: The War*

Against Germany, Washington, D.C., Center of Military History, United States Army, 1985, pp. 142-143.

48. Lutes, *Logistics in World War II,* pp. 38-39.

49. H.H. Dunham, *Monograph 13, Transportation and the Conquest of Sicily,* Washington D.C., Office of the Chief of Transportation, 1945, pp. 64, 70.

50. Esposito, ed., *The West Point Atlas,* Map 93.

51. Dunham, *Monograph 13, Transportation and the Conquest of Sicily,* pp. 79-83, 107, 108.

52. Ibid., pp. 83-19.

53. Ibid., pp. 91-98.

54. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* p. 202.

55. Beck, et. al., *The Corps of Engineers: The War Against Germany,* pp. 142-143.

56. Esposito, ed., *The West Point Atlas,* Map 95 and Beck, et. al., *The Corps of Engineers: The War Against Germany,* p. 210. Sergeant Powers was assigned to the Transportation Corps when President Roosevelt awarded him the Medal of Honor. He was memorialized by the Transportation Corps when the Fort Eustis welcome center was named Powers Hall. Sergeant Powers died in 1967. Source: Transportation Corps Professional Bulletin, October 1989, p. 39.

57. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 203-214.

58. Ibid., pp. 214-221, 231.

59. Ibid., pp. 221-226.

60. Ibid., pp. 228-229.

61. Ibid., p. 227.

62. Jeffrey C. Clarke and Robert Ross Smith, *Riviera to the Rhine,* Publication 7-10, Washington D.C., Office of the Chief of Military History, United States Army, 1993, pp. 71, 107.

63. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 290-293.

64. Ibid., pp. 290, 299.

65. Clarke and Smith, *Riviera to the Rhine,* Map 7, pp. 127, 201, 202.

66. Ibid., pp. 203-205.

67. Beck, et. al., *The Corps of Engineers: The War Against Germany,* p. 145.

68. Ibid., p. 450.

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1. Alfred M. Beck, Abe Bortz, Charles W. Lynch, Lida Mayo, and Ralph F. Weld, *The U.S. Army in World War II, the Technical Services, The Corps of Engineers: The War Against Germany.* Washington, D.C., Center of Military History, United States Army, 1985, passim.

2. Roland G. Ruppenthal, *Logistical Support of the Armies, Volume I,* Washington D.C., Office of the Chief of Military History, United States Army, 1953, p. 225, Chart 6.

3. Beck, et. al., *The Corps of Engineers: The War Against Germany,* p. 301, Map 15.

4. Ruppenthal, *Logistical Support of the Armies, Volume I,* p. 428, Map 16.

5. Ibid., pp. 476-477, Map 15.

6. Roland G. Ruppenthal, *Logistical Support of the Armies, Volume II,* Washington D.C., Office of the Chief of Military History, United States Army, 1959, pp. 10-17.

7. Ibid., p. 368, Map 7.

8. Joseph Bykofsky and Harold Larson, *The U.S. Army in World War II, the Technical Services, The Transportation Corps: Operations Overseas,* Washington D.C., Office of the Chief Military History, United States Army, 1957, p. 78, Map 3.

9. Helmut von Moltke, *The Franco-German War.* New York, Harper & Brothers, 1892, p. 8.

10. H. H. Dunham, *US Army Transportation in the European Theater of Operations, 1942-1945.* Monograph 29, Washington D.C., Office of the Chief of Transportation, 1946, p. 11.

11. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* p. 87.

12. Ibid., p. 109.

13. Ibid., pp. 109-122.

14. Ibid., p. 122.

15. Ibid., p. 128.

16. Ibid., p. 249.

17. M. J. Freschie, *Historical Critique of the United Kingdom Overlord Movement.* HQ, United Kingdom Base Transportation Office, APO 413, US Army, 1 November 1945.

18. Ibid., p. 36.

19. Ibid., p. 53.

20. James A. Huston, The Sinews of War, Army Logistics 1775-1953, Washington D.C., Office of the Chief of Military History, United States Army, 1966,

21. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* p. 306.

22. Ruppenthal, *Logistical Support of the Armies, Volume II,* pp. 124-133.

23. Ruppenthal, *Logistical Support of the Armies, Volume I,* pp. 416, 419, Tables 7 and 8.

24. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 269-278, 308, 312.

25. Ibid., pp. 307-308, 315-316.

26. Ibid., pp. 279-282, 313-315.

27. Ibid., pp. 316-319.

28. Ibid., pp. 320-324.

29. Ibid., p. 312.

30. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 238-242 and Ruppenthal, *Logistical Support of the Armies, Volume I,* pp. 552-557.

31. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 282-285.

32. Ibid., pp. 284-285, 327-329.

33. Ruppenthal, *Logistical Support of the Armies, Volume I,* pp. 558, 568-570.

34. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* p. 328.

35. Ibid., pp. 332-334, Map 5.

36. Ruppenthal, *Logistical Support of the Armies, Volume II,* p. 139.

37. Dunham, *Monograph 29,* pp. 218-223.

38. Ruppenthal, *Logistical Support of the Armies, Volume I,* p. 570-571.

39. Ruppenthal, *Logistical Support of the Armies, Volume II,* p. 136, Map 5.

40. Ibid., p. 142.

41. Dunham, *Monograph 29,* pp. 341-342.

42. Ibid., p. 343.

43. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* p. 338, Map 6.

44. Ibid., pp. 337-339.

45. Ibid., pp. 242-244.

46. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, p. 343, Map 7 and Ruppenthal, *Logistical Support of the Armies, Volume I*, pp. 548-549.

47. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, p. 334.

48. Ibid., p. 334.

49. Ibid., p. 342.

50. Ibid., pp. 344.

51. Ibid., p. 345.

52. Ruppenthal, *Logistical Support of the Armies, Volume II*, p. 155.

53. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 346-348, and Ruppenthal, *Logistical Support of the Armies, Volume II*, pp. 408-415.

54. Ruppenthal, *Logistical Support of the Armies, Volume II*, p. 413.

55. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 348-351.

56. Ibid., pp. 354-356.

57. Ruppenthal, *Logistical Support of the Armies, Volume II*, pp. 448-449, 572.

58. Ibid., pp. 574-581.

59. Ibid., pp. 319-327.

60. Ruppenthal, *Logistical Support of the Armies, Volume II*, p. 436, Map 11.

61. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 254-255.

62. Ibid., pp. 244-245.

63. Ibid., pp. 326-327.

64. Ibid., pp. 357-360.

65. Ibid., pp. 369-374.

CHAPTER NINE

1. John Miller Jr., *The U.S. Army in World War II, The War in the Pacific, Guadalcanal: The First Offensive*, Washington D.C., Historical Division, DA, Washington, D.C. 1949, Map No. I, inside back cover.

2. Brig. Gen. Vincent J. Esposito, ed., *The West Point Atlas of American Wars, Volume II*, New York, Praeger Publishers, 1959, Maps 129, 130.

3. Ibid., pp. Maps 132-140.

4. Ibid., pp. Maps 143, 144.

5. Ibid., p. Maps 147.

6. Ibid., pp. Maps 162-165.

7. Robert W. Coakley and Richard M. Leighton, *The U.S. Army in World War II, The War Department, Global Logistics and Strategy 1940-1943*, Washington D.C., Office of the Chief of Military History, United States Army, 1955, pp. 427-424.

8. James R. Masterson, *U.S. Army Transportation in the SWPA 1941-1947*, TC Monograph 31, Office of the Chief of Transportation, Washington D.C., October 1949, pp. 31-36.

9. Coakley and Leighton, *Global Logistics and Strategy 1940-1943*, pp. 420-424.

10. The organizations developed in the principal Pacific commands had a substantial bearing on transportation operations in the field and are addressed in some depth to describe the structure within which transportation operators had to work.

11. Extensive efforts were made to supply the Philippines with considerable loss of shipping. For example, on 19 February 1942, 70-80 Japanese planes attacked and sank

all resupply shipping assembled in Darwin. See Masterson, *U.S. Army Transportation in the SWPA,* pp. 19-31.

12. Joseph Bykofsky and Harold Larson, *The U.S. Army in World War II, the Technical Services, The Transportation Corps: Operations Overseas,* Washington D.C., Office of the Chief Military History, United States Army, 1957, pp. 425-429 and Masterson, *U.S. Army Transportation in the SWPA,* pp. 31-36. In October 1943, Brig. Gen. Thomas B. Wilson was transferred to the China-Burma-India Theater to be the Chief of Transportation there.

13. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 428-449, 434-436. At that time, Col. (later Brig. Gen.) William W. Wanamaker was C of T, having replaced Col. Plant in April 1944.

14. Ibid., p. 492. The Army Transport Service which focused on operating ports, Army transports, and small craft frequently was the nucleus of the command's Army Transportation Service that managed other modes as well. Both organizations used the acronym ATS.

15. Ibid., pp. 511-516.

16. Ibid., pp. 491-498, 511-516.

17. For details on CREGO's operations and its eventual disbandment on 31 Aug 45, see Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 437-447.

18. Ibid., pp. 513-516.

19. Ibid., p. 429.

20. Ibid., p. 435.

21. Masterson, *U.S. Army Transportation in the SWPA,* p. 697.

22. Masterson, *U.S. Army Transportation in the SWPA,* pp. 694-699 and Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 476-481.

23. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 497-501.

24. Ibid., pp. 495, 496.

25. Miller, *Guadalcanal: The First Offensive,* pp. 123, 142, 223- 226, 313-316, 371.

26. Ibid., p. 225.

27. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 503-509.

28. Ibid., p. 461. For operations at Oro Bay, Finschhafen, and other ports, and units assigned, see pp. 460-463.

29. Masterson, *U.S. Army Transportation in the SWPA,* p. 446.

30. Masterson, *U.S. Army Transportation in the SWPA,* p. 448 and Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* p. 464.

31. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* pp. 516-522, 533-537 provides a summary of these campaigns. See also, Philip A. Crowl and Edmund G. Love, *The U.S. Army in World War II, The Pacific Theater, Seizure of the Gilberts and Marshalls,* Washington D.C., Office of the Chief Military History, United States Army, 1955, pp. 187-193.

32. Crowl and Love, *The Pacific Theater, Seizure of the Gilberts and Marshalls,* pp. 123-131

33. Ibid., pp. 123-131.

34. Karl C, Dod, *The U.S. Army in World War II, the Technical Services, The Corps of Engineers: War Against Japan,* Washington D.C., Office of the Chief of Military History, United States Army, 1966, p. 56. Map 5.

35. Bykofsky and Larson, *The Transportation Corps: Operations Overseas,* p. 465.

36. Masterson, *U.S. Army Transportation in the SWPA,* pp. 451-454.

37. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 465-466, 534-535 and Masterson, *U.S. Army Transportation in the SWPA*, p. 454.

38. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 466-470, and Masterson, *U.S. Army Transportation in the SWPA*, pp. 460-468.

39. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 476-480 and Masterson, *U.S. Army Transportation in the SWPA*, pp. 670-681.

40. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 483-484 and Masterson, *U.S. Army Transportation in the SWPA*, pp. 699-715.

41. Bykofsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 535-537.

42. Ibid., p. 541.

43. Ibid., pp. 539-545.

44. Ibid., pp. 487-488.

CHAPTER TEN

1. Jean E. Smith, *The Defense of Berlin*, Baltimore Maryland, John Hopkins Press, 1963, p. 30.

2. Ibid., p. 94.

3. Ibid., p. 99.

4. James A. Huston, *The Sinews of War, Army Logistics 1775-1953*, Washington D.C., Office of the Chief of Military History, United States Army, 1966, p. 595.

5. The 76th Transportation Company, Medium Truck was assigned to the 53rd Transportation Battalion in Kaiserslautern Germany in 1994.

6. R.H. Knapp, "Save by Palletizing," *Military Review*, July 1951, p. 42.

7. Huston, *The Sinews of War*, p. 596.

8. William B. Bunker, "The Transportation Corps in the Vittles Operation", *Army Transportation Journal*, November-December 1948, p. 11.

9. Huston, *The Sinews of War*, p. 596.

10. Max Hastings, *The Korean War*, Simon and Shuster Inc., New York, 1987, p. 24.

11. Ibid.

12. Ibid.

13. Ibid., p. 27.

14. Ibid., p. 28.

15. Roy E. Appleman, *U.S. Army in the Korean War, South to the Naktong, North to the Yalu*," Washington D.C., Office of the Chief of Military History, United States Army, 1961, p. 19.

16. Ibid.

17. Ibid., p. 37.

18. Ibid., p. 39.

19. Ibid., p. 50.

20. Ibid., p. 59.

21. James A. Huston, *Guns and Butter, Powder and Rice*, Selsingrove, Susquehanna University Press, 1989, p. 52.

22. Ibid., p. 54.

23. Huston, *The Sinews of War*, p. 671.

24. Emma-Jo L. Davis, *History of the U.S. Army Transportation School, 1942-1962*, Ft. Eustis, VA, U.S.Army Transportation School, 1967, p. 89.

25. Ibid.

26. Paul F. Yount, was promoted to brigadier general after 14 years of active service. He later became the fourth Chief of Transportation serving from 1953-1958.

27. Huston, *Guns and Butter*, p. 218.

28. Ibid.

29. Ibid., p. 219.

30. Ibid., p. 220.

31. Ibid., p. 221.

32. Huston, *The Sinews of War*, p. 642.

33. Huston, *Guns and Butter*, p. 222.

34. Ibid., p. 253.

35. Ibid., p. 256.

36. Ibid.

37. Ibid., p. 257.

38. Terrence J. Gough, *U.S. Army Mobilization and Logistics in the Korean War*, Washington D.C., Center of Military History, United States Army, 1987, p. 68.

39. Huston, *Guns and Butter*, p. 256.

40. Ibid., p. 257.

41. Ibid.

42. Ibid.

43. Ibid., p. 258.

44. Ibid., p. 246.

45. Ibid., p. 249.

46. Ibid., p. 251.

47. *Transportation Corps Movement Doctrine for Support of Future Operations*, Ft. Eustis, VA, Transportation Corps Combat Development Group, 1957, passim.

48. Maurice A. Hoard, Jr., "The Vital Role of Movement Control," *National Defense Transportation Journal*, 1950, pp. 7-10, 53-54.

49. Ibid.

50. Huston, *Guns and Butter*, p. 230.

51. Ibid., p. 236.

52. *Army, Navy, Air Force Journal*, Volume 89, February 2, 1952, pp. 670-677.

53. Huston, *Guns and Butter*, p. 227.

54. Appleman, *South to the Naktong*, p. 519.

55. Bruce Palmer, Jr., *Intervention in the Caribbean, The Dominican Crisis of 1965*, Lexington, University Press of Kentucky, 1989, p. 13.

56. Lawrence A. Yates, *Power Pack: U.S. Intervention in the Dominican Republic, 1965-1966*, Fort Leavenworth, KS, Fort Leavenworth Papers no. 15, 1988, p. 7.

57. Palmer, *Intervention in the Caribbean*, p. 19.

58. Ibid., p. 183.

59. Yates, *Power Pack*, p. 202.

60. Ibid., p. 99.

61. Ibid., p. 198.

62. Ibid., p. 68.

63. Palmer, *Intervention in the Caribbean*, p. 35.

64. Lawrence M. Greenberg, *United States Army Unilateral and Coalition Operations in the 1965 Dominican Republic Intervention*, Washington, D.C., Analysis Branch, Center of Military History, United States Army,1987, p. 4.

65. Interview with Maj. (ret.) Luis Romero, by Capt. Eric R. Criner, September 15, 1993.

66. Yates, *Power Pack*, p. 122.

67. Ibid., p. 147.

CHAPTER ELEVEN

1. Adm. U.S.G. Sharp and Gen. William C. Westmoreland, *Report on the War in Vietnam*, Washington, D.C., U.S. Government Printing Office, 1969.

2. Ibid., p. 2.

3. Ibid., p. 3.

4. Joseph M. Heiser, Jr., *Vietnam Studies Logistic Support,* Washington D.C., Department of the Army, 1974, p. 6.

5. Ibid.

6. Ibid., p. 4.

7. Ibid., p. 7.

8. Ibid., p. 15.

9. *Evaluation of U.S. Army Transportation Management in South Vietnam,* Joint DA-USARPAC Transportation Management Team, 23 February 1968 (hereafter: DA-USARPAC Study), p. F-1.

10. General Fuson's contributions to the Transportation Corps spanned over 35 years of distinguished active commissioned service. His assignments included Director of Logistics, MACV and Commander, U.S. Army Transportation Center and Fort Eustis. During the period of 1975 - 1977, Lt. Gen. Fuson served as the Department of the Army Deputy Chief of Staff for Logistics.

11. Ibid., pp. I-13.

12. Public Law 99-433, 100STAT.992.

13. After 35 years of distinguished commissioned service, Lieutenant Colonel Thompson retired as a lt. gen. Following his tour in Vietnam, he served as the Director of Logistics, J-4, United States Readiness Command; Commander, 21st Support Command; and the Department of the Army Inspector General. In 1994, Lieutenant General Thompson (Ret.) was serving as the honorary Colonel of the Transportation Corps Regiment.

14. "U.S. Army Transportation Corps in the Republic of Vietnam," January 1970, p. 70.

15. The 124th Terminal Command was inactivated on 1 May 1972.

16. In his 35 years of outstanding commissioned service, General Ross made significant contributions to the Army and the Transportation Corps. He was particularly well known for his role in the development of the Post-Vietnam Transportation Corps. His assignments included Department of the Army, Deputy Chief of Staff for Logistics, and Commander, Army Materiel Command. General Ross retired from active duty on 31 March 1994.

17. The 8th Transportation Group and its three subordinate battalions were inactivated in the early 1970s after almost four years of service in the Republic of Vietnam. On 11 June 1986, the 124th Transportation Battalion was reactivated and assigned to the 45th Support Group to provide additional combat service support to the 25th Infantry Division, Hawaii. On 14 July 1986, the 8th Transportation Group was reactivated and redesignated Headquarters and Headquarters Detachment, 8th Transportation Brigade. In 1994, the 8th Brigade was an integral part of the Transportation Corps training base located at Fort Eustis, Virginia.

18. Jerome G. Peppers, *History of Military Logistics,* Logistics Education Foundation, Huntsville, AL, 1988, p. 240.

19. Ibid.

20. Ibid., p. 15.

21. Ibid., p. 24.

22. Ibid., p. 25.

23. *The Sentinel*, Fort Eustis, Virginia, 24 April 1959, p. 29.

24. Heiser, *Vietnam Studies Logistic Support*, p. 158.

25. In 1994, the 6th, 10th, and 11th Transportation Battalions were still active duty transportation battalions assigned to the 7th Transportation Group, Fort Eustis, Virginia. The 10th and 11th Transportation Battalions served as terminal service battalions, while the 6th Battalion was a truck battalion.

26. Lieutenant Colonel DeHaven served as Commandant, U.S. Army Transportation School and Commander, U.S. Army Transportation Center Fort Eustis, Virginia after promotion to major general, and subsequently as J-4, JCS as a lt. gen., the grade at which he retired.

27. The 4th Transportation Command remained on active duty as a major subordinate command in the Federal Republic of Germany until inactivated on 15 November 1991.

28. Heiser, *Vietnam Studies Logistic Support*, p. 25.

29. Ibid., p. 172.

30. Ibid.

31. DA-USARPAC Study, p. F-1.

32. Robert A. Brooks, *Transportation Proceedings*, November 1967, p. 7.

33. Heiser, *Vietnam Studies Logistic Support*, p. 172.

34. Ibid., p. 126.

35. Ibid.

36. Ibid.

37. RO/RO vessels were first used during the Civil War. Steamboats were modified with rail lines emplaced on their decks so railcars could be rolled aboard and transported across water obstacles to new operational areas.

38. General Frank S. Besson, Commander, Army Material Command was the primary force behind the expanding use of containers in Vietnam. After an inspection trip to Vietnam in 1966, he recognized that additional containerization was the key to eliminating Vietnam's clogged breakbulk pipeline. General Besson has been memorialized twice. The U.S. Army Transportation Museum was named in his honor. In 1988, the first vessel to enter the Army's inventory in over 30 years, the Logistics Support Vessel, LSV-1 was named for General Besson.

39. Known in 1994 as the Military Sealift Command (MSC).

40. These ships were designed and built specifically for the Department of the Defense to enhance DOD's merchant marine fleet. Designed to operate where no fixed ports were available, they were dependent on lighterage to bring their cargo ashore.

41. The 403d Transportation Company assumed a nearly identical mission during Desert Shield/Storm 22 years later with the difference that the supplies it handled arrived by air.

42. Throughout the Vietnam War, the U.S. Army's supply system had five classes of supply: Class I, Subsistence; Class II, Clothing; Class III, Petroleum Products; Class IV, Barrier Material; and Class V, Ammunition. After the war, the number of classes was expanded to ten to make classification easier.

43. Laterite is a residual product of rock decay that is red in color.

44. *The Wheel*, Fort Eustis, Virginia, 3 December 1965, p. 11.

45. The GOER was introduced to the Transportation Corps to help enhance the Corps' off-road capabilities. It was a large-tire, cargo-carrying vehicle designed and built by the

Caterpillar Tractor Company. It was a versatile vehicle with both cross- country and swim capabilities.

46. In 1994, the 7th Transportation Battalion was on active duty with the 507th Corps Support Group, 1st Corps Support Command, Fort Bragg, North Carolina.

47. Letter, General Frank S. Besson, 15 June 1967, Subject: Transportation Developments.

48. The spirit of Sergeant Seay's courage and sacrifice lives on in the Transportation Corps. His deeds have been commemorated by Seay Plaza, Fort Eustis and by Seay Field, 1st Corps Support Command, Fort Bragg.

49. Larry K. Ballard, "The Gun Trucks of Ambush Alley," *Army Logistican*, July-August 1986, p.28.

50. Ibid., p. 30.

51. Specialist Four Dahl was one of two Transportation Corps soldiers awarded the Medal of Honor in the Vietnam War. The other soldier was Sergeant Seay. The Transportation Corps had a Medal of Honor winner in World War II and one in the Korean War.

52. Ballard, p. 32.

53. A complete throughput of combat forces over the shore using a LOTS operation was a new concept. Past operations had soldiers and equipment staged on the beach until ground assets could move units/cargo into the theater. This operation throughput many of the personnel directly to their tactical assembly areas via helicopter.

54. Heiser, *Vietnam Studies Logistic Support*, p. 162.

55. Ibid., p. 163.

56. Ibid., p. 165.

57. Ibid., p. 164.

58. Ibid., p. 166.

59. Ibid., p. 154.

60. Harry S. Summers, *Vietnam War Almanac*, New York, Facts on File Publications, 1985, pp. 118, 189.

61. Heiser, *Vietnam Studies Logistic Support*, p. 163.

62. Carl F. Cannon, *History of Aircraft Maintenance in the U.S. Army, 1939 to the Present*, 1985, Fort Eustis, VA, U.S. Army Transportation School, p. 32.

63. Heiser, *Vietnam Studies Logistic Support*, p. 137.

64. In 1994, the 34th Support Group was on active duty serving in the Republic of Korea.

65. G.W. Collins, ed., "Red Ball Express: 1966," *National Defense Transportation Journal*, July-August 1966, pp. 28-29.

66. In Vietnam and again during Desert Shield/Desert Storm, U.S. Air Force 463L pallets were used for a wide variety of purposes leading to a theater and Department of Defense pallet shortage. During both wars a viable pallet recovery program would have precluded these shortages.

67. Robert W. Larson, "The United States Army Transportation Command, Europe," *Transportation Proceedings*, August 1969, p. 18.

68. REFORGER exercises were initiated in 1968 to demonstrate U.S. commitment to the readiness of NATO. The first REFORGER occurred January through February 1969, with the Transportation Corps contributing two transportation companies to the overall CONUS deployment. Units deploying in support of the first REFORGER included the 100th Truck Company, Fort Eustis, VA and the 342d Truck Company, Fort McClellan, Alabama.

69. Larson, The United States Army Transportation Command, p. 21.

70. After relinquishing command of the 37th Group in May 1967, Colonel Murray commanded the 4th Transportation Command in Vietnam. Subsequently, he served as the Director of Army Transportation, Department of the Army Deputy Chief of Logistics. Later he was promoted to major general and served as the Director of Logistics, MACV and Defense Attache, Saigon following the Vietnam cease fire.

71. Letter, Maj. Gen. John E. Murray, 28 February 1986, Subject: Operation FRELOC,

72. Maj. Gen. W.N. Redling, "Transportation Developments," 15 June 1967, p. 3.

73. On 31 July 1974 the command became Military Traffic Management Command (MTMC).

74. Transportation Center, Fort Eustis, Virginia, Regulation 10-1, p. ii.

75. The Wheel, Fort Eustis, Virginia, 19 September 1969, p. 1.

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1. John L. Romjue, *From Active Defense to Airland Battle: The Development of Army Doctrine 1973-1982*, Fort Monroe, VA, TRADOC Historical Monograph Series, Office of the Command Historian, TRADOC, 1984, p. 2.

2. TRADOC was established in July 1973 to carry out the Army missions of individual training and combat developments, includ ing the design responsibility for Army forces and organizations.

3. Susan Canedy, Anne W. Chapman, and John L. Romjue, *Prepare the Army for War, A Historical Overview of the Army Training and Doctrine Command 1973-1993* TRADOC Historical Monograph Series, Office of the Command Historians, TRADOC, Fort Monroe, VA, 1993.

4. Ibid.

5. *TRANSLOG,* August 1974, p. 1, Letter to the editor from Maj. Gen. Del Mar, dated 21 July 1974, subject: MTMC.

6. Ibid., p. 4.

7. General Meyer served as the Army Chief of Staff from 1979-1983.

8. Gen. E.C. Meyer, CSA White Paper, 1980, Subject: U.S. Army Capabilities.

9. Peter M. Dunn and Bruce W. Watson, ed., *American Intervention in Grenada, the Implications of Operation "Urgent Fury,"* Boulder, CO, Westview Special Studies in Military Affairs, 1985.

10. An airfield forced insertion operation required the assaulting force to seize control of the airfield.

11. Ibid., p. 163.

12. Ibid., p. 175.

13. Green Ramp served as the primary air outload point for the forces stationed at Fort Bragg. The 82d Airborne Division maintained one brigade in DRB 1 status which could deploy anywhere in the world from Green Ramp in 18 hours. The DRB was subdivided into three Division Ready Forces (DRF) each a battalion equivalent. The 82d deployed two DRF's in support of operation Urgent Fury. The logistical slice from the XVIII Airborne Corps headquarters and the 1st Corps Support Command accompanied the force.

14. Arrival/Departure Airfield Control Groups (A/DACG) were assigned to all U.S. Air Force Bases or Army airfields that supported a deployment mission for U.S. Army forces. The A/DACG performed numerous outload functions including the staging of deploying personnel and equipment, weighing and calculating the center of balance for deploying equipment, assisting in hazardous, cargo documentation, and verifying/certifying the deploying units load plans.

15. Vicki Regone and SP4 Michael Smith, "Soldiers From 7th Group Support Grenada Mission", The Wheel, 1 Dec 83, p. 14.

16. Dunn and Watson, *American Intervention in Grenada,* p. 179.

17. For a brief explanation of the Goldwater-Nichols Act, see Chapter Eleven.

18. In 1952, the Transportation Corps became proponent for aviation logistics support, and in 1954, the Department of the Army recommended that all Army aviation maintenance instruction be conducted at the Transportation School. This remained the case until 1983 when the Aviation Logistics School was established.

19. The regimental system stemmed from the early days of the Army when regiments were formed around an individual of means - the colonel of the regiment. The soldiers were paid by the colonel and owed their allegiance to him and to each other. The group stayed together, fought together and identified with the regimental flag and accouterments. *The Wheel,* July 1986, p. 6.

20. Ibid., p. 15.

21. MAC was redesignated the Airlift Mobility Command on 1 June 1992. MAC was disestablished as part of a major Air Force restructuring that recast the Air Force's structure from three major subordinate commands (Tactical Air Command, Strategic Air Command and Military Airlift Command) to two commands (Air Combat Command and Air Mobility Command).

22. Cassidy, General Duane H., "U.S. Transportation Command: New Command Force Projection", TRANSLOG, August 1987, p. 1.

23. Ibid., p. 2.

24. In the post-World War II era, Army vessels have been commanded by either non-commissioned officers or warrant officers, who unlike the warrants of other armed services, were not commissioned when they reached the grade of W-2. By definition, a vessel is commissioned when it is placed under the command of a commissioned officer, so Army vessels could not be commissioned. In 1987, the law regarding Army warrants was changed so they, too, were commissioned upon reaching the grade of W-2. This allowed the Army to commission those vessels, like the LSV, which were commanded by warrant officers.

25. Becker, Robert, "Army Commissions 1st Ship", Daily Press, 15 January 1988, pp. B1, B4.

26. Bruce W. Watson and Peter G. Tsouras, *Operation Just Cause,* The U.S. Intervention in Panama, Westview Press, 1991, p. 198.

27. Ibid., p. 199.

28. Ibid., p. 201.

29. Green Ramp, as noted in the text, served as Fort Bragg's primary Aerial Port of Embarkation (APOE) and was staffed by the 1st Corps Support Command to support the 82d's rapid deployment mission. Green Ramp was physically located within Pope Air Force Base, but the support structure and its real estate are considered Fort Bragg property. Therefore, Green Ramp was often referred to in connection with both Fort Bragg and Pope Air Force Base.

30. Ibid., p. 126.

31. Before the 20 December 1989 invasion, U.S. forces in Panama numbered 13,597. During Just Cause over 19,500 personnel were flown to Panama. Included in this figure are the more than 3,000 paratroopers who arrived during the early stages of the operation.

32. Between 20 December 1989 and 1 January 1990, the Military Airlift Command flew 408 MAC flights (55 C-130, 254 C-141, and 99 C-5's) supporting Just Cause. A total of 19,500 personnel and 11,700 tons of material were delivered.

33. The 7th Transportation Group, Fort Eustis, Virginia agreed to rotate an Arrival/Departure Airfield Control Group (A/DACG) every 90 days in support of Army cargo transiting Howard Air Force Base.

34. A composite platoon of 5 ton tractors, 2 1/2 ton trucks and busses, and sedans was formed out of in-country assets. Truck drivers from the 126th Transportation Company, 7th Transportation Battalion and from the 546th Transportation Company, 189th Maintenance Battalion were flown in to operate these vehicles.

35. Ibid., p. 125.

36. The call forward location on an airfield was the point where the field joint inspection was conducted between the Army and the Air Force. Upon completion of the inspection, the deploying equipment was controlled by the Air Force.

37. Ibid., p. 222.

38. Steele, Dennis, "Operation Just Cause", *Army,* February 1990, pp. 34-44.

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1. Mark Miller, *Desert Shield Fact Book,* 1991, Bloomington, IL, GDW Inc., pp. 6-7.

2. Ibid.

3. Norman Friedman, *Desert Victory, The War for Kuwait,* 1991, Annapolis, MD, Naval Institute Press, p. 27.

4. Robert H. Scales, Jr., *Certain Victory: The U.S. Army in the Gulf War,* 1993, Washington, D.C., Office of the Chief of Staff, U.S. Army, p. 42.

5. Ibid., p. 43.

6. A Ready Reserve Fleet Study initiated by Military Sealift Command just prior to Desert Shield indicated that the Ready Reserve Fleet was in a high state of readiness and could get to the ports of embarkation faster than the deploying units. The draft report was canceled one week after deployment began.

7. Ibid., p. 45.

8. Ibid.

9. The military time zone for Washington D.C. was Romeo time while Kuwait and Saudi Arabia fell in time zone Charlie. The time difference between the zones was 8 hours.

10. Ibid., p. 48.

11. In the first 30 days of World War II, Korea, and Vietnam the following numbers of soldiers were deployed: 29,000, 11,900, and 41,000 respectively.

12. CRAF provided the Department of Defense with additional civilian aircraft in the event of a national emergency. CRAF could be called up in stages to augment the Air Force's airlift requirements, while minimizing the impact on the civilian airline industry. During Desert Shield/Storm 38 CRAF aircraft were activated and flew more than 5,300 missions.

13. Eric Criner, Steve Lindahl, Drew Young, *Desert Shield, Joint Committee Report,* Fort Bragg / Pope Air Force Base, NC, XVIII Airborne Corps, December 1990, p. 18.

14. As described in the 1993 edition of the Joint Staff Officer's Guide, AFSC PUB 1, JOPES was the integrated joint conventional command and control system used to support military operation monitoring, planning, and execution activities. JOPES incorporated policies, procedures, personnel, and facilities by interfacing with automated data processing (ADP) systems, reporting systems, and WWMCCS ADP to support senior-level decision makers and their staffs at the National Command Authority (NCA) level and throughout the Joint Planning and Execution Community.

15. Bruce Babb, "Desert Shield: Experiences on the MAC Crisis Action Team," *Airlift,* Winter 1990-1991, pp. 1-3.

16. Unit Line Numbers (ULN) were alpha-numeric codes used to identify units on a TPFDDL and were the primary way to identify units in the JOPES deployment system. Aircraft arrived at deployment facilities slotted against a specific ULN from the TPFDDL.

17. Transportation Corps load planners maximized the usage of every aircraft in coordination with unit movement officers from deploying units. The average utilization rate for the C-141 was 96% while the rate of utilization of the C-5 was 97%. In laymen's terms the average C-141 departed Pope AFB with all but 4% of its total lift capacity (cargo) used.

18. The Latest Arrival Date (LAD) was a planning tool which forecast the closure of units into a theater of operations and was used to allocate transportation resources for each specific unit.

19. The Fort Bragg/Pope Air Base Force Deployment facility encompassed not only Green Ramp but the entire physical plant supporting the outload process. Fort Bragg's outload capabilities were dependent on facilities such as the Corps Marshaling Area, Personnel Holding Area, Call Forward Area and the Heavy Drop Rigging site. At Pope Air Force base, deployment outload was primarily supported from Green Ramp but Pope AFB also used several other ramps to support aircraft outloading.

20. Scales, *Certain Victory,* 1993, p. 87.

21. "Moving Out," *Government Executive,* November 1990, p. 232.

22. Scales, *Certain Victory,* 1993, p. 89.

23. Ibid.

24. Ibid., pp. 56-57.

25. William G. Pagonis and Jeffery L. Cruikshank, *Moving Mountains,* 1992, Boston, Harvard Business School Press, 1992, p. 90.

26. General Pagonis' military assignments contributed to his impressive logistical capabilities. His background included logistical support assignments with the 193d Infantry Brigade, Panama; battalion commander of the 10th Transportation Battalion, 7th Transportation Group, and Deputy Commander, 21st Support Command, Kaiserslautern Germany. At the time of deployment to Saudi, General Pagonis was serving as the Director of Logistics, Forces Command. Upon arrival in theater, he assumed the role of Deputy Commanding General for Logistics. Later, he was assigned to command of the ARCENT Support Command (Provisional) which evolved into the 22d Support Command. He retired as a Lt. Gen. in 1993.

27. Ibid., p. 65.

28. During the mid-eighties, the Army loaded the Green Harbor and three similar vessels with enough tentage, food, ammunition, and water purification and refrigeration equipment to provide a logistical jump-start to any Gulf operation until seaborne transport arrived from the United States.

29. William Matthews, "Sealift Feels Strain to Meet Commitment," *Navy Times,* 24 September 1990, pp. 6, 30.

30 Ibid., p. 6.

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1. Robert H. Scales, Terry L. Johnson and Thomas P. Odom, *Certain Victory: The U.S. Army in the Gulf War,* Washington D.C., Office of the Chief of Staff United States Army, 1993, p. 147.

2. Department of Defense, *Conduct of the Persian Gulf War, Final Report to Congress,* Department of Defense, April 1992, p. 411.

3. William G. Pagonis and Jeffery L. Cruikshank, *Moving Mountains,* Boston, Harvard Business School Press, 1992, p. 91.

4. LASH technology was developed in 1952. The LASH system provided for the barge to be separated from the mother ship using on board cargo handling equipment, which reduced the need for fixed port operations. The barges could be lifted onto smaller

vessels or pushed to a port using available tugs. ACADIA FOREST was the first commercial LASH vessel in service in 1962. LASH technology had been tried in the 19th century with the Scottish ship CONNECTOR. Utilizing three separate floating midsections, the vessel could drop a section at a port for off-loading and retrieve the section at a later date. Unfortunately, adequate technology did not exist to keep the vessel together in high seas, and during her maiden voyage CONNECTOR was lost at sea. World War II provided prototypes and advances in lighterage. The LASH vessels launched in the sixties were still in use in 1994.

5. Jeffery A. Kipers and Donald D. Parker, "The Storm on the Horizon, The 24th Transportation Battalion in Saudi Arabia," Tab A, *7th Transportation Group Operation Desert Shield/Storm After Action Review* (hereafter known as 7th Group AAR), Ft. Eustis, VA, 7th Transportation Group, 1991.

6. 24th Transportation Battalion After Action Review of Operation Desert Shield/Storm, Tab C, *7th Group AAR,* 1 January 1991.

7. 7th Transportation Group, *7th Transportation Group Unit Historical Lessons Learned Report, Operation Desert Shield/Storm,* Ft. Eustis, VA, 7th Transportation Group, 1991, Tab A, p. 4.

8. Logistics-over-the-shore (LOTS) operations provided for the movement of cargo, supplies, or personnel ashore over an improved landing beach or through a fixed port facility from off-shore using landing vessels and/or lighterage.

9. Ibid., p.1.

10. Ibid., p.10.

11. Different aircraft had different height restrictions for loading cargo on the aircraft. CRAF aircraft normally had the most restrictive height limitations because of the loading envelope of the aircraft. C130, C141 and C5 had more liberal height limitations depending whether the pallet was loaded on the ramp or the floor.

12. In 1994, the Air Mobility Command (AMC).

13. D.M. Evans, Headquarters, Department of the Army, *Operation Desert Shield/Storm After Action Report,* Army Concept Analysis Agency, Bethesda Maryland, AD-C 048960L, JULLS Number 61753- 26130, 27 September 1991.

14. *22d Support Command After Action Report,* Volume IVa, Tab F, 1 April 1991, p. 3.

15. Scales, et al., *Certain Victory,* p. 77.

16. *7th Transportation Group Unit Historical Lessons Learned Report,* Tab A.

17. Scales, et al., *Certain Victory,* p. 77.

18. The mission of the Heavy Equipment Transporter was to transport tanks and other heavy equipment in the theater of operations. Designed and built by the Oshkosh Truck Corporation the tractor-trailer had a payload capacity of 106,000 pounds over a range of 420 miles. The U.S. 1994 inventory was 750.

19. DOD, *Conduct of the Persian Gulf War,* p. 425.

20. Paul L. Willis, "Theater Linehaul Transportation Operations During Desert Shield and Desert Storm," 22d Support Command, April 1991, p. 4.

21. Ibid., p. 5.

22. The Global Positioning System (GPS) was a satellite based, radio navigation system that provided precise, world wide, three dimensional position, velocity, and timing data. By March 1991, 4,490 commercial and 842 military GPS receivers were deployed in for use by Desert Storm units.

23. Willis, "Theater Linehaul Transportation," p. 6.

24. Peter S. Kindsvatter, " VII Corps in the Gulf War," *Military Review,* January 1992, p. 3.

25. The 1st Infantry Division's, 3d brigade had not yet totally upgraded their M113 personnel carriers to Bradley Fighting vehicles and the decision was made to deploy the 3d Brigade of the 3d Infantry Division instead.

26. Kindsvatter, "VII Corps in the Gulf War," p. 3.

27. Ibid., p. 9.

28. Ibid., p. 11.

29. *22d Support Command After Action Report,* Volume IVb, Tab B, 10 May 1991, p. 15.

30. Ibid., p. 15.

31. Ibid., p. 11.

32. Willis, "Theater Linehaul Transportation," p. 7.

33. Ibid., p. 9.

34. Ibid., p. 10.

35. Block times were used to bar the use of a main supply route to all other traffic except the unit with priority. Therefore, units were given block times to move along certain routes. When their block time expired another unit gained priority over the route and used its block time to move.

36. Col. Stephen F. Rausch, ed., "Tracking the Storm," *Miltary Review,* September 1991, p. 72.

37. Scales, et al., *Certain Victory,* p. 146.

38. Col. Frederick C. Perkins and Col. John C. Race, Jr., "Moving the XVIII Airborne Corps During Desert Storm, A Personal Experience Monograph," U.S. Army War College, 25 May 1994, p. 24.

39. Ibid., p. 24.

40. Willis, "Theater Linehaul Transportation," p. 14.

41. Scales, et al., *Certain Victory,* p. 216.

42. Perkins and Race, Jr., "Moving the XVIII Airborne Corps," p. 19.

43. Michael D. Krause and William G. Pagonis, "Theater Logistics in the Gulf," *Army Logistician,* July-August 1992, p. 6.

44. Ibid.

45. Ibid.

46. Willis, "Theater Linehaul Transportation," p. 15.

47. Ibid., p. 16.

48. Scales, et al., *Certain Victory,* p. 323.

49. Ibid.

50. Ibid., p. 338.

51. Willis, "Theater Linehaul Transportation," p. 19.

52. Scales, et al., *Certain Victory,* p. 339.

53. Ibid.

54. *22d Support Command After Action Report,* Volume IVb, Tab 6.

55. Wesley V. Manning, "Command Report Desert Storm," *22d Support Command After Action Report,* Volume III, p. 8.

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2. Chester Wardlow, *The Transportation Corps: Movements, Training and Supply,* Washington D.C., Office of the Chief of Military History, United States Army, 1956, pp. 166, 326, 417.

3. Joseph Bykofsky and Harold Larson, *The U.S. Army in World War II, the Technical Services, The Transportation Corps: Operations Overseas,* Washington D.C., Office of the Chief Military History, United States Army, 1957, pp. 324-326.

4. Hoard, "The Vital Role," p. 7.

5. Jack Fuson, *Transportation and Logistics: One Man's Story*, Draft Manuscript, Washington D.C., Center of Military History, United States Army, 1994, Chapter 5.

6. Ascom City was originally the depot for American occupation forces after World War II and retained its name during the Korean War.

7. James A. Huston, *Guns and Butter, Powder and Rice*, Selsingrove, Susquehanna University Press, 1989. Another factor bearing on port problems was that the command which controlled the ports did not control either water transport or rail requiring coordination across major commands to ensure rail cars arrived during vessel off-load. Countless occurrences of ships discharged without rail transport to clear the cargo from the port added to the congestion as off-loaded supplies were stored on piers waiting onward movement.

8. Ibid., p. 251

9. Field Manual 55-10, *Army Transportation Movements Management*, Headquarters, Department of the Army, June 1969, passim.

10. Transportation Corps Combat Developments Group, *A Study for the Establishment of Doctrine, Procedures and Techniques for Future Operations*, U.S. Army Transportation Center, Ft. Eustis, VA, 1957, Annex A and B, passim.

11. Joseph M. Heiser, Jr., *Vietnam Studies Logistic Support*, Department of the Army, 1974, p. 159.

12. Joint DA-USARPAC Transportation Management Team, "Evaluation of U.S. Army Transportation Management in South Vietnam," 23 February 1968, pp. H1-H4.

13. Field Manual 55-10.

14. *22D Support Command After Action Report*, Volume IVa, Tab F.

15. Ibid.

16. Paul L. Willis, "Theater Linehaul Transportation Operations During Desert Shield and Desert Storm," *22d Support Command, April 1991*, pp. 1-20.

17. Examples of DOD directives and regulations include: DOD Directive 4500.9, Transportation and Traffic Management, dated 1January 1989; DOD Regulation 4500.32, Standard Transportation and Movement Procedures, Volume I dated 7 May 1992 and Volume II date 1 January 1989; and DOD Directive 4500.37, Management of the DOD Intermodal Container System, dated 2 April 1987.

18. Fuson, *Transportation and Logistics*, Chapter 11, p. 3., and Chapter 15, p. 5.

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Glossary of Technical Terms

A-frame
Device used as a field expedient in beach operations when cranes were not available in sufficient quantity. Usually attached to an amphibian truck or other vehicle, it could lift approximately 4,000 pounds. Also, a pack frame used to man-carry loads.

Amphibian vehicle
Vehicle capable of operating on both land and water.

Balanced cargo
a mixture of heavy and light cargo, which approximately fills the cargo space and weighs the ship down to its maximum draft.

Balanced stocks
An acumulation of supplies of all classes in quantities necessary to meet requirements for a fixed period.

Balloon cargo
Items, such as assembled trucks, which occupy an exceptionally large amount of space in relation to their weight.

Bareboat charter
A form under which the charterer hires the vessel only and provides the crew, supplies, fuel, and other operating requisites.

Berth
Place where a ship lies at pier, quay, or wharf.

Block loading
System, used extensively in the Pacific from late 1943 for resupply of invasion troops, involving the loading of vessels with carefully organized blocks of supplies such as trooops were likely to require soon after landing.

Block system (rail)
System, often used in single-track operation, whereby only one train can operate over a particular section or block at a time. In order to move a train from one station to another, the operator must clear the intervening section with the operator at the end of the block.

Block system (trucking)
A form of relay operation whereby trucks operate continously from origin to destination and back with changes in drivers at intermediate stations, which are usually located one day's travel time apart.

Bunkerage
Fueling or coaling of ships.

Cannibalize
the use of equipment or parts from inoperable/damaged materiel to maintain other materiel.

Combat loader
A vessel especially equipped for combat loading. The Navy provided two types-APA (transport, attack), and AKA (cargo ship, attack).

Combat loading
Loading a ship with equipment and supplies required by assault forces, and stowiing the various items in such a manner as to make possible their rapid unloading in the order needed.

Combat zone
Forward area of a theater of operations, where conbat troopos are actively engaged.

Commodity loading
The loading of vessels with a specific type of cargo such as rations, vehicles, or ammunition, to fill an immediate on-the-spot requirement.

Communications zone
The part of a theater of operations behind the combat zone, where supply, transportation, and other facilities are located and services performed.

Deadline
Remove from action, as for repairs.

Dead-weight tonnage
Actual carrying capacity of a vessel, including stores, fuel, water, and cargo.

Double heading
The use of two locomotives to pull a train, usually over rugged country.

Dry cargo ship
Any ship, except a tanker ship carrying liquids in bulk. As used in World War II the term applied to passenger ships as well as freighters.

Dumb barges
Nonpropelled barges.

Echelon maintenance
System of maintenance and repair of materiel and equipment in which jobs are allocated to organizations in accordance with the availability of personnel, tools, supplies, and time within the organizations. Categories range from first echelon, which includes simplest forms of upkeep to the fifth, which includes heavier repairs including overhaul.

Filler cargo
Packaged and bagged supplies which can be stowed in small and irregularly shaped spaces in the hold of a ship.

Flatting
bottom stowing and flooring off of cargo in a vessel in order to provide ballast or an emergency reserve, and on which vehicles can be easily stowed.

Full and down
Term indicating that a vessel has all cargo space filled and that the cargo is sufficiently heavy to take the ship down to the legal maximum draft.

General cargo
Broadly used, the term included all except bulk cargoes, but in Army usage it may include explosives.

Graving dock
Dry dock used for ship repair or construction.

Landing craft
Any vessel used to carry men, equipment, and supplies ashore.

Lighter
Boat or flat-bottomed barge used for loading or unloading ships.

Line of communications (LOC) hauling
The transporting of bulk supplies and personnel over theater main supply roads in accordance with priorities and commitments set by the theater or a comparable command. This hauling was usually intersectional in scope, in contrast with local or base hauling.

Long ton
Weight ton of 2,240 pounds.

Measurement ton
40 cubic feet; sometimes called ship ton, since it was used chiefly in connection with ocean transportation.

Metric ton
Weight ton of 2,204.6 pounds.

Packaged gasoline
Gasoline in cans or drums.

Palletized or skidloaded cargo
Cargo fastened to a platform, often equipped with bridle and runners for towing along the ground. Facility in moving pallets on beaches made up for some loss in shipping space. Pallets facilitate movement of breakbulk cargo by mechanical means.

Passing track or siding
A track adjacent to and parallel to the main track with a switch at both endds connecting it with the main track. Used in single-track operation, the passing track was used to permit trains traveling in opposite directions to pass.

Pier
Structure that projects into water where vessels berth for loading or unloading cargo, usually constructed at right angles to the shore line.

Port capacity
The tonnage that can be discharged daily from ships, based only on evaluation of the physical facilities of the port.

Port or beach clearance
The tonnage that may be transported inland daily from a beach or port by available means of inland communication, including highways, railroads, and inland waterways.

Prestowing
A system similar to block loading, used in connection with the invasion of Normandy.

Quay
Wharf parallel with basin or harbor, with water on one side.

Rail wagon
Railway car.

Reefer box
Refrigerated box, used on board ship or brought ashore.

Reefer vessel
Refrigerated vessel.

Semitrailer
Wheeled vehicle without motive power, intended primarily for the transportation of cargo or equipment designed to be towed and attached to a truck-tractor by means of a fifth-wheel device, a portion of its weight being carried by the truck-tractor. It is equipped with retractable gear to support the front end when detached. Containers can be loaded on dollies and moved in semi-trailer configuration.

Short ton
Weight of 2,000 pounds.

Spotting
Placing railway car on a track for loading or unloading.

Tanker
Tank ship for transporting petroleum products and other liquids in bulk.

Theater of operations
Army command including the area of actual fighting (combat zone) and the adjacent area utilized for supporting administsrative and supply activities (communications zone).

Topping off
Top stowing of cargo to complete the loading of a ship.

Trailer
Vehicle designed to be towed, provided with a drawbar or tongue for attachment to a coupling mounted on the towing vehicle.

Train-order system
a method of train operation used generally in conjunction with a timetable, showing where scheduled trains will meet.

Truck-tractor
Wheeled vehicle propelled by a self-contained power unit, designed primarily as a truck chassis, but provided with a fifth wheel for attachment to and for towing semitrailers.

'Tween decks
Space between the main deck and the hold.

War flats
Flatcars of 56-ton capacity (WW II), manufactured for the War Department.

Weight ton (British)
2,240 pounds.

Weight ton (U.S.)
2,000 pounds.

Wharf
Structure where vessels berth to load or unload cargo, usually constructed parallel to the shore line.

Zone of interior
The area which furnishes manpower and materiel to the forces in theaters of operation. During World Wars I and II, the zone of interior was the United States.

Glossary of Code Names

ANAKIM
Plan to retake Burma and open the line of communications to China through the port of Rangoon.

ANVIL
The planned 1944 Allied invasion of southern France in the Toulon-Marseille area.

ARCADIA
U.S.-British conference at Washington, December 1941-January 1942.

AVALANCHE
Plan to seize Salerno.

BIG STICK
Operation plan to destroy the Communist suppply complex based on Sibyon-ni, to advance Eigth Army left flank to the Yesong River, and regain Kaesong.

BIGOT
Code for correspondence dealing with plans for future military operations.

BLUEHEARTS
Code name for the original plan for an amphibious landing behind enemy lines, abandoned by 10 July 1950. Succeeded by CHROMITE.

BOLERO
Build-up of troops and supplies in the United Kingdom in preparation for a cross-Channel attack.

CARGO
An amphibious exercise in preparation for the cross-Channel attack.

CEDAR FALLS
AN operation during the Vietnam war in which the U.S. Army attacked and destroyed a Viet Cong stronghold known as the Drew Traingle.

CENT
Task force built around the 45th Infantry Division for the invasion of Sicily.

CHASTITY
Plan for the construction of an artificial harbor in the Quiberon Bay area, on the southern coast of Brittany.

CHROMITE
Code name for amphibious operations in September 1950, one of which was a landing at Inchon.

CRIMSON
Project to set up in central and northeastern Canada a series of airfields situated along alternate routes to permit a choice of landing fields in the event of bad weather.

CRYSTAL I
U.S. weather station and airfield at Fort Chimo, Labrador.

CRYSTAL II
U.S. weather station and airfield on Frobisher Bay, Baffin Island.

CRYSTAL III
U.S. weather station and airfield on Padloping Island.

DESERT SHIELD
The deployment of U.S. Forces to Saudia Arabia in order to stop Iraq's aggression from continuing into Saudia Arabia.

DESERT STORM
The multinational coalition military operation to force Iraq out of Kuwait.

DESERT EXPRESS
A rapid, air transport service to provide critical supplies (mainly class IX) to the Desert Shield/Storm theater.

DRAGOON
Allied invasion of southern coast of France, 15 August 1944, planned under the code name ANVIL.

FRELOC
The evacuation in 1967 of all U.S. Armed forces and installations from French territory.

GOOSEBERRY
A partial breakwater, formed by sinking blockships moored bow-to-stern and designed to provide a sheltered area for tugs, barges, landing craft, and DUKW's.

GYMNAST
Early plan for the invasion of North Africa.

HARLEQUIN
An exercise in preparation for the launching of an amphibious force from the southern coast of England.

HIGHLAND
An operation during the Vietnam War by which the 1st Cavalry Division was transported over-the-shore and moved into theater.

HUSKY
Allied invasion of Sicily in July 1943.

JUST CAUSE
Deployment of U.S. Forces to Panama on 20 December 1989.

LOGEX
A Desert Shield logistical exercise to rehearse the 22d SUPCOM's logistical support of the XVII and VII Corps movements into their attack positions.

MAGNET
Movement of U.S. forces to Northern Ireland, 1942.

MULBERRY A
Artificial port in American sector at OMAHA Beach.

MULBERRY B
Artificial port in British sector at Arromanches-les-Bains.

NEPTUNE
Actual 1944 operations within OVERLORD. This code name was used for security reasons after September 1943 on all OVERLORD planning papers which referred to the target area and date.

OMAHA
Invasion beach north of Aure River, northern France.

OVERLORD
Plan for the invasion of northwest Europe, spring 1944.

PEGASUS
An operation that provided the relief forces to the Khe Sahn outpost during the 1968 Tet offensive in Vietnam.

POWER PACK
The 82d Airborne deployment to the Dominican Republic in April 1965.

PROJECT DEEP FREEZE
National Science Foundation experiments in the Antarctic in 1957.

QUADRANT
First Quebec conference, August 1943.

RAINBOW 4
U.S. joint Army-Navy plan for defense in the event that both Britain and France should be defeated.

RED BALL EXPRESS
Code Name for a rapid U.S. truck service in France in WW II, and an air transport service during the Vietnam War.

REFORGER
An exercise initiated in 1968 to show the world the United States' contribution to the increased readiness of NATO.

REMAGEN
An operation during the Vietnam war which was designed to test the capabilities of helicopters to support combat operations.

ROUNDUP
Plan for major U.S.-British attack across the Channel in 1943.

SEXTANT
Cairo-Tehran Conferences 22 November-7 December 1943.

SHINGLE
Plan for landings at Anzio.

SLEDGEHAMMER
Plan for a limited-objective attack across the Channel in 1942 designed either to take advantage of a crack in German morale or as a "sacrifice" operation to aid the Russians.

TASK FORCE SMITH
The first U.S. military operation during the Korean War.

TORCH
Allied invasion of North and Northwest Africa, November 1942.

TRIDENT
Washington Conference, May 1943.

UGLY
A scheme for numbering requisitions so that the oversea command could readily identify all items en route in a convoy by the receipt of a cargo cable listing the identifying numbers and the cargo tonnage under each number.

URGENT FURY
Deployment of U.S. Forces to the island nation of Grenada in October 1983.

UTAH
Invasion beach on the Cotentin peninsula, northern France.

VITTLES
The name for the massive Berlin Airlift during 1948-1949.

WILDFLOWER
Great Britain.

Glossary of Acronyms/Abbreviations

AAA
Antiaircraft Artillery
AAE
Advanced Administrative Echelon
AAF
Army Air Forces
AAR
Association of American Railroads
ABC Route
Antwerp Brussels Charleroi Route
ABCCC
Airborne Command And Control Center
ABDA
American British Dutch Australian (Command)
ABL
Alaska Barge Line
ABL
American Barge Lines (in India)
Abn
Airborne
ABS
Atlantic Base Section
ACofS
Assistant Chief of Staff
ACofT
Assistant Chief of Transportation
ACR
Armored Cavalry Regiment
ACSI
Assistant Chief of Staff for Intelligence
ADA
Air Defense Artillery
A/DACG
Arrival/Departure Airfield Control Group
ADC
Alaska Defense Command
ADCOM
Advance Command and Liaison Group in Korea
ADM
Admiral
ADSEC
Advance Section
ADVATIS
Advanced Allied Translator and Interpretor Section
AEF
American Expeditionary Force
AFB
Air Force Base
AFF
Army Field Forces
AFFE
Army Forces, Far East
AFHQ
Allied Force Headquarters
AFPAC
Army Forces, Pacific
AFWESPAC
Army Forces, Western Pacific
AGF
Army Ground Forces
AGO
Adjutant General's Office
AGWAR
Adjutant General, War Department
AH
Attack Helicopter
ALOC
Air Lines of Communication
AMC
Army Materiel Command
AMGOT
American Military Government
AMIK
American Mission in Korea
AOE
Army of Excellence
AP&SC
Army Port and Service Command
APOD
Aerial Port of Debarkation
APOE
Aerial Port of Embarkation
ARCENT
Army Component to Central Command

ARVN
Army of the Republic of Vietnam
ASC
Air Service Command
ASCOM
Army Service Command
ASF
Army Service Forces
ASG
Area Support Group
ASP
Ammunition Supply Point
ASW
Assistant Secretary of War
ATA
American Trucking Association
ATC
Air Transport Command
ATIS
Allied Translator & Interpreter Section
ATS
Army Transport Service
B&O
Baltimore and Ohio Railroad
BARC
Barge Amphibious Resupply Cargo
Bde
Brigade
BELMOT
Belgian Movements Organization for Transport
BG
Brigadier General
B/L
Bill of lading
BMWT
British Ministry of War Transport
Bn
Battalion
BPE
Boston Port of Embarkation
Brig Gen
Brigadier General
BS
Base Section
BUCO
Build up Control Organization
BuDocks
Bureau of Docks (Navy)
C/S
Chief of Staff
CB
Citizens Band
CBI
China, Burma, India
CBS
Coastal Base Section, Continental Base Section
CCF
Chinese Communist Forces
CCS
Combined Chiefs of Staff
CDC
Caribbean Defense Command
CE
Corps of Engineers
CENTCOM
Central Command
CG
Commanding General
CH
Cargo Helicopter
CINC
Commander-in-Chief
CINCCENT
Commander-in-Chief Central Command
CINCFE
Commander-in-Chief, Far East
CINCPAC
Commander-in-Chief, U.S. Pacific Fleet
CINCPOA
Commander-in-Chief, Pacific Ocean Areas
CINCUNC
Commander-in-Chief, United Nations Command
CMA
Corps Marshaling Area
CMTC
Combined Military Transportation Committee
CNO
Chief of Naval Operations
CO
Commanding Officer
Co
Company
CofE
Chief of Engineers
CofOrd
Chief of Ordnance

CofS
Chief of Staff
CofT
Chief of Transportation
Col
Colonel
COMMZ
Communications Zone
COMNAVFE
Commander, U.S. Naval Forces, Far East
COMSERVPAC
Commander, Service Forces, U.S. Pacific Fleet
COMSOPAC
Commander, South Pacific Area
COMZ
Communications Zone
COMZONE
Communications Zone
CONAD
Continental Advance Section (Southern France)
CONEX
Container Express
CONUS
Continental United States
COR
Contracting Officer Representative
COSC
Combined Operational Service Command
COSCOM
Corps Support Command
COSSAC
Chief of Staff to the Supreme Allied Commander (Designate)
CP
Command post
CPA
Central Pacific Area
CPBC
Central Pacific Base Command
CPL
Corporal
CPT
Captain
CRAF
Civil Reserve Air Fleet
CREGO
Chief Regulating Officer
CSA
Corps Storage Area
CSM
Command Sergeant Major
CSS
Combat Service Support
CSUSA
Chief of Staff, U.S. Army
CWO
Chief Warrant Officer
DA
Department of the Army
DACG
Departure Airfield Control Group
DAO
Defense Attache Office
DCofS
Deputy Chief of Staff
DCG
Deputy Commanding General
DCofT
Deputy Chief of Transportation
DSS
Direct Support System
Det
Detachment
Div
Division
DOD
Department of Defense
DODAAC
Department of Defense Activity Address Code
DRB
Division Ready Brigade
DRF
Division Ready Force
DSA
Division Support Area
DSSD
Depot Supplies Shipment Data
DUKW
2 1/2 ton, 6 X 6 amphibian truck, used for short runs from ship to shore
E&D sec
Embarkation and Debarkation Section
EAC
Echelons Above Corps
EBS
Eastern Base Section.

EDRE
Emergency Deployment Readiness Exercise
EDT
Eastern Daylight Time
EMBARCO
Embarkation Control
EOC
Emergency Operation Center
EPW
Enemy Prisoner of War
EST
Eastern Standard Time
ETF
Eastern Task Force
ETO
European Theater of Operations
EUSAK
Eighth U.S. Army in Korea
FASCOM
Field Army Support Command
FDC
Fire Directon Center
FDRP
first destination reporting point.
FEAF
Far East Air Forces
FEC
Far East Command
FECZ
Forward Echelon, Communications Zone (France)
FFI
French Forces of the Interior
FLS
Forward Landing Strip
FAFPAC
Fleet Marine Force, Pacific
FO
Field Order
FORSCOM
United States Army Forces Command
FRELOC
Free Lines of Communications/Fast Relocation
FY
Fiscal Year
G1
Personnel section of divisional or higher headquarters
G2
Intelligence section of divisional or higher headquarters
G3
Operations and training section of divisional or higher staff
G5
Civil affairs section of divisional or higher staff
GCC
Gulf Cooperation Council of the Arab States
GDSS
Global Decision Support System
Gen
General
GHQ
General Headquarters
GHQ, SWPA
General Headquarters, Southwest Pacific Area
GO
General Order
GOER
GOER Vehicle
GPS
Global Positioning System
GRT
Gross Registered Ton
GS
General Staff
GSC
General Staff Corps
H&R
Holding and Reconsignment
HE
High Explosive
HEAT
High Explosive, Antitank
HEMMT
Heavy Expanded Mobility Tactical Truck.
HET
Heavy Equipment Transporter
HRPE
Hampton Roads Port of Embarkation
HUSAFPOA
Headquarters, U.S. Army Forces, Pacific Ocean Areas
IBC
Iceland Base Command.
IBS
Island Base Section
ICC
Interstate Commerce Commission.

ICRC
International Committee of the Red Cross
ID
Infantry Division
IG
Inspector General
IGD
Inspector General's Deparatment
I&R
Intelligence & Reconnaissance
IRO
International Refugee Organization
ISR
Iranian State Railway
ISS
Identification of Separate Shipments
IWD
Inland Waterways Division
IWT
Inland Water Transport
IWTS
Inland Water Transport Service
J1
Joint Staff Personnel Section
J2
Joint Staff intelligence Section
J3
Joint Staff Operations Section
J4
Joint Staff Logistics Section
J5
Joint Staff Civil Affairs Section
JAG
Judge Advocate General
JANIS
Joint Army Navy Intelligence Service
JB
Joint Board
JCS
U.S. Joint Chiefs of Staff
JDA
Joint Deployment Agency
JDS
Joint Deployment System
JFC
Joint Forces Command
JIC
Joint Intelligence Committee
JLC
Japan Logistical Command
JLOTS
Joint Logistics Over The Shore
JMTC
Joint Military Transportation Committee
JOC
Joint Operations Center
JOPES
Joint Operation Planning and Execution System
JOSCO
Joint Overseas Shipping Committee
JPB
Joint Purchasing Board
JSPOG
Joint Strategic Plans and Operations Group
JSSC
Joint Strategic Survey Committee
JTF 7
Joint Task Force Seven
KATUSA
Korean Augmentation to the U.S. Army
KCOMZ
Korean Communications Zone
KCRC
Kansas City Records Center
KIA
Killed in Action
KKMC
King Khalid Military City
KMAG
United States Military Advisory Group to the Republic of Korea
KMC
Korean Marine Corps
KSC
Korean Service Corps
LACV
Lighter, Air Cushioned Vehicle
LAD
Latest Arrival Date
LAPE
Los Angeles Port of Embarkation
LARC
Lighter Amphibious Resupply Cargo
LASH
Lighter Aboard Ship
LBV
Landing Barge, Vehicle
LCI
Landing Craft, Infantry

LCL
Less Than Carload
LCM
Landing Craft, Mechanized
LCP
Landing Craft, Personnel
LCT
Landing Craft, Tank
LCU
Landing Craft, Utility
LCV
Landing Craft, Vehicle
LCVP
Landing Craft, Vehicle And Personnel
LOC
Lines Of Communication
LOGEX
Logistics Exercise
LOTS
Logistics-Over-The-Shore
LSD
Landing Ship, Dock
LST
Landing Ship, Tank
LSV
Logistics Support Vessel
LT
Long Ton
1LT
First Lieutenant
2LT
Second Lieutenant
Lt
Lieutenant
Lt Gen
Lieutenant General
LTG
Lieutenant General
LUBSEC
Luzon Base Section
MAAG
Military Assistance and Advisory Group
MAC
Military Airlift Command
MAC
Military Armstice Commission
MACV
Miitary Assistance Command, Vietnam
Maj
Major
Maj Gen
Major General
MATS
Military Air Transport Service
MBS
Mediterranean Base Section
MC
Medical Corps
MCA
Movement Control Agency
MCC
Movement Control Center
MCO
Movement Control Officer
MCT
Movement Control Team
MDAP
Mutual Defense Assistance Program
MG
Major General
MHE
Materials Handling Equipment
MLRS
Miltiple Launch Rocket System
MMC
Material Management Center
MOS
Military Occuational Speciality
MOVCO
Movement Control
MP
Military Police
MPH
Miles Per Hour
MRS
Military Railway Service
MSC
Military Sealift Command
MSG
Master Sergeant
MSR
Main Supply Route
MSTS
Military Sea Transportation Service
MT
Measurement Ton
MT
Motor Transport
MTB
Motor Transport Brigade
MTMC
Military Traffic Management Command

MTMTS
Military Traffic Management and Terminal Service
MTO
Mediterranean Theater of Operations
MTOUSA
Mediterranean Theater of Operations, U.S. Army
MTS
Motor Transport Service
MTV
Motor Transport Vessel
NAD
North Atlantic Division
NASBO
North African Shipping Board
NATO
North African Theater of Operations
NATO
North Atlantic Treaty Organization
NATOUSA
North African Theater of Operations, U.S. Army
NAVFE
U.S. Naval Forces, Far East
NBC
Newfoundland Base Command
NCO
Noncommissioned Officer
NCOIC
Noncommissioned Officer In Charge
NKPA
North Korean People's Army
NOIC
Naval Officer In Charge
NOPE
New Orleans Port of Embarkation
NPRJ
National Police Reserve Japan
NTS
Naval Transportation Service
NSC
National Security Council
NWSC
Northwest Service Command
NYPE
New York Port of Embarkation
OCAFF
Office, Chief of Army Field Forces
OCMH
Office of the Chief of Military History
OCofE
Office of the Chief of Engineers
OCS
Officer Candidate School
OCT
Office of the Chief of Transportation (variation of OCofT)
OCofT
Office of the Chief of Transportation (prior to 1964)
OCOT
Office of the Chief of Transportation
ODT
Office of Defense Transportation
OH
Observation Helicopter
ONI
Office of Naval Intelligence
ONO
Office of Naval Operations
OPD
Operations Division, War Department General Staff
OPEC
Organization of Petroleum Exporting Countries
OPLAN
Operation Plan
OQMG
Office of The Quartermaster General
OSA
Office of the Secretary of the Army
OSAF
Office of the Secretary of the Air Force
OSD
Overseas Supply Division
PAO
Public Affairs Office
PBS
Peninsular Base Section
PDF
Panamanian Defense Forces
PFC
Private First Class
PGC
Persian Gulf Command
PGSC
Persian Gulf Service Command
POA
Pacific Ocean Areas
POE
Port Of Embarkation

POL
Petroleum, Oils, and Lubricants
POM
Priority of Movement
POW
Prisoner Of War
PRR
Pennsylvania Railroad
PVT
Private
PX
Post Exchange
QM
Quartermaster
QMD
Quartermaster Department
QMG
Quartermaster General
QNSC
Qui Nhon Support Command
R DAY
Redeployment Day
R&D
Research and Development
RAA
Redeployment Assembly Area
RCC
Redeployment Control Center
RCT
Regimental Combat Team
REFORGER
Return of Forces to Germany
Regt
Regiment
RO/RO
Roll On/Roll Off
RGD
Railway Grand Division
RMCT
Regional Movement Control Team
ROB
Railway Operating Battalion
ROC
Railway Operating Company
ROK
Republic of Korea
ROKA
Republic of Korea Army
ROM
Refuel On the Move
RR
Railroad
RSB
Railway Shop Battalion
RTCH
Rough Terrain Container Handler
RTO
Rail or Railway Traffic Officer
Ry
Railway
S 1
Adjutant
S 2
Intelligence Officer
S 3
Operations and Training Officer
S 4
Supply Officer
SEAC
Southeast Asia Command
SFC
Sergeant First Class
SFPE
San Francisco Port of Embarkation
1SG
First Sergeant
SGM
Sergeant Major
SGS
Secretary of the General Staff
SGT
Sergeant
SHAEF
Supreme Headquarters, Allied Expeditionary Forces
SMESA
Special Middle East Shipping Agreement
SOLOC
Southern Line of Communications
SOP
Standing Operating Procedure
SOS
Services of Supply
SP4
Specialist Four
SPA
South Pacific Area
SPBC
South Pacific Base Command

SPDB
Ship Priority and Destination Board
SPE
Seattle Port of Embarkation
SPOD
Sea Ports Of Debarkation
SSA
Supply Support Activity
SSC
Saigon Support Command
SSG
Staff Sergeant
STON
Short Ton
SUPCOM
Support Command
SWPA
Southwest Pacific Area
TAA
Tactical Assembly Area
TAACOM
Theater Army Area Command
TAAM
Theater Army Aviation Maintenance
TAC
Tactical Air Command
TAT
To Accompany Troops
TC
Transportation Corps
TCC
Transportation Consolidation Center
TCP
Traffic Control Post
TEA
Transportation Engineering Agency
TF
Task Force
TMA
Traffic Management Agency
TMMC
Theater Materiel Management Center
TMO
Transportation Movement Office
T/O
Tables of Organization
TOE
Table(s) of Organization and Equipment
TPC
Troop Port Command
TPFDDL
Time Phased Force Deployment Data List
TRADOC
United States Army Training and Doctrine Command
TRANSCOM
Transportation Command
TTP
Trailer Transfer Point
TZO
Transportation Zone Office
U.K.
United Kingdom
U.S.
United States
UAE
United Arab Emirates
UH
Utility Helicopter
ULN
Unit Line Number
UN
United Nations
UNC
United Nations Command
UNCOK
United Nations Commission in Korea
USAF
U.S. Air Force
USAFBI
U.S. Army Forces, British Isles
USAFFE
U.S. Army Forces, Far East
USAFIA
U.S. Army Forces in Australia
USAFICPA
U.S. Army Forces in the Central Pacific Area
USAFISPA
U.S. Army Forces in the South Pacific Area
USAMGIK
United States Army Military Government in Korea
USAFPAC
U.S. Army Forces, Pacific
USAFPOA
U.S. Army Forces, Pacific Ocean Areas
USARAL
U.S. Army in Alaska

USAREUR
United States Army, Europe
USASOS
U.S. Army Services of Supply (Southwest Pacific Area)
USAT
United States Army Transport
USAV
United States Army Vessel
USF
U.S. Forces
USFET
U.S. Forces, European Theater
USMC
U.S. Marine Corps
USMIM
US Military Iranian Mission
USN
U.S. Navy
USRA
United States Railroad Administration
USSOCOM
United States Southern Command
USSR
Union of Soviet Socialist Republics
USTRANSCOM
United States Transportation Command
VADM
Vice Admiral
VJ
Victory in Japan
WD
War Department
WDC
Western Defense Command.
WP&Y ROUTE
White Pass and Yukon Railroad
WPBC
Western Pacific Base Command
WPD
War Plans Division, War Department General Staff
WSA
War Shipping Administration
WTB
War Transport Board
WWMCCS
Worldwide Military Command and Control System
ZI
Zone of Interior

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About the Authors

BENJAMIN KING

Upon graduation from the University of Connecticut with a Bachelor of Arts in history, Benjamin King joined the Army as a lieutenant in the Field Artillery. After his release from active duty in 1977, Mr. King became an historian at the Casemate Museum in Fort Monroe, Virginia, researching Coast Artillery fire control procedures. He was appointed Command Historian of the U.S. Army Transportation Center and School in July 1992. He has written extensively on Transportation issues and history. He currently resides in Newport News, Virginia with his wife Loretta.

COLONEL RICHARD C. BIGGS (Retired)

Colonel Biggs received an ROTC commission and a Bachelors of Arts degree from the University of California, Berkeley. Beginning his career as an Infantry officer in combat in the Pacific in World War II at Pearl Harbor, and in Australia, New Guinea and the Philippines, Col Biggs later became a Transportation Corps officer, and commanded a port and a truck battalion during the Korean War. After attending the Industrial College of the Armed Forces, he commanded Transportation Corps units in Germany and at Fort Eustis, Virginia. His staff assignments included V Corps Transportation Officer, and supply and maintenance management positions as a senior Army civilian on the Army General Staff; in Headquarters, United States Army, Europe; and in the Defense Attache Office, Saigon. Since 1983, he has managed base maintenance contracts in Turkey, consulted in that field, and volunteered as a co-author of this book. He and his wife Kitty reside in Williamsburg, Virginia.

CAPTAIN (P) ERIC R. CRINER

Captain Criner received an ROTC commission from the College of William Mary and simultaneously received a Bachelor of Arts Degree in Business Administration from Christopher Newport University. He received a Master of Science in Logistics Management from the Florida Institute of Technology in 1993. His assignments include tours with Military Traffic Management Command, Rotterdam, Netherlands; 37th Transportation Group, Kasierslautern, Germany; 1st Corps Support Command, Fort Bragg, North Carolina. Captain Criner participated in Operation Just Cause and commanded the 403d Transportation Company in Saudi Arabia during the Persian Gulf War. He is currently assigned to Fort Eustis, Virginia where he serves as a special assistant to the Chief of Transportation. Captain Criner and his wife Sue have one son, Colin.