Report date: 15 March 1945

Title: Lessons from the Italian Campaign, from the Garigliano Line to the Gothic Line, 1 February-30 September 1944, including a period of the Anzio beachhead (Training memorandum no. 2, 15 March 1945

Author: United States Army, Headquarters Mediterranean Theater of Operations

Abstract: The digest of American combat experience and battle lessons from the Italian Campaign contained herein, covering the period from the Garigliano Line to the Gothic Line, 1 February-30 September 1944, is published for information and guidance in the training of U.S. forces in this Theater. – By Command of Lieutenant General McNarney: George D. Pence, Major General, G.S.C., Chief of Staff (from title page)

Number of pages: 164 p.

Classification: Unclassified; Approved for public release

Lessons from the Italian campaign.

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APPENDIX "A" to G-2 Report No. 150

Special Report on Defensive Position, Vicinity of FILIGNANO (H-046268).

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This report describes a prepared defensive position, organized and defended by the enemy about two kilometers west of FILIGNANO, ITALY. The north flank was anchored on LA BANDITA (H-0227) and the position extended to the south through the village of LAGONE (H-027270) to include Hill 769 (H-0326). It may be considered as typical of the defensive positions organized by the enemy in the mountainous sectors of the Fifth Army Front.

To the west of FILIGNANO, which has an elevation of 460 meters, the ground rises abruptly, reaching heights of 855 meters (LA BANDITA) and 970 meters (MT LA POSTA) about 3000 yards northwest of FILIGNANO and a height of 769 meters about 2000 yards southwest of that town. The attacker was therefore forced to fight uphill, with the defender initially having all the advantages of superior observation. The hills are crisscrossed with rock walls one to two feet thick, while between the hills are deep ravines and small terraced valleys. Each terr is supported by a stone retaining wall, similar in appearance to those crossing the hills. Trails, usually paved with stone, run up the valleys and across the hills; in many places these trails run between rock walls about two feet thick and varying in height from three to five feet. Portions of the hillsides are covered with olive groves or with small patches of trees and undergrowth; the remainder of the hillsides are barren rock slopes.

The position, which faced generally east, was defended by a force estimated at a battalion reinforced by two additional companies. The MLR was located on forward slopes and consisted almost entirely of mutually supporting light and heavy machine gun bunkers. Apparently the majority of the available machine guns were so employed, only a few rearward (breakthrough) positions being noted. Several of these rearward positions were remarkable for their short field of fire; one position (which still contained a light machine gun bipod) had a field of fire extending to the front and flanks only as far as stone walls not over fifty yards distant and five to six feet high.

Some mortars were evidently emplaced on reverse slopes but at least one was less than one hundred yards in rear of the forward machine gun positions. This emplacement, which consisted of stone walls forming a rectangular mortar pit immediately adjacent to a strong stone shelter for personnel and ammunition, was located behind a wall on a topographical crest. Without leaving the emplacement, the crew could observe the terrain to their front and flanks to a distance of approximately 1500 yards.

A few riflemen were employed as sentinels on the trails and to cover dead spaces in the bands of machine gun fire. However, the majority of the riflemen of front line companies were held under cover, in stone shelters, about 100 to 200 yards in rear of the forward machine gun positions and were employed for prompt local counterattacks with very limited objectives.

Apparently little or no barbed wire was employed in front of, or within, the position and mines were laid only in the ravines and valleys which were natural routes of approach. No antitank gun positions were noted. However, German weapons were sited to cover each base with interlocking bands of fire, and to place direct fire down each trail and valley. Each forward machine gun position observed had a considerable area of dead space to its immediate front, but each was also located so that it could cover the front of an adjacent position and support its fires. Zones not completely covered with small arms fire

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were covered with artillery and mortar barrages. Numerous German rifle grenades were found scattered about the position, particularly in the vicinity of the forward machine gun bunkers and personnel shelters, indicating that the defenders were well supplied with this munition. Very few hand grenades, and these all of the egg type, were noted but reports of participants indicate that hand grenades were freely employed by the defenders.

The outstanding feature of this position was the simplicity and crudeness of the defensive works, and the skillful manner in which they had been blended with the terrain. Because of the extremely rocky nature of the ground where they were located, most of the positions observed were constructed entirely above ground. Machine gun bunkers, mortar emplacements, and personnel shelters, were made of local stone with their overhead cover supported by timbers of ties and by doors taken from nearby villages.

While crudely constructed, reports indicate that they effectively withstood direct hits with 81mm mortar heavy shell. Mortar emplacements and shelters for riflement were usually located behind existing stone walls. The forward machine gun bunkers, although primarily sited for field of fire, were, nevertheless, so placed as to blend perfectly with the surrounding terrain. After visiting a number of these positions I was unable to see them from a distance of five to six hundred yards, although I knew exactly where to look for them; the bunkers, many of which were partially concealed by undergrowth, became an invisible part of the maze of rock walls which formed their background. The trails between rock walls were used by the enemy as communication trenches; together with the other rock walls running across the hillsides they enabled the defenders to shift troops and weapons in complete concealment from the attacker's ground observation and eliminated the need for crawl trenches, none of which were observed. Within the village of LAGONE several buildings were occupied and defended during the course of the battle. There was no evidence that any attempt had been made to improve these buildings as defensive positions; their strong construction provided adequate protection against anything but direct hits with heavy caliber shells while the single winding trail through the village provided an excellent covered route of communication.

This position was taken only after bitter fighting. Initially the main effort of the attack was directed against the hostile right flank, and after seven days of intensive fighting, Hill 769 was captured. A four day lull ensued during which the hostile center and left flank was pounded with artillery and mortar concentrations. The attack was then resumed and a foothold secured on the high ground on the north edge of LAGONE, while three small hills in rear of the village were also captured. Nevertheless, the enemy succeeded in keeping open a narrow avenue of escape and in withdrawing his surviving elements from the village under cover of darkness.

(NOTE: This report is a consolidation of material obtained from personal reconnaissance and from Inclosure No. 2 to G-2 Report No. 109, 45th Division.)

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15 March 1945

TRAINING MEMORANDUM)
NUMBER 2)

LESSONS FROM THE ITALIAN CAMPAIGN

The digest of American combat experience and battle lessons from the Italian Campaign contained herein, covering the period from the GARIGLIANO Line to the GOTHIC Line, 1 February - 30 September, 1944, is published for information and guidance in the training of U.S. forces in this Theater.

BY COMMAND OF LIEUTENANT GENERAL MCNARNEY:

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List of Major Sources

All material directly quoted from field commanders, observers, and from official documents relating to combat lessons and included in the text has been extracted from the following sources. For the sake of brevity, these sources are indicated by arbitrary symbols at the end of direct quotations contained in the text. The following glossary provides a full explanation to all such symbols appearing throughout the text.

Symbol	Title of Source
AGF/132	Army Ground Forces Board, MTOUSA, Report No. 132, 14 March 1944.
AGF/139	Army Ground Forces Board, MTOUSA, Report No. 139, 31 March 1944.
AGF/140	Army Ground Forces Board, MTOUSA, Report No. 140, 3 April 1944.

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Symbol	Title of Source
AGF/144	Army Ground Forces Board, MTOUSA, Report No. 144, 8 April 1944.
AGF/147	Army Ground Forces Board, MTOUSA, Report No. 147, 21 April 1944.
AGF/148	Army Ground Forces Board, MTOUSA, Report No. 148, 25 April 1944.
AGF/152	Army Ground Forces Board, MTOUSA, Report No. 152, 10 May 1944.
AGF/156	Army Ground Forces Board, MTOUSA, Report No. 156, 27 May 1944.
AGF/165	Army Ground Forces Board, MTOUSA, Report No. 165, 6 July 1944.
AGF/168	Army Ground Forces Board, MTOUSA, Report No. 168, 13 July 1944.
AGF/171	Army Ground Forces Board, MTOUSA, Report No. 171, 19 July 1944.
AGF/172	Army Ground Forces Board, MTOUSA, Report No. 172, 22 July 1944.
AGF/178	Army Ground Forces Board, MTOUSA, Report No. 178, 16 August 1944.
AGF/QR	Army Ground Forces Board, MTOUSA, Quarterly Report, 21 April 1944
5A/LL	Training Memorandum No. 12, "Lessons Learned in the Battle from the Garigliano to the North of Rome," HQ Fifth Army, 15 July 1944.
IIC/LL1	Training Memorandum No. 9, "Lessons Learned," HQ II Corps, 9 April 1944.
IIC/LL2	Memorandum,"Lessons Learned," HQ II Corps, 16 June 1944.
IIC/LL3	Training Memorandum No. 18, "Lessons Learned," HQ II Corps, 8 July 1944.
IIC/AIC	Report, "II Corps Artillery in the Italian Campaign," HQ II Corps, 5 June 1944.
VIC/AOP	Memorandum, "Air Observation Post Activities in Italy," HQ VI Corps Artillery, 7 July 1944.
3ID/SR	Special Report, "Cargo and Battle Sleds," HQ 3rd Infantry Division, 18 July 1944.
34ID/LL	Compilation, "Lessons Learned in Combat," 34th Infantry Division, September, 1944.
36ID/LL	Memorandum, "Lessons Learned in Combat," HQ 36th Infantry Division, 12 April 1944.

List of Major Sources

Symbol	Title of Source
45ID/AOP.	"Monthly Air Observation Post Report," HQ 45th Infantry Division, April, 1944.
88ID/DAC.	Memorandum (AG400-2), "Augmentation of Field Artillery Battalions," HQ Division Artillery, 88th Infantry Division, 27 October 1944.
1Amd.D/RO	Report of Operations, 1 May - 10 June, HQ 1st Armored Division, 16 June 1944.
TFC/1Amd.D/VR	Verbal Report, Commanding Officer, Special Task Force, 1st Armored Division, to G-3 AFHQ Observer, Lake Bracciano, 15 June 1944.
CC"A"/SR.	Special Report, "Demolition Snakes," Commanding Officer, Combat Command "A", 1st Armored Division, 16 June 1944.
CS/1Amd.D/SR	Special Report, Chief of Staff, 1st Armored Division, 15 June 1944.
CEF/CB	Report, "Conduct of Counterbattery Operations in the Corps Expeditionnaire Francaise," HQ, CEF, 2 June 1944.
1Amd.G/LL	Report, "Lessons Learned in Combat," HQ 1st Armored Group, 10 March 1944.
2Amd.G/LL	Memorandum, "Lessons Learned," HQ 2nd Armored Group, 25 June 1944.
2Amd.G/CL	Report, "Combat Lessons," HQ 2nd Armored Group, 10 July 1944.
2Amd.G/SR	Special Report, "Lessons Learned in Combat," HQ 2nd Armored Group, 2 August 1944.
2Amd.G/Ind	Indorsement, 2nd Armored Group, Army Ground Forces Board Special Report, 22 July 1944.
753TB/LL.	Memorandum, "Lessons Learned in Combat," HQ 753 Tank Battalion, 5 March 1944.
894/SR	Special Report, "Report of Actions of 894th Tank Destroyer Battalion," 10 June 1944.
697/240H.	Memorandum, "Experience with the 240mm Howitzer and 8-inch Gun in the Italian Campaign," HQ 697th Field Artillery Battalion, 4 October 1944.
5A/AOP	"Air Observation Post Bulletin No. 20", HQ Fifth Army, 31 October 1944.
TM14/5A	Training Memorandum No. 14, "Scouting and Patrolling," HQ Fifth Army, 10 August 1944.
L/CG/5A	Letter, Commanding General, Fifth Army, to Commanding General, Mediterranean Allied Tactical Air Force, subject air support in the Spring Offensive, 10 June 1944.

List of Major Sources

Symbol	Title of Source
TM44/AF/43	Training Memorandum No. 44, "Lessons from the Tunisian Campaign," HQ Allied Force, 4 August 1943.
TM50/AF/43	Training Memorandum No. 50, "Lessons from the Sicilain Campaign," HQ Allied Force, 20 November 1943.
TM5/AF/44	Training Memorandum No. 5, "Lessons from the Cassino Operation," HQ Allied Force, 4 June 1944.

PREFACE

The achievements of the Officers and Men of the Fifth Army in their long, difficult, and successful Campaign on the Italian Peninsula require no detailed comment here. The courage, resourcefulness, and self-sacrifice manifested in this Campaign which has driven the enemy more than three hundred miles from the initial Salerno Beaches to the present line and has involved some of the most difficult operations ever experienced in this Theater, are well known to all concerned. The epic period of the Anzio Beachhead, the great Spring Offensive of 1944 during which the first Axis capital fell to our arms, and the long advance to the Valley of the Po, are now matters of history.

In this Campaign, especially in the latter phases, much has been learned from combat that will be of value to troops now training for further operations against the enemy. For this reason these tactical lessons from battle and combat experiences are published for the benefit of all. What has been learned, and the benefit that this knowledge will provide for troops in training, will stand as tributes to the Officers and Men of the Fifth Army who participated in this Campaign.

15 March 1945

Joseph T. McNarney

JOSEPH T. McNARNEY
Lieutenant General, U.S.A.,
Commanding Mediterranean Theater of Operations

LESSONS FROM THE ITALIAN CAMPAIGN

From the Garigliano Line to the Gothic Line, 1 February - 30 September 1944, Including the Period of the Anzio Beachhead.

SECTION I : INTRODUCTION

1. The lessons from the fighting in Italy during the period from the initial landings at SALERNO to 1 February 1944 have been published in Training Memorandum No. 3, this Headquarters, 10 March 1944. The following memorandum continues the digest of cumulative experience reported by American units through the subsequent phases of the Campaign in the advance to the Gothic Line. It comprises the second of a series of related training publications covering progressively the lessons from the campaign in Italy. Combat experience, battle lessons, and further confirmation of established tactical doctrine already treated in Training Memorandum No. 3 will not be included in the present memorandum. Wherever such experience or lessons previously reported have been given special emphasis in reports of commanders in the period presently considered, appropriate reference to the preceding publication will be made, but repetition of the same published material will be avoided unless such lessons be of warranted importance or have been particularly stressed by field commanders with different approach or application from the treatment given in Training Memorandum No. 3.

2. The material contained in this publication is not to be considered as tactical doctrine. It represents a summary of the major lessons from the Italian Campaign in the period under consideration digested from the reports of Fifth Army and its component corps and divisions; from the reports of the Army Ground Forces Board, Mediterranean Theater of Operations, which include reports of combat experience, lessons, and pertinent comments from field commanders and staffs of all echelons; and from other reliable and appropriate sources. In order that direct quotations and other statements of special importance may be readily identified, a key is provided at the end of the table of contents.

3. Although proper reservation is enjoined in the use of the following materials, it is believed that the lessons and examples they contain will be of value in the training of units and individuals who have not yet entered combat, and also to those who have yet to experience combat under the conditions peculiar to the phases of the Italian Campaign covered herein. In the application of such material to unit and individual training, the exercise of judgment and consideration of individual situations is essential.

4. As has been emphasized in all previous publications covering campaign lessons, the soundness of basic principles prescribed in standard training literature has been confirmed in all reports of battle experience in the period under consideration. In this connection the Commanding General, Fifth Army reported as of 15 July that "no new basic principles of warfare have arisen from the operations. . .nor have any of the old principles been found to be outmoded" (5A/LL). The application of these principles to the various situations and conditions peculiar to the Campaign, however, has presented a number of valuable examples and experiences that can be used fully to advantage in training.

5. The several phases of the Campaign treated herein have been marked by aspects and peculiarities different from those discussed in Training Memorandum No. 3 covering the earlier period. Similarly the terrain involved in the later phases, especially during the May offensive and the pursuit north of Rome, has differed in a number of respects from that traversed from SALERNO to the Gustav Line. For these reasons the characteristics of the operations and the terrain involved should be understood in order that the tactical lessons from them may be appreciated in their proper perspective. The two succeeding sections in this memorandum are included for this purpose.

SECTION II : PHASES AND CHARACTERISTICS OF THE CAMPAIGN

6. GENERAL

The continued campaign in Italy during the period under present consideration can be divided logically into four distinct operational

phases: the continuation of operations along the static winter line on the GARIGLIANO-CASSINO front; the amphibious landing operation at ANZIO and NETTUNO, with the resulting period of static warfare within the beachhead thus gained; the period of regrouping, training, and preparation for the Spring Offensive; and the operations comprising the Spring Offensive which carried the advance of our forces from the line of the GARIGLIANO to the Gothic Line north of the ARNO River.

7. COMPARISON WITH THE EARLIER PHASES OF THE CAMPAIGN

a. Although the operations under consideration have been a continuation of those of the earlier period, certain differences present in the later stages as compared with the earlier phases are of interest in connection with the lessons learned. For a summary of the characteristics of the Italian Campaign from September, 1943 to February, 1944, see Training Memorandum No. 3, this Headquarters, Section II, pp. 2-6.

b. In the first phase of the present period, the operations presented little difference from those which immediately preceded. One marked feature without comparable predecessor stands out in the large-scale air-ground attack on the strongly defended town of CASSINO and its contiguous defenses. The concentration of air effort on a single objective in close support of ground troops in this action has had no parallel in the past compaign experience in this Theater. Although this attack did not succeed, valuable lessons were derived from action of the combined arms.

c. The ANZIO-NETTUNO landing operation introduced a new type of situation into the Campaign which had not hitherto existed in this Theater. The establishment of the beachhead created two separated fronts which were not joined for a period of four months. This operation differed widely from the previous amphibious assault on SALERNO some four months before. In the ANZIO operation complete surprise was achieved, and the landings were made without appreciable resistance. Absence of surprise, accompanied by strong and determined resistance, characterized

the previous operation. At SALERNO, after the early critical period of the beachhead consolidation and extension, the advance was pushed steadily inland and northward to the enemy winter line. At ANZIO-NETTUNO, a distinctly different situation quickly developed. The landing forces were soon confronted with equal and later greater enemy strength disposed in superior and advantageous positions for defense, and the result was virtual stalemate and static warfare from the end of January until 23 May when the Beachhead Phase of the Spring Offensive broke the German defenses of the perimeter and terminated the beachhead period of the Campaign.

d. The period of regrouping and preparation for the Spring Offensive has no comparable counterpart in the previous stages of the Campaign, and need not be considered in this comparison.

e. In terms of comparison, the Spring Offensive also has no counterpart in the preceding phases of the campaign. Never before in the experience of American troops in this Theater has there been a fully comparable action to that which broke the formidable and long-held German prepared defense lines and developed into an unbroken advance of more than 250 miles. In certain respects the pursuit phases of the operation after the fall of Rome resembled the campaign of the American forces in Sicily, but on a far greater scale and on a much larger front.

f. Contrast in weather and climatic conditions between the earlier and later periods of the Campaign should not be overlooked. During the fall, winter, and early spring, the operations were hampered and rendered severely difficult by the prevailing rainy season and its accompanying obstacles of mud, wet, and cold. In the period during the Spring Offensive, the dry season had set in and these obstacles experienced in the winter period were removed. Dust and heat, however, produced some difficulties, though in far lesser degree.

8. CONTINUATION OF THE OPERATIONS ON THE STATIC WINTER LINE

a. The operations after the end of January were mainly characterized by a continued effort to break the prepared enemy positions along

the GARIGLIANO-CASSINO line, and in conjunction with the seaborne thrust which had outflanked the enemy line by the assault landings at ANZIO on 22 January, to effect a general advance north to ROME. A summary of the ANZIO beachhead front is contained in the next succeeding paragraph. On the main front during this period the fighting was similar to that which prevailed in the preceding phase. It consisted mainly of difficult mountain operations against determined resistance from strongly prepared positions, many of which were located on dominant and superior ground.

b. The focal point of our main effort was in the CASSINO sector, where repeated attacks were made to break through this key strongpoint controlling the LIRI Valley. In this area the enemy was materially aided by dominant observation from a number of vantage points on commanding heights which rendered approach and assault preparations virtually impossible to conceal except under the cover of darkness. The action in and around CASSINO was largely a series of infantry operations strongly supported by massed artillery of all available calibers, and by armor wherever the terrain permitted its employment. Close support by tanks and tank destroyers played an important role whenever the situation permitted. Engineer assistance was also of prime importance.

c. Combined with, and between major offensive actions, small unit operations of many types also characterized the period. The action of combat and reconnaissance patrols assumed special importance. The close country and rugged mountainous terrain greatly restricted the employment of armor, and the same problems of supply and communication in the high, rugged mountains prevailed as before.

d. On 15 March, a final all-out frontal effort was launched to carry the CASSINO positions, and this attack was supported by an overwhelming force of bombardment aircraft. The results of this effort and the lessons gained therefrom are treated in SECTION IV, Paragraph 20b, below. Following this air-ground attack of 15 March, a period of regrouping and deliberate preparations for a major spring offensive on

the entire line characterized the operations in the American front.

9. THE ANZIO-NETTUNO LANDINGS AND THE BEACHHEAD OPERATIONS

a. On 22 January a flanking movement by sea around the main line was made, and a second front was opened as a result of the assault landings of a reinforced corps in the ANZIO-NETTUNO area. This operation was carried out in conjunction with a major effort on the main line to break the CASSINO and GARIGLIANO defenses of the enemy and press through to join the newly landed force.

b. The landing operation was a marked success. Almost complete surprise was achieved, and the landings were virtually unopposed. The assault forces pushed inland to their initial objectives, and the consolidation of the beachhead was well under way when the main enemy counterthrust materialized. After a period of critical fighting, the line was stabilized on a perimeter front. The beachhead forces were thereafter confronted by equal and later superior numbers often located on commanding ground affording dominant observation over the beachhead area. The combat operations on the perimeter front resolved into static, holding action, with intense artillery support of the infantry manning the perimeter line.

c. Armor was invaluable for flank and counterattack protection. During the period, the armored division present, together with a separate tank battalion, constituted the main counterattack force. Tank units were also used extensively in their secondary role as artillery with good results, and when the unusual situation demanded, they were at times dug in and employed as armored pillboxes in strong points. On several occasions armored units were profitably used for strong raids on the enemy positions to disrupt his preparations for attack, and for countering strong thrusts at the perimeter line.

d. The operations of the antiaircraft artillery units were outstanding, and the subject of their action is treated in Section IX, below. Throughout the beachhead phase, especially in the critical period of the first enemy main counterthrust, the air cooperation and

naval support were skillfully and powerfully employed and proved to be of utmost importance. Supply and maintenance of the beachhead forces constituted a major achievement of the campaign. The supply operations over the beaches and in the small port of ANZIO demonstrated to excellent advantage the potentialities of our craft, supply organization, and port units.

10. REGROUPING AND PREPARATORY PHASE BEFORE THE SPRING OFFENSIVE

a. During this period American and Allied units were regrouped and realigned, and detailed preparations were made for a major offensive on the entire Allied front. The characteristics of this phase of the campaign are of special interest from the training point of view. In preparation for the large-scale attacks, units on the main GARIGLIANO line conducted intensive training in conformity with the plans for the projected operations. Similarly within the Beachhead area a period of intensive training was held despite the limited areas and the proximity of the front lines. Of major importance was the combined training of infantry and armor, with special emphasis on close cooperation and teamwork between the elements of the two arms which were to work together in the impending operations. In specially selected areas, actual rehearsals were held to perfect the action of the infantry-tank organizations. The briefing of the different commanders and their men was detailed and thorough, and sand-tables were extensively used. On the main GARIGLIANO front, two fresh divisions that had recently been brought into the line perfected their training and fire-hardening during this period. Every opportunity was taken to familiarize the men with the nature of the terrain and other conditions that would be encountered. These units became thoroughly acclimatized to the situation and to battle conditions before the offensive was launched.

b. From the staff viewpoint, the main feature of this phase was the detailed planning and the implementing of the plans for the offensive. The coordination of these plans, and their interlocking with those of the Allied Forces sharing in the operation was of prime

importance. The planning on which the offensive was based was characterized by simplicity, flexibility, and thorough implementing.

c. Operationally, the fighting during this phase was largely confined to strong, aggressive patrolling to obtain all possible information of the enemy positions and dispositions. Small unit operations designed as deceptive measures were also undertaken on a minor scale. Artillery units were sufficiently active to keep the enemy harassed during the period. In summary, the period prior to launching the Spring Offensive was one of realignment, intensive training, planning, and implementing of plans. Combat activity was generally confined to constant patrolling and minor diversionary action.

11. CHARACTERISTICS OF THE SPRING OFFENSIVE, 11 MAY - 1 AUGUST

a. General Summary

American participation in the Spring Offensive, launched on May 11 after the period of intensive planning, preparation, and training, was characterized by several types of action and operations. Initially it involved a large-scale coordinated attack on a wide front to break the two main enemy prepared defensive lines in the U.S. sector: first, the winter, or Gustav Line, and second, the much publicised Adolf Hitler Line to which the enemy fell back after his initial positions had been overrun. The remaining phases of the campaign involved the maintenance of heavy pressure against a stubbornly withdrawing enemy after his main defenses had been broken, and developed into rapid pursuit action which lasted until the approaches to the Gothic Line were reached after more than 200 miles of unbroken advance. This extended offensive included a wide variety of operations in equally varying types of terrain. The attack and ensuing advance was pushed through a number of hill masses and mountain ranges and their accompanying narrow valleys; along the irregular Tyherrean coastal plain and across and around the flooded littoral and Pontine Marsh area; across the open and rolling country of the Tiber Valley and north of Rome; and finally through the rough, rugged region before the approaches to the Gothic Line in the northern Appenines.

The fighting throughout was marked by aggressive offensive action, vigorous pressure against a yielding enemy, and pursuit after the main defensive lines had been breached and the enemy began a general withdrawal. Its principal features included the attack and envelopment of strong points, the passage of demolitions and obstacles, river crossings, and the attack and passage of towns and villages. The temporary improvisation of specially organized task forces for pursuit after the crossing of the Tiber was of particular importance in the later phases of the offensive. As the country became more open and suited to armored action, the operations of tank units in close cooperation with infantry and artillery played a major role in the advance. The outstanding feature of the whole offensive in all its phases was the high degree of cooperative effort rendered by the combined and associated arms. The quality and effectiveness of the air support and cooperation during the long advance have had no comparable equal in this Campaign or in prior campaigns in this Theater.

b. The First Phase of the American Offensive

The offensive campaign of the U.S. forces during the period under present consideration consisted of five distinct phases. The first of these involved the coordinated attack from the firm base that had been established across the GARIGLIANO River in the vicinity of MINTURNO. The objective of the U.S. effort in this phase of the operation was to drive through the Gustav Line and sieze the AUSONIA - MINTURNO road in conjunction with the effort of Allied Forces on the right which advanced simultaneously to capture SAN GIORGIO. The combat operations during this phase were characterized by highly effective cooperative action on the part of all associated arms. The advance was driven through rough, mountainous country, flanked on the left by a narrow, irregular coastal plain bordered by the sea. The main effort was made through the inland hill mass, and the infantry, strongly supported by massed artillery and aided forward by the armor and engineers, overran its sector of the Gustav Line and reached its objective according to plan. The resistance encountered was determined, and the thorough planning, preparations

and training for the attack were most favorably reflected in the success of the operation. In general, the nature of the fighting differed little from that which had prevailed in the earlier operations in the advance to the main enemy line some months before. Tactical surprise was achieved. The artillery preparation was extremely effective, not only in softening the enemy defensive positions but also in creating havoc and destruction throughout his unit communications nets. This latter effect of the artillery bombardment was of particular importance. The entire action in this first phase was marked by aggressiveness and vigorous drive.

c. The Second Phase of the Offensive

The second phase of the offensive consisted of a continuation of the general attack from the newly gained objectives through the PETRALLA Hill mass and the AURUNCI Mountains. The U.S. thrust during this phase converged on the town of ITRI and seized this objective and the southern segement of the ITRI - PICO Road. From this point the American forces continued the advance in a three-pronged drive through the mountainous country, broke the Adolf Hitler line in their sector, and siezed FONDI and its road net and the coastal town of SPERLONGA. The end of this phase saw the German army in the U.S. sector in retreat through the AUSONIA Mountains and along the coast towards LITTORIA and the ANZIO Beachhead. The operations in this phase were marked by a continuation of the vigorous, coordinated attack that had characterized the preceding first phase. Again the highly effective cooperation among the supported and supporting arms produced most favorable results. Resistance continued to be stubborn and determined. The advance, except in the latter stages of the thrust to the coast toward SPERLONGA involved the continued attack, envelopment, and overrunning of mutually supporting strong points and defended positions in rugged, difficult country broken by narrow valleys and at intervals by limited areas of less restricted country.

d. The Third Phase of the Offensive

The third phase consisted of two major operations. The

first was the pursuit of the enemy through the AUSONIA Mountains and along the seaward edge of the flooded littoral toward the ANZIO Beachhead. The second operation was the break-out from the Beachhead, directed northeast to cut the main coastal highway (Route No. 7) to ROME and eastward to join the advancing U.S. forces which were pressing up the coast. These two operations succeeded in clearing the entire coastal area southeast of the Beachhead, and prepared the way for the siezure of the last major barrier before ROME. The outstanding feature of the break-out attack from the Beachhead perimeter was the combined infantry-tank-artillery action. In the preparatory period before the offensive, the greatest attention had been given to infantry-tank training, and in the attack of May 23 which crushed the German containing positions about the Beachhead, this preparation and training showed the greatest results. Again, as in the initial attack from the GARIGLIANO Line, the artillery preparation was most effective and the results produced on the enemy positions and communications had a large share in assisting forward the combined infantry-tank attack. The third phase in general was marked by excellent timing and coordination between the action of the forces advancing from the main front and the assault out of the Beachhead positions.

e. The Fourth Phase of the Offensive

The fourth phase, following the break-out from the Beachhead and the joining of the two fronts, developed into an accelerated drive on the disorganized German forces who sought to hold the ALBAN Mountains which formed the last barrier to the open approaches to ROME. The line of advance swerved almost due north to encircle and seize this vital hill mass, and despite the unfavorable country for armored action, the attack was driven rapidly to this objective. The seizure of the ALBAN hill mass terminated practically all serious German resistance in the American sector south of ROME. After some delaying action in the open country beyond this important terrain feature, the enemy abandoned ROME and the city fell to U.S. armor and infantry on June 5.

f. The Fifth Phase of the Offensive

The fifth and last phase of the Campaign in the period covered by this memorandum comprised the passage of the TIBER and the pursuit of the enemy north of ROME. In this period the fighting was generally characterized by the action of provisionally organized pursuit forces composed of combinations of several arms, designed for rapid, aggressive action against a withdrawing enemy. In the earlier stages of the advance north of ROME much of the combat operations consisted of maintaining contact, passing of obstacles and demolitions, and the envelopment and destruction of small rearguard and delaying forces which sought to hold key points and delay the Allied advance. The operations of the small, self-contained, and mobile pursuit forces were prominent in the earlier period of action north of the TIBER. As the enemy withdrew into the more rugged country to the north, he gradually reverted from rapid deliberate withdrawal into increasing organized resistance. When the mountainous approaches to the Gothic Line were reached, the enemy again began offering serious opposition from prepared positions in the hilly and mountainous country in front of the northern APPENINES. The phase under consideration ended with the capture of the stubbornly defended port of LEGHORN and the passage of the ARNO River. The main characteristics of the fighting in this phase were organization and conduct of pursuit action across open rolling country and through rugged hills and mountains; the passage, envelopment and bypassing of obstacles, demolitions and delaying forces; and the continuation of pressure and advance after the enemy shifted from deliberate retreat to organized defense before the approaches to the Gothic Line.

SECTION III : CHARACTERISTICS OF THE TERRAIN

12. FROM THE GARIGLIANO TO THE ALBAN HILL MASS

a. In the period of continued operations on the GARIGLIANO - CASSINO line before the Spring Offensive (cf. Section II, Paragraph 8,

supra), the terrain features were the same as had prevailed in the earlier period discussed in Section III of Training Memorandum No. 3. The region traversed in the first three stages of the Spring Offensive was also generally similar in many respects to that previously encountered, until the ALBAN hill mass was reached. Dissimilar features from those in the earlier phases of the Campaign are described when appropriate below.

b. In the main, from the GARIGLIANO positions in the American sector to the ALBAN Mountains, the terrain was characterized by a continued series of mountain ranges and ridges situated at varying distance from an irregular coastal plain. The hilly hinterland rose from moderate to strong relief, sharply puncuated by steep slopes and high, rugged mountains, and cut by narrow, enclosed valleys. The ridge formations generally extended parallel to the coastal plain, and were pierced at intervals by transverse valleys and water gaps. The mountains varied in degree of vegetation. Some areas were clothed with considerable forestation; others of volcanic origin were barren, or sparsely covered with scrub and low vegetation. Outcroppings of limestone were prominent in many instances. The valleys were for the most part small and restricted. They were usually under intensive cultivation and were often cut and crossed by drainage and irrigation ditches. Roads were very limited and restricted. In the U.S. sector a single main highway (Route No. 7) was available. The remaining communications and supply routes were confined to unmetalled secondary roads, tracks, and trails.

c. From the GARIGLIANO line, the coastal plain seaward from the mountainous hinterland above described extended as an irregular, flat and rolling belt of varying width. It narrowed sharply in the vicinity of the GAETA peninsula and promontory where the southern reaches of the AURUNCI Mountains thrust out close to the sea. Beyond this promontory the plain widened slightly and again contracted to a narrow bottleneck at TERRACINA, where the AUSONIA range extended likewise almost to the shore. Beyond this point the coastal plain widened out into the littoral and the Pontine Marsh area, which in turn widened

outward to LITTORIA and CISTERNA. Much of this flat region had been effectively flooded by the German forces, and at the time of the advance it consisted of a flat expanse of flooded farmland, drowned fields and villages, and demolished and overflowing irrigation ditches and canals. On the seaward side it was bordered by an irregular dune strip of varying elevation and width. The one main highway in the U.S. sector ran through this area, and because of its elevation was above the water level. Smaller secondary roads followed the shoreline from TERRACINA toward the Beachhead at ANZIO, and were used as the main route of the advance around the flooded areas. Beyond the Beachhead area, the coastal plain continued in flat and undulating, rolling country to the TIBER basin. North of the Beachhead, it extended towards the rising ground toward the ALBAN Mountains.

d. In the fourth phase of the Spring Offensive the main U.S. effort was directed to the seizure of the ALBAN Mountains (cf. Section II, Paragraph 11c, supra). This important terrain feature located at the northeastern end of the coastal plain consisted of an extensive cluster of high, volcanic hills. The upper slopes of these formations have been deeply cut by ravines, and the lower slopes have united to form the barren, ash-covered plain extending towards ROME and the SABINE Mountains. The largest of the extinct cones has become waterfilled to form Lake ALBANO. Large areas in and about these hills were thickly covered with evergreen forest, and the surrounding approaches were characterized by broken, irregular country restricting movement and observation. The hill mass was situated between the two principal highways leading to ROME. Highway No. 7 passing through the towns of VELLETRI, GENZANO, and ALBANO, skirted the hills on the south, and Highway No. 6 passed close to the northern edge of the hills to converge with the former route into the city.

e. Operations in the regions above discussed were materially influenced by the terrain features prevailing. In the mountainous hinterland, the same problems of movement, maneuver, supply and communication were present as in the earlier period of the Campaign treated in Training Memorandum No. 3. Mountain warfare and its special requirements

of tactics and supply continued until the seizure of the ALBAN Mountains. In the American sector, the limited road net also imposed severe strain on communications and supply. The passage around the drowned littoral and Pontine Marshes to join the forces attacking from the Beachhead involved a new type of terrain and the advance was accordingly governed by the available routes. Cross country movement of vehicles, armored and otherwise, was greatly limited in the entire region, except in certain areas of the coastal plain which were relatively well suited to armored action. Such areas, however, were few and limited.

13. TERRAIN FEATURES OF THE ANZIO BEACHHEAD

The terrain enclosed within the perimeter of the ANZIO Beachhead was entirely part of the coastal plain northwest of the littoral and Pontine Marsh area. From the receding bluffs immediately inland from the beaches and dune strip, the country extended in flat and rolling conformation toward rising ground in the direction of ROME. The volcanic hill mass of COLLI LAZIALI (ALBAN HILLS), some twenty miles inland in this direction, formed a natural barrier and afforded the enemy observation and favorable positions for the defense of this sector. To the east and south, the area extended to the Pontine Marshes. Most of the ground contained within the perimeter had been reclaimed land, and generally consisted of small farms under varying degrees of cultivation. Drainage canals and ditches were present throughout a large part of the area, and a number of small streams, cut into deep gullies by erosion, flowed through the region. During the wet season, the porus, clayey quality of the ground throughout large portions of the Beachhead rendered digging and field excavation difficult and limited in some areas because of the ground water. Immediately inland from the port of ANZIO a strip of scrub timber broken by intermittent open fields served to screen the port and part of the beach areas, and also provided cover for supply dumps and bivouacs. The Beachhead area contained a limited network of secondary roads, generally with gravel and unmetalled surfaces. In the rainy season these roads deteriorated under the heavy traffic of movement and supply, and in the later dry season, the dust resulting from

movement often drew enemy artillery fire. The right flank of the Beachhead was protected by the MUSSOLINI Canal, which provided a formidable barrier against armored attack. The left flank, in the British sector, was likewise protected by the MOLETTA River and a number of deep stream gullies. One of the chief features of the area in general was its vulnerability to enemy observation and shell fire from higher ground inland from the perimeter line.

14. FROM THE TIBER BASIN TO THE VALLEY OF THE ARNO

a. From the ALBAN hill mass northeast to ROME and beyond, the sector of the American advance extended across the basin of the TIBER River toward Lake BRACCIANO and the SABATINI Mountains, and along the coastal plain to CIVITAVECCIA. The coastal plain, widening inland along the river valley consisted mainly of flat and slightly rolling country under varying degrees of cultivation. Much of the area was cut and crisscrossed by drainage ditches and canals, a number of which were wide and deeply cut into the plain. A large portion of the cultivation was given over to grain, with intermittent tree growth and vineyards. The basin and its contiguous plain extended in a general radius northeast for approximately twenty miles across the American sector, rising to the hilly country beyond. The plain immediately surrounding ROME afforded a good network of primary and secondary roads, extending in spoke formation outward from the city. These roads provided favorable avenues for pursuit after the passage of the TIBER.

b. Beyond the TIBER basin the zone of American operations extended through the continued irregular and narrowing coastal plain and the hilly and mountainous hinterland of TUSCANY. The region traversed inland from the narrow plain varied from low to moderate relief, with intermittent irregular plateaus, rugged hills, and valleys. As compared with the higher, steeper mountains encountered in the advance to ROME, the slopes in this region were generally moderate, but the country, except for some open areas and sections of the coastal plain, was restricted and unsuited for cross-country vehicle movement on a large scale. Thick

forestland dominated considerable parts of the region, and in contrast, other areas of volcanic origin were barren, with treeless slopes and scrub-covered foothills. The water-filled cones of several large extinct volcanoes formed the series of large volcanic lakes - BRACCIANO, VICO, and BOLSENA. Farther north, as the valley of the ARNO was approached, the relief became bolder and stronger, with increasingly steeper and more rugged slopes. A number of rivers and streams crossed the areas of the American advance. These generally flowed west and southwest forming the watershed from the hilly hinterland to the sea. They passed through fairly wide alluvial valleys which were intersected by small tributary steams and their smaller, narrower valleys. The valleys were generally under dense cultivation, grain, vineyards, and fruit culture predominating. The road net in the region covering the American advance continued to be limited. However there prevailed an increasing number of unmetalled secondary roads, which with engineer improvement and maintenance, proved adequate for the advance and supply. In the American sector, only one principal highway, the coastal Route No. 1, was available. This was supplemented by several lateral main roads connecting with the parallel main highway which served the Allied sector on the right.

15. TOWNS AND VILLAGES

The towns and villages throughout the entire area covered during the Campaign under present consideration were similar in character to those described in Section III, Training Memorandum No. 3. Their influence on the nature of the fighting remained the same as before. Thus far there has been no fighting in large cities, since the enemy has evacuated such centers as ROME and LEGHORN without serious opposition after the main defenses were carried.

SECTION IV : GENERAL LESSONS FROM THE COMBINED AND ASSOCIATED ARMS

16. GENERAL

a. From the overall point of view, the main lesson from the Campaign in the entire period under consideration has been the need and achievement of the highest degree of integrated cooperation among all the participating arms. In some instances the Campaign clearly showed that failure to achieve this needed cooperative action in the required degree led to checks, losses, and inability to advance. When the deficiencies in the inter-arm teamwork were corrected, the results were outstanding in success.

b. Broadly considered, the Campaign in this period, particularly during the Spring Offensive, demonstrated forcefully that the skillful use of all the associated arms working in close cooperation and mutual support provides a striking power that cannot be long resisted or withstood, even in terrain highly favorable for defense and disadvantageous for attack. More strongly than ever has the lesson been brought out that no single arm or service can act as an independent agency in the conduct of its own separate operations. Conversely, the unity of action and the integrated effort of all -- naval and land, ground and air, and the component elements of the ground and service forces -- operating appropriately as parts of one integrated force, proved to be the deciding factor in the success of our arms.

c. Of particular importance has been the combined action of infantry and armored units, together with the cooperation of tank destroyers, all in turn supported by massed and flexibly controlled artillery fire. Similarly the same lesson has been drawn from the successful action of the component infantry elements, from the rifle squad to the heaviest of the weapons units. Likewise in appropriate relation to the combined operations as a whole has been the importance of the air support and cooperation with the ground forces, which in the Spring Offensive reached a degree of efficiency and effectiveness not before equalled in this Theater. Although these observations are recognized as

the broadest of generalities, they nevertheless constitute from the overall view the greatest lessons of the Campaign.

d. From the broad, tactical aspect, the principal lessons of all arms have served again to reemphasize the major conclusions drawn from Tunisia, Sicily, and the earlier period of fighting in Italy: that our basic doctrines are fundamentally sound and have been proven correct on every battlefield in the Theater. The outstanding corrolary to this conclusion has been the necessity for appropriate application of these doctrines with judgment, flexibility, and due consideration for each individual situation. "You must," observed the Chief of Staff, VI Corps, after the breakout from the Beachhead and the advance to CIVITAVECCIA, "fit the established principles and organization to the given situation."

e. Improvisation to meet unusual or difficult situations and conditions was also an important element in the success of the Campaign. This included the creation of improvised and provisional units for special purposes, such as pack trains, provisional cavalry detachments, and pack artillery units for difficult mountain operations; specially organized task forces for pursuit action and other special missions; and the improvising of non-standard equipment for particular purposes demanded by existing situations. From this experience the lesson can be drawn that ingenuity and initiative in all echelons with respect to such improvisation is often required under peculiar field conditions that may be encountered.

f. A final broad lesson from the period of the Campaign covered here is merely a restatement of an old tactical principle: that no operation should be undertaken unless all the proper and necessary means are made available to carry it out with reasonable assurance of success. It is of noteworthy interest that one of the major influencing factors in the success of the Spring Offensive was that the offensive was not launched until complete preparations in troops, materiel, and supplies were ready and available to insure success on the entire front.

17. MAJOR FACTORS IN THE SUCCESS OF THE SPRING OFFENSIVE

a. The outstanding success of the general Spring Offensive which broke the period of static and stablilized warfare along the Winter Line and developed into an advance of more than 250 miles stemmed from a combination of different elements, each of which contributed to the results of the operation. These factors in the success of the offensive may be properly viewed as lessons and conclusions drawn from this period of the Campaign which should be of value to commanders of all echelons which may be engaged in operations of a general similar nature.

b. The careful, detailed planning and the thorough preparations which preceded the main attack and the assault out of the Beachhead were of particular influence, and formed the initial basis of success. The units that participated were regrouped and realigned to provide the best possible tactical advantage and surprise. They were fully prepared, fitted, and equipped for all phases of the tasks to be accomplished. The plans for their employment were simple but thorough, and were flexibly coordinated among all arms and services.

c. The attack was launched in sufficient strength in every sector of the line. One key to the success of the offensive, declared the Chief of Staff of a participating Corps, was the use of our forces in sufficient strength at all points.

d. Unit training throughout all echelons, especially in the battalion level, was of special importance. Thorough training in the use of all weapons contributed fully to the success of the operation. Likewise, the special training of the combined arms, with particular emphasis on tank-infantry cooperation in the period of preparation, was an outstanding factor both on the main front and in the Beachhead break-out.

e. Among the most significant elements in the successful offensive were stern battlefield discipline, high morale, agressive leadership, and individual initiative throughout all ranks. Without these qualities in officers and men alike, the other factors could not have contributed as they did to the success of the operation.

f. A comprehensive knowledge of the situation and of the tasks to be accomplished had been imparted to all participating troops. Such knowledge and familiarization were derived from thorough briefing, the use of sand-tables and terrain study, and constant, aggressive patrolling, probing, and reconnaissance of the enemy positions and dispositions.

g. In the initial attack, the artillery support, directed especially against the enemy reserves and communication system as well as against his defensive positions, was a most powerful influence in the achievement of the opening successes. Continued sustained artillery support of a high order likewise contributed to the unbroken advance.

h. Tactical surprise on a large scale was also attained. The attack was general, on a wide front, and in sufficient force at all points to maintain the heaviest pressure where needed. It is apparent that for considerable time the enemy was unable to determine where the main effort was to be made. With his communications shattered and disrupted by the initial artillery preparation and by the extensive air bombardment, the enemy was unable to control or employ effectively the reserves he had at his disposal, and at every point he was confronted by attacking forces in strength that could not be withstood.

i. An important element making for success was the effective use of accurate intelligence information. During the static period, detailed and valuable data were accumulated concerning the enemy strength, dispositions, and reserves. Full use of this information was made in planning the attack and in directing the effort against critical points where reserves could not be employed in strength to stem the assault.

j. Constant and effective air support of a quality and on a scale without previous parallel was also a major factor in the success of the offensive. The results of the air operations after the enemy had been driven into retreat were devastating in the losses inflicted on personnel and motor transport.

18. LESSONS FROM THE COMBINED AND ASSOCIATED GROUND FORCE ARMS

a. General Considerations

(1) As indicated in the broad lessons drawn from the operations of the combined arms summarized in Paragraph 16, supra, the effective, cooperative action of the ground force arms was of prime importance throughout the Campaign. With respect to the lessons from this subject, the varying siutations and terrain conditions prevailing during the period of operations must be considered. Cooperative employment of the different arms in restricted, mountainous country will naturally differ considerably from that in open, rolling areas suited to large scale operations of the several arms together. Hence in any evaluation and use of the lesson material that follows, the varying characteristics of the terrain and existing situation must be kept in mind.

(2) In general, the Campaign despite its outstanding successes revealed the necessity for more effective and more thorough training and coordination among the elements of the ground force arms that will normally fight together as a team, whether in mountains, across plains, or in any other type of terrain. Reports and comments of commanders of all echelons have universally stressed this point. It has been pointed out repeatedly that although the degree of cooperation generally attained was often sufficient to produce success in a majority of the operations undertaken, far more combined training and a greater degree of mutual understanding of the employment of the several arms as a team are required.

(3) The combined infantry-artillery action has been a marked exception. Long association and combined training of the organic artillery with its supported infantry within the division, and the close cooperation of the corps and reinforcing artillery through the present fire control system, have served effectively to coordinate these two arms and render their operations into the closely integrated action of one team. The same, however, has not been the case as between the infantry and armor, the infantry and tank destroyers, the armor and tank destroyers, and further combinations of these arms.

(4) Experience throughout the units of Fifth Army with respect to the combined operations of all three arms generally, has been summarized with special reference to the Spring Offensive in a report of lessons learned from this period of the Campaign:

> . . .The principal lesson derived on this subject, which found concurrence in practically every unit, was that there has been a definite lack of coordination and teamwork vitally necessary in these combinations -- particularly between infantry and tanks, and infantry and tank destroyers. Infantry commanders have not had the proper knowledge and appreciation of the powers, limitations, and capabilities of tanks and tank destroyers. Liaison and communication between infantry, tanks, and tank destroyers has not been satisfactory. Some tank commanders must develop more aggressiveness in immediate support of infantry against machine gun nests and small delaying detachments.
>
> It is the general belief of all units that these obstructions to proper coordination can be eliminated by the combined training of these elements. The suggestion that tank battalions and tank destroyer battalions work, train, and operate with the same infantry division was general. The excellent coordination and teamwork presently existent between the infantry regiment and its attached artillery battalion was pointed out, while it was also cited that in one instance a tank battalion had fought with six different divisions since 11 May, and was not with any one of them long enough to develop the coordination so necessary in these combined actions. The Army fully recognizes the value of coordination between these arms, and its policy is directed towards insuring the maximum time of attachment for its development. However it was true that lack of a sufficient number of tank battalions, and the operational necessity of concentrating tank strength where it could be best employed, at times made it necessary to disregard normal attachment. Artillery is organic; tanks are not and should not be. . .(5A/LL)

b. Infantry-Tank Cooperation

(1) Armored Infantry and Normal Infantry. Reports and comments on battle experience from the Army level down to the battalions and companies have all stressed the need of greater cooperation between infantry and armor as a major lesson of the Campaign. This lesson has been applicable to the elements of the armored division, and to the infantry divisions and separate tank battalions alike. One outstanding conclusion has been drawn: that for all practical purposes there is no real difference between the armored infantry and the foot troops of the normal infantry division. Both types have operated with tanks and have participated in similar action throughout the Campaign. In some cases both have been employed together in the same large unit. For example

in the attack of the 1st Armored Division out of the Beachhead, one combat command employed the organic armored infantry; the other operated with a regiment of the 34th Infantry Division. It can be concluded that the troops of the infantry division and the attached separate tank battalions should receive the same degree of training and should learn to operate together as do the organic infantry and tanks of the armored division.

(2) Joint Planning and Understanding. Thorough understanding of the plan of action on the part of both infantry and tank commanders in an operation employing the two arms is paramount to success. In most situations involving elements of the infantry division and attached separate tank battalions, the responsibility for insuring this understanding often rests with the infantry commander. This point has been emphasized by the Commanding General, VI Corps, in a memorandum disseminated to platoon level in the period of preparation for the Spring Offensive:

> . . .All infantry commanders must thoroughly realize their personal responsibility for the coordination, communication, and control of the tanks attached to their units in combat. There have been instances in the past when complete cooperation between the tanks and the infantry during combat did not exist. This has inevitably been caused by failure on the part of the infantry commander to sit down with the tank commander concerned and thoroughly familiarize the tank commander with his plan of attack and assure himself that the means of communication and control were set up and tested prior to the jump-off. The infantry commander must know that the tank commander understands the infantry plan, and he must understand the tank commander's plan to support him. Unless this understanding is complete, the attack will bog down before objectives can be reached and organized. . . .(AGF/147)

As among the elements of the armored division, responsibility for the complete understanding of the plans of both tank and infantry commanders may vary from one to the other as the situation demands. The requirement of joint planning and mutual understanding, however, remains essentially the same. A battalion commander of the 1st Armored Regiment declared in this connection after the successful operations in the offensive from the Beachhead to VITERBO:

> . . .In any operation, too much time and planning for the first move cannot be provided for. Combined staff discussions, conferences between all associated field commanders, combined field exercises by troops concerned, should all form a part of the preparation whenever time permits. . . Even units which are used to working together should have opportunity to discuss their plans with each other, down at least to companies, prior to the beginning of a particular operation. . .(AGF/172)

(3) Combined Training and Continued Attachment. The value and necessity of combined training and of continued attachment of tank battalions to the same infantry division with which they will fight were reiterated by all commanders. The substance of this general opinion is that "tank battalions should 'grow up' with the units they will support in battle." Such training and attachment serves to bring about the much needed appreciation and understanding of the characteristics, employment, and limitations of the two arms, and also makes possible the personal association and understanding among staffs and commanders so essential for team cooperation in action. The Commanding General, II Corps, reported in July in a summary of lessons learned from the offensive that

> . . .Operations of tanks and tank destroyers with infantry showed a lack of understanding on the part of commanders of the limitations and capabilities of other arms and services. This should be corrected by intensive combined training. During lulls in combat, rehearsals, command post exercises and conferences can be utilized to smooth out operational procedure of these task forces. . .(IIC/LL2)

Among the several separate tank battalions opinion as a result of continued combat was universal as to the need for combined training. The Commander of the 755th Tank Battalion, whose experience was comparable to that of other similar units, reported towards the middle of the offensive:

> . . .Too little stress has been placed on tank-infantry-artillery cooperation and liaison. In many cases the infantry and tank units have had little or no training together prior to entry into combat. It is of utmost importance that the infantry, artillery, and tank units train as a team. Infantry commanders and tank commanders should be instructed in the use of both arms, in the limitations and capabilities of each. . .(2Amd.Gp/LL)

Similar opinion has been expressed in a report of the Commander of the 1st Armored Regiment, a unit which conducted intensive training with its infantry before the break-out from the ANZIO Beachhead:

> . . .Training problems stressing the control and coordination of the infantry-tank team have revealed lack of knowledge of the characteristics of each arm on the part of both. This type of combined training should be encouraged by higher echelons of command, not only within armored units but also throughout the Army, to familiarize both infantry and tank units with the characteristics and limitations of the infantry-tank team. . .(AGF/152)

Infantry commanders have likewise pointed to the need of this combined training. The effects of such preparatory joint instruction in the period before the break-out from the Beachhead are shown in a report from the Commander of the 6th Armored Infantry:

> . . .During the last operation (from the time of the breakthrough at ANZIO to the capture of ROME), it was found that combined infantry-tank training cannot be stressed too much. The recent training of this regiment with the armored elements of the Division have proved to be the greatest value. This was shown in the closer cooperation, and better understanding of the capabilities and limitations of troops, weapons, and equipment of each arm. . .(AGF/172)

Commanders of separate tank battalions were unanimous in their recommendation that their units should be in continued attachment to the divisions with which they are to operate in battle. Short periods of attachment and frequent change of attachment from one division or task force to another served to prevent the essential degree of teamwork, familiarization of units, and coordination. The Commander of the 760th Tank Battalion declared after extensive action in the Spring Offensive:

> . . .Tank battalions should always train with the division with which they are to fight. If the battalions cannot always be part of the division, then time should be allowed for a period of training together before entering combat. . . (AGF/165)

An extreme case may be cited as an example of frequent change of attachment and its results with respect to combined operations of the two arms. The Commander of the 756th Tank Battalion frankly declared in a report of combat lessons that

> . . .my battalion was attached so many times that I almost lost count. In one case the battalion was attached to three different organizations within a period of 12 hours. Coordination is impossible under such conditions . . .(AGF/165)

(4) Regulation of Pace and Control in Combat. In the cooperative action of infantry and tanks in combat, control and the regulation of pace has been a serious problem. When the rate of movement of both arms is not properly controlled, the essential mutual support is lost through the infantry and armor becoming separated. Control to keep the two elements together in effective joint action was exercised in some units by the establishment of phase lines. The tanks would advance to the phase lines and wait for the infantry to come up. They would then move on to the next phase line. In one regimental combat team supported by tanks the problem of regulating pace was partially solved by movement in 200-yard bounds by the leading elements. Rear elements would follow and join the leading elements before the next bound was made. Further experience with this problem was reported by Fifth Army in a general summary of lessons from the offensive:

> . . .The use of tanks with infantry must be carefully coordinated. Tanks must not be sent too far ahead of the infantry if the best results are to be attained. One case was reported where infantry, mopping up behind the tanks, were so far outdistanced that the tanks were more detrimental than helpful in that they curtailed artillery and heavy weapons support of the infantry. . .(5A/LL)

In the 191st Tank Battalion, it was reported that "the infantry at times would fail to keep up with the tanks even though we slowed down" (AGF/165), and in the 6th Armored Infantry the Commander described his experience with the problem and his solution:

> . . .It is felt that while close support of tanks, both medium and light, is desirable, it is not always practicable. In many instances it was found that tanks, either light or medium, maneuvered and moved forward faster than the foot troops can advance. By lingering and waiting for the infantry to mop up, the tanks expose themselves unduly, and if the tanks continue on, enemy infantry will rise up and a regular infantry battle ensues, thereby breaking up the tank-infantry team play. This was remedied by using medium tanks for the assault punch and attaching light tanks to the infantry to assist in mopping up operations . . .(AGF/172)

The excellent cooperation and coordination of the advance of the two arms experienced between the 756th Tank Battalion and the 1st Special Service Force provides a good example of the control that should be attained. The Battalion commander of the tank unit reported after the first phase of the Spring Offensive:

> . . .This Battalion operated with the Special Service Force, and it was a pleasure. There was complete coordination and a thorough understanding of what each was to do. The troops kept up with the tanks and the tanks kept up with the troops. When the tanks hit some bad going that delayed them, the infantry would halt under cover and wait while the tanks could catch up again. If the tanks started to get ahead of the infantry, at the first opportunity the tanks would halt in defilade and wait for the infantry to catch up. We made much faster progress that way with far fewer losses. We progressed as a team and each took care of the type of target we were trained for. . .(AGF/172)

(5) Time for Coordination of Plans and Preparations.

When an operation is planned or an attack is contemplated involving the use of armor with the infantry, sufficient time must be allowed the tank commander to learn the infantry plan, make his reconnaissance, coordinate his plan with the infantry, and bring up his tanks into position for the attack. In many instances this essential time for preparation was not allowed the tank commander. The Commanding Officer, 760th Tank Battalion reported that "coordination has sometimes been lacking because we have at times received orders for an attack after an operation has started. . ."(AGF/165). The same condition has also been reported in the experience of the 756th Tank Battalion:

> . . .Many times orders have been received so late that there was no time for coordination of the attack, and in order to help any at all the tanks had to be committed on the run and coordination had to be attempted during combat. That does not work. Given a bit more time for getting together before the attack, the tanks can save the infantry many casualties and the infantry can save many tanks by knowing just what their part is to be against prepared or unexpected antitank defenses. . .(AGF/165)

Attachment of tank units at night to join and support infantry for morning attacks does not allow the tank commanders sufficient time for preparation, reconnaissance, and coordination of plans with the supported infantry. The experience of a separate battalion commander may be cited as an example:

> . . .Attachments were usually made at night and sometimes it was practically impossible to find the infantry commanders to whom we were to report. . . .The time allowed for coordination in such cases was, as a rule, too short. . . .(AGF/165)

(6) Methods of Employment of Infantry-Tank Team. The most effective method of employment of the infantry and tanks was found to be a strong asault wave of medium tanks in the advance, followed at approximately 100 to 200 yards by the infantry closely supported by light tanks in immediate contact. Previous experience had shown that the leading tanks often bypassed concealed infantry and automatic weapons which would wait until the armor had passed and then attack the following infantry. Without immediate armored support, the infantry would be stopped with losses. The presence of the light tanks with the following infantry gave the needed support and means of dealing with such islands of resistance and strong points left in the wake of the leading tank waves. This formation for the combined action of the two arms was satisfactorily used in the attack from the Beachhead and in the succeeding operations that drove the enemy north of the TIBER. Its employment has been described in some detail by the Commander of the 1st Battalion, 1st Armored Regiment:

> . . .The medium tank-infantry-light tank team was used most successfully in breaking the defenses surrounding the ANZIO Beachhead and in subsequent operations. It was found that the best troop arrangement for a force of this type was a company of medium tanks, a battalion of infantry, and a company of light tanks. The tanks were attached to the infantry battalion. The medium tank company was employed as a whole under the direct command of its company commander. The light tank platoons were attached one to each infantry assault company for closer and faster support. The light tank company commander coordinated the movement of the light tanks.
>
> In this force medium tanks preceded, destroying with their heavier guns the main defenses, directing artillery, or placing fire on the antitank defenses. As the medium tanks moved forward destroying the main obstacles of the defense, they by-passed many enemy infantry strong points. These strong points would then be taken by the infantry-light tank team following immediately behind the medium tanks to take advantage of the shock effect of the medium tanks. The infantry moved forward followed by the light tanks until resistance was met. At this time the infantry would throw out a green smoke grenade which meant "light tank help wanted here." The light tanks following the infantry would move to this point, and the infantry would designate the target by signal, pointing, firing tracer

ammunition, or by a combination of these. The light tanks then would work the position over with machine gun and 37mm fire and move into the position, followed closely by the infantry, who usually had only to mop up and collect the prisoners. Casualties, particularly among the infantry, were very light through this effective use of the medium tank-infantry-light tank team. . .(AGF/172)

Similar details covering the experience of the 3rd Battalion of the same regiment have been thus reported by its commander, with additional comment on lessons from the operations:

. . .In the past period of combat the most successful engagements carried out in the most economical manner in casualties in both tanks and infantry were those planned as follows: Medium tanks led the attack on enemy positions. Infantry followed at a distance of 100 to 200 yards behind the medium tanks. At times the medium tanks were at considerably greater distances from the infantry. Light tanks stayed right with the infantry where they were able to knock out those positions which the medium tanks had by-passed: positions such as well concealed machinegun nests and enemy personnel with automatic weapons, which can do very serious damage to the infantry. The light tanks, moving with the foot troops, caused the enemy in these positions to give up readily. The infantry used green smoke grenades to call attention of the light tanks to the fact that the individual had a target which he wanted to point out to the tank. Any light tank was to proceed to the location of the smoke and be directed by the individual who set off the smoke, as to just what the target was.

The attack should be made in the early morning or late evening - preferably early morning. In early morning tanks and supporting infantry can assemble under cover of darkness. Ground haze and limited visibility that are usually present in the early morning, is a distinct advantage for the attacking force. Extensive use of supporting artillery should always be made. It should be used for the softening up effect and for screening purposes through the use of smoke. A smoke screen has been found to be more effective in the early morning.

With this type of coordination above described the tanks can give excellent close support for infantry mopping-up squads. Objectives can be taken quickly with a surprisingly low number of casualties to our forces. A few rounds of colored smoke on the objective are a distinct aid in guiding the tankers to the objective. . .(AGF/172)

(7) Employment of Tank-Borne Infantry. Tank-borne infantry was employed during the Campaign for the first time in the operational history of this Theater. This type of combined employment was initially used in the break-out from the Beachhead, and was later adopted during the pursuit phases. The employment of the two arms in this manner was found especially useful in mopping up strong points of resistance in order to assist forward the main advance. In one combat command of the

1st Armored Division, groups of medium tanks carrying infantry, called "raiders," were used effectively for this purpose. In some instances tank-borne infantry was carried into action for other missions, notably for consolidating ground taken by the armor, and in certain phases of pursuit. This practice gave the advantage of getting the riflemen forward rapidly, and it was also effective as a means of bringing up quickly the heavy weapons needed to support the consolidation. Tank-borne infantry was also used in the operations of the 45th Infantry Division, and the Assistant Division Commander has reported that the results were excellent. One general disadvantage noted in the employment of infantry carried on tanks was the difficulty of reorganization after dismounting and deployment. Proper squad and platoon organization and control could not be maintained while the riflemen were carried forward on the tanks, and consequently after dismounting and deployment for action, some reorganization was required in each instance. Where such employment was appropriate to the situation, however, the advantages of tank borne infantry were found to outweigh the disadvantages above cited.

(8) Employment of Infantry-Tank Combat Sleds. A special operation involving the use of sled-borne infantry towed behind medium tanks was tried in the break-out from the Beachhead for the first time in this Theater. The purpose of this combination was to get the infantry forward with the tanks with a minimum of losses and to have them instantly available to take advantage of the ground gained by the tanks. The sleds were manufactured in the field in "sets." Each set consisted of two "trains" of six sleds each, flexibly connected to each other and also flexibly cross-braced between each pair of sleds. A set of sleds was connected to the towing tank by a bridle that could be disconnected from the tank by pulling a wire connected to the pintle pin. The platoon or squad leader who rode in the right leading sled controlled the wire used for disconnecting the sleds. The same individual was also in communication with the tank commander of the towing tank by means of a headset and microphone connected into the intercommunication system. (AGF/165). The actual combat tests with these sleds was not conclusive.

In one regiment a platoon of tanks and four sets of sleds failed to get into action because of rough ground and the loss of several tanks from enemy mines. In another regiment the results were considered negligible because of the unsuitability of the terrain. In another unit, one platoon was used against a strongly fortified house. The sleds were towed to within 150 yards of the house, and from this position the towed infantry, supported by the tanks, assaulted the house and its defenses. In this case the combination of infantry and armor took the objective. With regard to the conclusions to be drawn from these operations, the Commanding General, 3rd Infantry Division, with whose command the equipment had been used, declared:

> . . .It is felt that a conclusive test of battle sleds has not been made in combat. Being new weapons, the leaders were hesitant in their application after the initial rehearsal phase of the attack. Antitank mines and ditches proved to be their worst obstacles. Tests prior to battle demonstrated that generally where the tanks could go, the battle sleds could be towed.
>
> It is believed that the infantry-tank assault sled teams have a place in the assault. Unfavorable terrain and antitank mines have so far proved to be their greatest hindrances. Battle sleds are definitely a special weapon and should be employed against organized positions where terrain and antitank defenses permit. . .(3ID/SP)

A battalion commander of the 7th Infantry, in whose unit the sleds were used, also reported that the results were inconclusive but that the new equipment and combination of the two arms have definite possibilities:

> . . .The tank sleds recently used in the breakout from the ANZIO Beachhead contributed very little or nothing to the actual break-through. However, they have very definitely proven a possibility well worth further expermentation and test in combat. This may be one method of moving into a determined enemy's position where other methods prove unsuccessful, with the minimum of losses in personnel. When this method of infantry-tank operation is employed, experiments thus far lead me to believe that not less than a tank company should be employed with the appropriate proportion of infantry in sleds, and that tanks not towing sleds should be employed in the echelon of tanks towing sleds, for the purpose of deception, maneuver, and to afford some protection to the tanks towing the sleds. . .(3ID/SP)

The Commander of the 751st Tank Battalion, whose units participated in towing the sleds, reported that the sleds were difficult to handle on the turns, and made a great deal of noise, especially when running over

rough and rocky ground. The speed during the towing operations was held to below ten miles per hour. (AGF/165).

(9) Infantry-Tank Communications in Combat. One of the chief problems experienced in the control and coordination of infantry and tanks in combat has been the need of a satisfactory means of communication between the two elements. Several solutions have been tried with varying degrees of success. One method of control has been the designation of a tank observer, who, accompanying the infantry commander, is in direct radio communication with the tank commander. A converse method was also reported by Fifth Army in having the infantry company or platoon commander ride in one of the tanks. Direct radio communication between the tanks and the infantry by means of the SCR 300 has been reported satisfactory in some instances, and unsatisfactory in others. Fifth Army has reported that the results of this means of communication between cooperating tanks and infantry have not been conclusive, and that further combat testing in the field will be necessary (5A/LL). Visual communication between the tanks and infantry has been conducted by the use of colored smoke grenades to indicate to the tanks that assistance is needed in a given locality or position. Target designation by the use of tracer ammunition from small arms has also been used. The use of green smoke proved very satisfactory, according to the comments from most units, and the Commander of the 1st Armored Regiment reported:

> . . .In our support of the infantry we arranged for the infantry to set off a smoke grenade -- green -- when they were held up. The nearest tank would go to the infantryman and find out what was holding up the advance. The infantryman would point out or otherwise designate the enemy resistance and the tanks would then overcome it. It worked very well. . . .(AGF/165)

(10) Infantry-Tank Liaison in Combat. The question of liaison between the infantry and the supporting tanks was a particularly serious one during the period of rapidly moving action after the opening of the Spring Offensive. Provision for adequate numbers of liaison officers with equipment and transportation has not been made in the tables of organization and equipment of either arm. During the

operations throughout the offensive, separate tank battalions were often attached and detached from infantry units. Frequent change of attachment increases the problem of liaison between the supported and and supporting units. Liaison parties were sent from the tank battalions to infantry companies, battalions, regiments, and to the divisions. Radios were removed from tanks not in use and installed in trucks, preferbly 1/4-ton, when available. At times tanks were used for liaison parties. The experience of the 191st Tank Battalion with the problem of liaison was thus summarized by the Battalion Commander:

> . . .The number of liaison officers should be increased. I have had fourteen parties out at one time. When attachment is changed there is often no time to recall liaison parties that are out, so new ones have to be formed and sent to the new organizations. There were times when I had to use almost any one, including first sergeants, for liaison work. I used officers from the maintenance platoon in addition to some overstrength officers I fortunately happened to have on hand. They were sent out on foot, in jeeps, in trucks, in tanks, and in any means of transportation that could be found. We usually strip the reconnaissance platoon of all vehicles for liaison parties. . . (AGF/165)

Further experience from the report of the Commander of the 752nd Tank Battalion is also quoted as of interest on this subject:

> . . .The infantry calls for a great many liaison officers when we are attached to them. We send them to the battalions, to regiments, and to the division. They use any transportation we can scrape up. We try to keep very close contact with the infantry and with our own units. Our liaison officers have been very useful many times in giving locations of the infantry units to their own commanders when they were out of contact.
>
> . . .I need from six to eight liaison officers with the battalion at all times when we are in combat. These officers must be good and have special training prior to the time they are needed if they are going to be of any use in battle. . . (AGF/165)

c. Infantry-Tank Destroyer Cooperation

(1) General. The primary mission of tank destroyer units is the antitank protection of the formation to which the destroyers are attached or are supporting. An important and profitable secondary role has been found to be general assistance and support of infantry, usually in the role of assault guns for such missions as attack and the reduction by direct fire of strong points, pillboxes, defended buildings,

and similar objectives. In this role, the destroyers and infantry must operate as a team and engage in mutually supporting action. General experience throughout the Campaign has disclosed a number of lessons in the employment of tank destroyers and infantry, which are briefly outlined below.

(2) Joint Planning, Combined Training, and Attachment. As in the case of infantry-tank cooperation (Paragraph 18b, supra), close understanding and joint planning, combined training, and continued attachment of the destroyer battalions to the same infantry divisions, are essential for proper infantry and tank destroyer cooperation. As indicated in the report of Fifth Army, frequent changes of attachment from one division to another causes lack of coordination and proper cooperation between the two arms, and prevents the achievement of the required teamwork in action. The attachment of destroyer battalions to divisions should be, insofar as possible, on a permanent basis (5A/LL).

(3) Necessity for Infantry with the Destroyers. When employed with infantry in the various roles indicated in Subparagraph (1) preceding, the destroyers should always be accompanied by infantry in close contact. They should not be alone. Artillery support should be available to the two arms working as a team.

(4) Improper Use of Tank Destroyers with Infantry. Tank destroyers should not be used as tanks. They are not adapted to tank missions, and must not be used in advance of the infantry on such missions. One major lesson from the Campaign with respect to the employment of the two arms has been such misuse of destroyers by the infantry commanders to whom they have been attached. One destroyer battalion commander reported that his units had been used as tanks for tank missions no less than nine times in the period from 26 May to 11 June. This improper use, quoted here as an example, was summarized in his report:

> . . .During the planning stage for an attack it was found that practically without exception the infantry commanders were reasonable in their requirements and expectations of support by the tank destroyers. But once the battle was

joined, the original plans with few exceptions were often discarded and the destroyers were ordered to go forward as tanks ahead of the infantry and overrun the points of resistance. At least nine such missions were assigned to this battalion, some of which were to flank strong points, seize and hold features until the friendly infantry came up. . .(894/SR)

Similar experience has been reported by the Commander of the 636th Tank Destroyer Battalion, though in the attack operation out of the Beachhead, it was declared that faulty employment of the destroyers by the infantry commanders was exceptional rather than the rule:

. . .Generally speaking the employment of the tank destroyers attached to regiments in this operation has been good, but in some instances battalion commanders have insisted on the destroyers preceding the infantry or have ordered them into unsuitable positions to perform certain missions. This has generally been due to the fact that the infantry battalion commander was not fully aware of the potentialities and limitations of these weapons and did not understand their limitations when employed against enemy infantry without sufficient support from friendly infantry.

Continued efforts to educate the infantry battalion commanders in the employment of tank destroyers should be made. Perhaps the most practical form of education will be to put over the idea of telling a tank destroyer company or platoon commander what his mission will be in a certain operation, and permit the tank destroyer officer to suggest positions and methods for accomplishing that mission . . .(AGF/172)

(5) Infantry-Tank Destroyer Liaison. As in the case of infantry and tanks, the maintenance of effective liaison between the infantry and the supporting tank destroyer units is of prime importance. Experience and opinion of the Commander of the 804th Tank destroyer Battalion has been thus reported:

. . .It is essential that adequate liaison be maintained between the tank destroyer company and the infantry regiment. This liaison is not difficult to achieve, but communications do sometimes break down. The battery pack SCR 610 is too heavy and cumbersome to be carried with advancing infantry elements. On one occasion an infantry regiment sent an SCR 300 to the destroyer company. This worked out very satisfactorily, and it is recommended as the answer to this question of maintaining efficient communications between tank destroyers and infantry. . .(AGF/172)

(6) Target Designation by The Infantry. Target designation by the infantry for the supporting tank destroyers proved to be an important element in the effective cooperation of the two arms in action. The employment of infantry runners, and the use of smoke grenades to call

attention of the destroyers, followed by specific indication by tracer fire have been recommended by the Commander of the 804th Tank Destroyer Battalion. His comment on this subject is quoted as follows:

> . . .During operations calling for close support of infantry, a standardized system of target designation is essential. On some occasions the infantry company commander would dispatch runners to come back to the destroyers and point out the exact point of enemy resistance. This generally worked very well, and it is felt that many times this system may be the most satisfactory. Firing of .50 caliber tracer also worked very well, but it was necessary to use a smoke or flare signal to warn the destroyers to "watch my tracer," and a similar signal to "cease fire.". . .(AGF/172)

(7) Support by Destroyers from Prepared Positions. Support of infantry by tank destroyers in prepared positions has been preferable whenever the situation has permitted. Successful employment in this manner has been reported by the Commander of the 701st Tank Destroyer Battalion:

> . . .In supporting an infantry attack a company of this battalion was in such positions (prepared positions well forward), and rendered valuable assistance and support to the infantry in destroying three enemy pillboxes, two enemy self-propelled guns, and an enemy tank by direct fire. . . (AGF/152)

(8) Special Missions in Support of Infantry. In some situations destroyers were used on special missions in support of the infantry to clean out strong points of resistance. An example of the employment of a single destroyer for this purpose with complete success is contained in a report from the 776th Tank Destroyer Battalion. The details of preparation, reconnaissance, and consultation between the infantry commander and the destroyer commander are of special interest and significance:

> . . .The Regimental Commander of the 338th Infantry reported that the advance of his 1st Battalion had been stopped by machine gun fire coming from somewhere on hill 109. I made a careful study of the hill with the infantry battalion commander, and we spotted all the likely locations for machine gun nests, although the infantry did not know their exact position, but only the approximate area from which the fire was coming. A foot reconnaissance for a position from which we could bring fire was made by the sergeant of the 1st Platoon and myself. I identified the targets to him. He then took one destroyer to the position by a defiladed route. The destroyer crew fired eighteen rounds of HE and one round of APC at the target area. Enemy personnel were seen to evacuate one dugout when a neighboring dugout was hit. The APC was used on one

position on which the HE had no visible effect. The APC followed by HE tore up the position effectively. The infantry reported that they received no more trouble from this area. . .(AGF/172)

(9) Movement in Support of Infantry. Effective employment of tank destroyers moving into action in support of infantry, as experienced by a company of the 601st Tank Destroyer Battalion, has been thus reported:

> . . .In moving with the assaulting infantry, no more than a section should move at one time. One section should cover the advance at all times. Short, quick moves are the best. If the advancing section is fired on, the covering section should take the enemy under immediate and rapid fire, even if they can't determine the exact spot of the originating fire. The advancing section should procede to a place of cover without hesitation. I have found that the fire from the covering section tends to confuse the enemy. . . .
>
> When called on by the infantry to flush the enemy from a house, one gun is generally enough to employ. It works well if your remaining guns cover the routes of egress from the house. In one instance when this method was used, not one of an estimated squad of the enemy escaped. . . (AGF/165)

d. Tank Destroyer-Tank Cooperation

(1) General. The mission of the destroyers in support of tanks is to provide protection from enemy armor and to provide direct fire support when needed. The destroyers should normally engage the enemy armor, but they may be called on to attack with their fire hostile antitank guns, self-propelled guns, and other secondary targets when necessary in support of the friendly armor. In the combined action of the two arms, the destroyers should not be employed in offensive action in advance of the supported tanks. An exception to this principle occurs when the destroyers are engaged in countering an enemy armored attack. Overwatching protection has been proven by experience to be the most effective mission for destroyers in cooperation with armor, except in the one instance noted above.

(2) Proportion of Destroyers to Tanks. Reports from units of Fifth Army have all indicated that the most satisfactory proportion of tank destroyers to tanks when operating over terrain that permits their deployment is one platoon of destroyers to a company of tanks. (5A/LL)

(3) The 3-inch Gun in Support of Armor. The value of the high-velocity tank destroyer gun in countering similar enemy high-velocity weapons and in giving support and protection to friendly armor has been stressed by several commanders. "The 3-inch gun of our M-10 tank destroyer," the Commander of the 2nd Armored Group observed,

> is the only comparable weapon at hand to the long-barreled German 75 and 88mm guns. Therefore, it is always desirable that tank destroyers overwatch the advance of our tanks. They are best placed in defilade positions, as their armor is not as heavy as that of our medium tank. . .The attachment of a tank destroyer battalion to an armored group will provide the necessary high-velocity guns to destroy the enemy tanks. . .(2Amd.C/SR)

(4) Tank Destroyer Support of Tanks. The cooperative action of the tank destroyers and their supported armor in the earlier stages of the Spring Offensive revealed in some instances the need of more aggressiveness on the part of the destroyer commanders. Although the destroyers should not be pushed out in front of the armor, except in the emergency of meeting a hostile armored attack, they should nevertheless be well up to cover the movements of the tanks they are supporting. In some instances there was a tendency for the destroyers to remain too far behind, and their support fires on such occasions were less effective than they should have been. On this point the battalion commander of the 1st Armored Regiment reported early in July that

> . . .in the recent operations it was evident that the tactical use of the tank destroyers was in some instances not skillfully or properly conducted. The M-10 vehicle, mounting its 3-inch gun, is the only truly dependable weapon to deal with the heavier armed and armored German tanks. At times the M-10 vehicles were not in position to lend their support. In some instances the crews of the M-10's were not sufficiently abreast of the situation, nor did they show the aggressiveness needed. On occasions they stayed back too far and were not overwatching the advance of the leading elements. . .(ACF/172)

In subsequent operations, the cooperation of the destroyers and their tactical employment showed a marked improvement in aggressiveness and close support. The Commander of the 1st Armored Regiment later reported that the destroyer support had been of the greatest assistance in the advance of the armor. In one instance he recorded that

. . .the destroyers were brought up into position over almost impossible ground, literally crushing down houses, and then succeeded in knocking out by direct fire at over 2,000 yards a German 150mm self-propelled gun. The first shot delivered broke off a track from the enemy self-propelled, and succeeding shots destroyed the gun and vehicle by burning. . .(AGF/172)

(5) Tank Destroyer-Tank Communication. As in the case of infantry and tanks, campaign experience showed a definite need of better communication between the destroyers and the tanks. Radio between the two elements did not prove to be reliable and often the tanks and destroyers were out of communication. A battalion commander of the 1st Armored Regiment drew attention to this problem in a report of lessons learned from the Campaign:

. . .There has been a definite need for a great deal of improvement in the communication set-up between tanks and tank destroyers. It has been frequently impossible to contact each other by radio, and this condition has helped to bring about a lack of proper cooperation. Some better means of communication between the two arms should be developed. . .(AGF/172)

(6) Attachment of Small Units vs. General Support. Experience in the employment of the destroyers in support of armor has varied somewhat among the different battalions. Generally speaking, the destroyers have been attached to the armored units, usually a platoon to a company, or a company to a battalion. Some destroyer commanders have recommended, especially in view of faulty communications, that the tank destroyers not be attached, but that the commander be given a mission of close support and be relied on to carry it out. The comments of the Commander of the 701st Tank Destroyer Battalion on this point are quoted below from a report of operations:

. . .In support of tank attacks the only policy we have been able to adopt has been that of attaching small units, companies or platoons to tank battalions or companies. In this situation the tank destroyers have followed closely behind the tanks until they found positions from which they could cover the advance. These positions have not been prepared, but wherever possible buildings have been used to afford some protection. This system works well only where there is close coordination and good communication between the tanks and tank destroyers. Planning must be done well in advance and all details agreed upon between the units concerned. . .(AGF/152)

Conversely, the Commander of the 191st Tank Battalion, in reporting on the subject, recommended that the destroyers not be attached, but rather the destroyer commander be given a mission and be held responsible for adequate support in the action:

> . . .Because of difficulties in communication, it is inadvisable to attach tank destroyers to tank companies. The destroyers should be kept under their own unit control and be charged with furnishing close support to the tank unit. In some cases they should also assist by fire other than against enemy armor. . .(AGF/165)

19. THE COMBINED GROUND FORCE ARMS IN PURSUIT ACTION

a. General

The breaking of the German resistance before ROME resulted in a rapid and general withdrawal of the enemy in the American sector, followed by pursuit action on a large scale and on a wide front. In no other campaign in this Theater has there been a pursuit action involving American forces on a scale comparable to the operations of this period. A number of lesson-experiences were apparent from the action of the combined ground force arms in this phase of the Campaign.

b. Transition from Offensive to Pursuit

Prominent in the experience during this phase was the necessity for rapid transition from normal offensive action to pursuit operations. It was found that all echelons must be prepared to effect this change without delay, and exploit the success of their advance to the maximum degree. Lack of preparedness for the change from normal attack to pursuit often results in large numbers of the enemy escaping, or in the enemy conducting effective delaying rearguard action to permit the main body of his forces to withdraw successfully. In order to effect this transition with the maximum of results, it is necessary that all units be readily prepared to re-organize for pursuit, and have plans ready at all times in the event of such a change in the nature of the action. In some instances, this principle was not fully carried out. An example of frank opinion on this subject is quoted from the Commander of a special task force of the 1st Armored Division which was organized for the pursuit:

. . .An armored division must be prepared for success. We did not contemplate success as rapidly as it came, and the Division did not organize for pursuit as rapidly as it should. We were slow in changing our concept of the action, and as a result we were not properly organized for pursuit such as developed quickly. In the first instance attention was completely directed to the problem of breaking the enemy resistance, and we did not give enough thought to pursuit after the resistance should be broken. As a result, time was lost in organizing for pursuit. Time is the essence of pursuit action. In short, we were not fully prepared for the success we achieved. All divisions should be prepared for success and for the pursuit that follows, by organizing for pursuit while the breakthrough fight is going on. . . (TFC.1Amd.D/VR)

c. Planning for the Use and Allocation of Roads and Routes

A highly important element in the transition from offense to pursuit has been the proper advance planning and allocation of available roads and routes for the advance of pursuit columns. In some instances failure to make this preparation, and to allocate properly the routes to the different forces engaged have resulted in confusion, delay, and the slowing down of the pursuit forces. This in turn has resulted in the escape of enemy forces that might have otherwise been cut off, captured, or destroyed. Adequate supply of maps to all elements concerned proved to be an important factor in planning the pursuit and in making proper allocation of routes. Shortage of maps in one instance, and the resulting failure to designate routes for specific units, produced traffic difficulties and delay. The outstanding example of this lesson can be drawn from the action in the passage of the TIBER in pursuit of the enemy north of ROME. The Commanding General, 1st Armored Division, in his report of operations for the period has observed:

. . .After seizing the bridge across the TIBER River, the Division was to push in two columns to sieze an initial bridgehead line approximately six miles beyond the TIBER. Due to non-availability of maps and the destruction of bridges south of ROME, tremendous traffic congestion developed and progress was very slow. Both Combat Commands and the Division Reconnaissance were forced into converging routes at the outset. The 36th Division was attempting to advance over the same route as Combat Command "A" and blocked the road when their artillery elements passed in front of our advance reconnaissance elements and made contact with an enemy strongpoint. Elements of another infantry division took the wrong route and were forced to countermarch over the route of advance of Combat Command "B". . .(1Amd.D/RO)

d. Organization of Pursuit Task Forces

(1) In the transition from normal offensive action to pursuit operations, a number of pursuit task forces were organized and operated by the several major commands. These generally consisted of small, flexible, mobile, and hard-hitting forces composed of the several ground force arms. Insofar as possible, they were self-contained and self-sustaining for the particular missions assigned to them. The exact composition and formation of these task forces varied with the mission to be performed, the terrain involved, the available units at hand for employment, and with the nature of the enemy action in the sector where they were used. In some instances they were used to seek out and locate the enemy retreating forces after contact had been broken. In others they were organized to destroy enemy delaying forces and bring pressure on the main withdrawing force. In still other cases, they were designed to cut off and destroy elements of the enemy seeking to escape. In all situations, speed, mobility, and fire power to meet the enemy situation presently existing were the main considerations in the composition and use of these pursuit task forces. As a result of the experience with several combinations of these composite units, Fifth Army has drawn the conclusion that all pursuit task forces used under conditions such as prevailed in Italy should generally consist of elements of cavalry reconnaissance, artillery forward observers, engineers, tanks, tank destroyers, and mobile infantry. The proportions and order in column of these elements will naturally vary with the mission and the terrain.

(2) The report of lessons learned from Fifth Army has listed several different combinations and proportions of arms organized in pursuit forces for different missions. In the 36th Infantry Division, a successful combination was used as follows, organized initially in column:

3 tanks
3 tank destroyers
Platoon to a battalion of infantry
Continuous artillery support by leapfrogging

In this combination as many of the infantry as possible rode on the tanks, but the speed of the movement conformed to the pace of the foot troops.

In the 636th Tank Destroyer Battalion, the following organization and composition was adopted with success:

Cavalry reconnaissance platoon
Artillery forward observer
Tanks (Carrying from a platoon to
Tank destroyers (a battalion of infantry

In this combination, Fifth Army recommended that a section of engineers, equipped with mine detectors and a bulldozer be added to the task force. Two effective combinations of pursuit forces were organized by the 701st Tank Destroyer Battalion, designed for different types of missions, as follows:

(a) Light tank platoon
Artillery and assault gun forward observers
Engineer reconnaissance detachment
Squad to a platoon of infantry
Section of Tank Destroyers

(b) Company of medium tanks
Company of tank-borne infantry
Platoon of tank destroyers
Platoon of engineers
Platoon of light tanks
Cavalry reconnaissance elements to the flanks

(3) Within the 1st Armored Division, several combinations were successfully employed. These varied with the mission, and especially with the nature of the road net available. The Commander of the 6th Armored Infantry reported as follows:

> . . .Where rapid advance is anticipated, more serious thought and planning should be given to road priorities and alternate routes of advance, so as to aid in eliminating confusion in the column. It is believed that flying columns and advance guards should be smaller. The roads available should be the determining factor in the number and composition of the small columns employed in advancing through a sector. The following formation is recommended where resistance is likely to be spotty or light:
>
> 1 platoon of medium tanks
> 1 section of tank destroyers
> 1 platoon of infantry
> 1 section of engineers
> 1 company of medium tanks, less one platoon
> 1 company of infantry, less one platoon
> 1 section of artillery
>
> In pursuit it is essential that a part of the advancing unit be prepared to enter into a fire fight as soon as fired on. This fire will act as covering fire for maneuvering units and allow them to close in on the enemy more rapidly. . . (AGF/172)

The Chief of Staff of the same division also commented on the general organization and effective employment of these pursuit forces:

. . .A very successful use was made of small task forces in the rapid advance after the breakthrough. A number of small task forces was organized, each consisting in general of an armored battalion, a company or battalion of infantry, a battery of armored artillery, a platoon of tank destroyers, and a platoon of engineers. These should train together and be ready to hit at once when enemy resistance is encountered. A similar force is ready to follow through and continue the advance when the first force has cleared the way. The force which is passed through is then reorganized and follows behind ready for employment again. When the advance of the division is along several roads, each of the advancing columns should have these small task forces, and employ them in a similar manner. . . .(ACF/165)

e. Reconnaissance Elements in Pursuit

(1) Experience throughout the latter phases of the Campaign showed that reconnaissance elements have been highly valuable in the pursuit operations, either alone, or in combination with other arms. They have been especially effective in combination with armored units. The following material has been extracted from the report of Fifth Army on lessons learned in the Spring Offensive (5A/LL).

(2) Reconnaissance elements have been successfully used in aggressive armored reconnaissance rather than in the passive security role. This is generally believed to be proper usage. The 36th Division found that the reconnaissance troop could operate at night with success, but should have infantry with it to outflank antitank and self-propelled guns.

(3) A reconnaissance team used with great success in the recent pursuit operations included:

(a) An artillery forward observer with each platoon
(b) 1 platoon of infantry with each reconnaissance troop
(c) An engineer reconnaissance detachment

The infantry in this combination rode in the vehicles of the reconnaissance troop.

(4) Aggressive reconnaissance by the 91st and 117th Reconnaissance Squadrons was the rule rather than the exception throughout the current pursuit.

f. Employment of Pursuit Task Forces

(1) Aggressive action and proper internal organization to permit immediate deployment and flanking movement when resistance and

delaying forces are met were important factors in the employment of these pursuit forces. In some instances, there was failure to achieve these requirements in necessary degree. On this subject the Commanding General, II Corps reported in the middle of June:

> . . .The delay caused us by small enemy detachments is out of all proportion to the numbers and means at our disposal. Among other errors committed has been our failure to leave roads soon enough and make a wide enough envelopment or by-pass. . .Too often a column of tanks was inactive on a road, held up by a single self-propelled or antitank gun. The time lost waiting for infantry to arrive, deploy, and attack the gun could have been reduced by 50% or more by rapid deployment of the tanks or a wide development which would in most cases have resulted in the capture or destruction of the gun. Likewise, relatively large groups of infantry have been long delayed by a small enemy group with a machine gun or two astride a road. Again the time wasted waiting for the arrival and action of tanks could have been materially reduced by early and wide deployment. . .(IIC/LL/1)

(2) Experience showed that excellent results are obtained by employing two of these small pursuit task forces on each road or avenue of advance. By having a fully organized force prepared to pass through a leading force which has deployed to deal with delaying positions and forces, the advance can be maintained at a steady, unbroken rate. In this connection, the experience of a pursuit task force commander of the 1st Armored Division is quoted as a pertinent example:

> . . .The spearhead of a pursuit should consist of a small, compact, highly mobile task force made up of the combined arms (tanks, tank destroyers, infantry, engineers, and reconnaissance) supported by artillery. Two such forces should advance on each axial road. When the leading force has been forced to deploy by enemy action, the rear force should be prepared to pass rapidly through or around the leading force as soon as the situation permits, so as to relentlessly maintain the continuity of the pursuit. Speed is the essence. All or part of the infantry should be mounted on the tanks rather than on their own carriers so that they may be made immediately available when needed, and so that the column may be made more compact by eliminating the infantry carriers.
>
> When contact with an enemy road block has been made, one or more platoons of tanks with the infantry should immediately be ordered to make a close in envelopment of the enemy after a hasty reconnaissance. This will usually force the enemy to abandon his position, or at least will develop the situation. If carried out with sufficient speed, it will succeed in cutting off enemy rear elements. Time should not be wasted in making elaborate plans at this stage. For example, though an artillery concentration on the road block is doubtless desirable, the envelopment of the road block should not be delayed simply because artillery support is

not available at the moment. The attack and envelopment of the road block must be made at once, otherwise the enemy, having accomplished his delaying mission, will disengage and set his trap up again a few miles further on.

Attached reconnaissance elements should be used principally to patrol side roads. They are too thin-shinned for use as leading vehicles on the main axis.

Generally speaking, medium tanks should lead the pursuing column. When passing through villages or when approaching defiles, the commander should not hesitate to dismount one or more squads of infantry and require them to deploy and precede the tank column a short distance. The infantry must in this case be encouraged to move rapidly and boldly until fired upon, otherwise much time will be lost in skulking from bush to bush when actually the enemy may be miles away. . .(AGF/172)

20. AIR-GROUND OPERATIONS

a. General

Air support of ground operations throughout the period of the Campaign under consideration showed steady improvement and increased effectiveness. During the critical phase of the Beachhead defense at ANZIO, the assistance rendered by the supporting air units was of vital importance and had a full share in the successful holding of the beachhead area. In the Spring Offensive, the results of the air operations in conjunction with the ground advance were exceptionally outstanding. After the fall of ROME, the Commanding General, Fifth Army declared that the air support

. . .was magnificent. Taken from my point of view, this has been a demonstration of air support of the Ground Forces approaching perfection. The XII Tactical Air Command and all other units which have engaged in these operations have at all times given immediate response to every call for assistance with prompt and effective results. The aggressive action of the supporting air units has enabled us to show the enemy how irresistable the air-ground combination can become. . .(L/CG5A)

Two phases of the Campaign in the period here considered, the air-ground assault on CASSINO, and the Spring Offensive, were productive of lessons-experiences especially noted in the reports of the commanders concerned. These are outlined briefly in the succeeding paragraphs.

b. Air-Ground Lessons from the CASSINO Operation, March 1944

(1) In the effort to take the strongly fortified town of

CASSINO and its contiguous positions by direct assault, close air support was employed on a scale never before attempted on a single objective in this Theater. The plan called for an overwhelming air bombardment by both medium and heavy bombers in large numbers, followed by an artillery preparation which in turn was to be followed by a vigorous infantry assault supported by tanks on the town and its adjoining positions. Although the attacking infantry succeeded in penetrating into a part of the defended town and gained control of part of the German positions, it was not possible to hold the ground thus gained, and the general operation was not successful. Although no specifically "new" lessons were learned from this operation, a number of important conclusions were drawn from the experience and certain methods of improvement in the operational technique of the both arms were advanced by the respective air and ground commanders.

(2) General lesson-experiences applicable to both ground and air operations, as reported by both commanders, were in brief as follows (TM5/AF 44):

Reported by Air Commander	Reported by Ground Commander
(a) The bombing of a fortified enemy strongpoint such as CASSINO must be followed by a determined and vigorous ground attack which must be initiated in the shortest possible time after the last bomb has been dropped.	(a) The follow up of the infantry must be immediate and aggressive, employing the maximum infantry strength available. The maximum amount of infantry was not employed in this attack, nor was the attack pushed aggressively enough. Too great reliance was placed on the ability of the bombing to do the task alone.
(b) Employed in close support of a ground operation, air bombardment cannot be expected to obliterate strong defenses and determined resistance. This is especially true in the case of a fortified town such as CASSINO.	(b) The town of CASSINO was not only fortified, but use was made of cellars and tunnels. Despite the tremendous air effort, our infantry were met by a determined enemy in well fortified positions. It follows therefore that no aerial bombardment alone can clear an area of infantry who are well dug-in.
(c) Heavy bombing of a strongly defended town will produce craters and masses of rubble from demolished buildings which become serious obstacles in the advance of attacking infantry and armored vehicles. These obstacles will also provide the enemy with advantageous firing points and positions for defense.	(c) The heavy bombing hindered our advance by cratering and blocking the routes with debris. Due to cratering few tanks could enter the town. The tonnage of bombs dropped must be carefully considered in the ground plan of action, as debris and cratering hinders the use of armor.

Reported by Air Commander	Reported by Ground Commander
(d) Provision must be made for bomb-line markers which can be clearly identified from the air at bombing altitudes.	(d) Every possible means must be used to insure accurate identification of the targets by the pilots.
(e) The capabilities and limitations of each arm must be mutually understood and appreciated. The closest cooperation must be achieved between the commanders and staffs of both arms.	(e) Not specifically stated in the ground commander's report, but clearly implied in the report as a whole.

(3) The general lessons applicable to the air operations in the attack on CASSINO were thus summarized in the report of the Air Commander, and where indicated, by the Ground Commander (TM5/AF 44):

(a) In the CASSINO Operation, both Tactical and Strategic Air Forces were employed. The Tactical Air Force gave better performance and results, largely because close support is a normal operation for this type of air force. Conversely, close support missions are rare operations for the Strategic Air Force, which has little training and experience in such operations.

(b) In general, heavy bombers should not be used in close support operations when there is present an adequate Tactical Air Force.

(c) When operations require the use of heavy bombers in close support of ground operations, the following recommendations are advanced by the air commander:

(aa) When practicable, bomb leaders and bomb navigators should make a previous flight over the target area.

(bb) Bombing altitudes should be specified. The heavy bombers showed a tendency to bomb from too high an altitude.

(cc) Angles of approach should be specified, especially when ground troops are close to the target area.

(dd) Intervals between bomber groups, especially when the wind is sufficiently strong to clear the smoke from the targets, should be decreased. The whole bombing operation should be concentrated in the briefest possible time.

(ee) A member of the Strategic Air Force Commander's staff should be present in position to observe the bombing action of his units, and should have radio communication with his units in the air.

(d) A percentage of bombs should be fuzed for delay action to reach cellars and penetrate heavily covered emplacements (Reported by the Ground Commander only).

(e) In a large scale air bombardment in which aircraft approach the target area from widely scattered points, an unmistakable artificial landmark such as smoke for the orientation of navigators would assist the entire air effort (Reported by the Ground Commander only).

(f) Alternate targets should be designated in case some flights of aircraft are late at the end of the schedule (Reported by the Ground Commander only).

(g) Despite its casualty effect and morale effect on enemy personnel, air bombardment by heavy bombers is not sufficiently accurate for general use in the tactical area of land battle (Reported by Commander, Allied Armies in Italy).

(4) The general lessons applicable to the ground operations in the attack on CASSINO were thus summarized in reports of the ground commander (TM5/AF 44):

(a) The infantry assault following the air bombardment must be immediate and aggressive and in maximum available strength. The maximum amount of infantry was not employed in this attack, nor was the attack pushed aggressively enough. Too much reliance was placed on the ability of the air bombardment to do the task alone.

(b) The initial assault waves must follow quickly the artillery barrage after the air bombardment. They should not stop to mop up isolated strong points and centers of resistance. Such centers of resistance should be left to clearing up or mopping up parties following the initial assault.

(c) Because of the craters and rubble created by the air bombardment, only a few tanks could enter the town in support of the infantry. Those that did rendered valuable support.

c. General Air-Ground Lessons from the Spring Offensive

The following general lesson-experiences from the air-ground operations in the Spring Offensive have been reported by the Commanding General, Fifth Army, in a report of lessons from this phase of the Campaign (5A/LL):

(1) The general air support was favorably commented on if it was far enough ahead. All units have a definite fear of friendly bombing and strafing from support too close-in.

(2) It has been found that many pilots are not well versed in the use of yellow smoke for ground identification, and those that are often cannot see it when in a dive. Prearranged air support missions with 3 to 4 hours' preparation have worked successfully. The air commander must know the particular plans of the division he is supporting.

(3) The Allied control of the air had a great moralizing influence on the ground troops. Air operations actually visible to the men created much enthusiasm and confidence.

(4) Air support as long range artillery is not only valuable but proved quite essential.

(5) Close-in air support requires additional and surer means of target identification if it is not to be a danger to friendly troops.

(6) Forward fighter bomber controls were established in two corps sectors. Experience in each was as follows:

(a) In one sector the forward control was at an observation post which afforded observation of the battlefield. The controller had available gridded photos and special maps of the area under observation, and had an accurate knowledge of the location of our own troops. This arrangement enabled the controller successfully to direct aircraft on major centers of resistance. An outstanding example was the bombing of CASTELFORATA about 1000 yards in front of our own troops. After the bombing, the resistance was greatly reduced, and our troops secured the town and dominating terrain with little difficulty.

(b) In the other corps sector the forward controller did not have a good view of the battle area. When the position of our

troops was accurately known, the forward controller was successful in directing planes on enemy positions. However as the breakthrough was achieved, and the situation became fluid, some errors were made and several attacks were made on our own troops. Therefore ground controllers must cease operations when the situation becomes fluid and the location of our troops is indefinite.

(7) Air power can be used to deepen and thicken artillery fire to assist the initial forward movement of infantry and tanks.

(8) The best protection from attacks by friendly aircraft on our own troops is a rigidly-adhered-to bomb safety line.

(9) Air support cannot remove isolated centers of resistance holding up the immediate advance. It can be very effective in interrupting enemy defensive preparations at a distance ahead of the advanced elements.

(10) Completely satisfactory identification of ground troops by friendly aircraft is still an unsolved problem.

(11) An element of calculated risk is always involved when aircraft are employed close to our own troops. This calculated risk must be accepted by ground troops in the same manner that it is accoptod in connection with supporting artillery.

d. Support by Armed Reconnaissance Aircraft

(1) Armed reconnaissance by fighter-bomber aircraft was employed with great effect in front of the Fifth Army. Over 1000 enemy vehicles have been claimed destroyed or damaged in the course of one day's operations. Certain conditions must be fulfilled before armed reconnaissance can be effectively employed:

(a) Advance by ground troops must be at such a rate as to force enemy movement during daylight.

(b) There must be a disruption of the enemy antiaircraft capabilities, caused by his forced movement of his anti-aircraft installations.

(c) The air units must have accurate knowledge of the location of our own troops. A clearly recognized bomb safety line must be established.

(d) Rapid means must be established for disseminating to all elements concerned information of changes in the bomb safety line.

(e) Rapid means must be provided for locating enemy movement and for directing attacking aircraft to the targets. This is an air problem and was solved by having all reconnaissance aircraft and fighter-bombers flash their observations to the fighter controller. The controller then directed flights to the targets and passed the information to the Tactical Air Command which could rapidly concentrate additional force on the target as necessary.

(2) Armed reconnaissance operations lose their value as the enemy recovers from his defeat and his daylight movement is reduced.

e. Close Air Support in Moving Situations

(1) In rapidly moving situations it becomes extremely difficult to provide the supporting air units with definite and accurate information as to the location of friendly troops. In such situations the necessity for target indicators is of great importance. Experiments were conducted during the Spring Offensive in the use of L-5 Artillery OP aircraft as target indicators for the supporting Tactical Air Force units. The system, called HORSEFLY procedure, was worked out and tested by Fifth Army, and the following details are extracted from their report of lessons learned from the Campaign (5A/LL).

(2) The procedure was designated as follows:

(a) The 324th Fighter-Bomber Group was designated in close support of the 1st Armored Division.

(b) A forward fighter controller with VHF radio was established at the air strip of the 1st Armored Division.

(c) Four L-5 aircraft were secured from the Artillery Section of Fifth Army. VHF radios were installed in each of these aircraft and they were based on the air strip of the 1st Armored Division.

(d) Point to point radio channel was established between the 324th Fighter-Bomber Group and the 1st Armored Division air strip.

(e) The usual air support communications nets were in normal operation.

(f) The forward fighter controller was given a special code name (GREAT BEND).

(g) The L-5 aircraft were given code names (HORSEFLY YELLOW, HORSEFLY BLUE, HORSEFLY RED, AND HORSEFLY WHITE). Each plane was physically designated by having the upper surfaces of its wings painted the corresponding color above indicated for identification by the fighter-bombers.

(3) The procedure in action was as follows:

(a) A target would be discovered by forward observers or by artillery observation planes and would be reported to the Division Assistant G-3 Air, at the division air strip.

(b) A HORSEFLY plane would be dispatched from the air strip to locate the target and keep it under observation pending the arrival of fighter-bombers.

(c) Every hour flights of four fighter-bombers would report to the forward fighter controller (GREAT BEND) and ask for targets. If no targets were available they would be directed to attack some pre-arranged alternate targets. If a target were available they would be directed to rendezvous with the appropriate HORSEFLY plane at some designated point.

(d) The fighter-bombers and the HORSEFLY plane would then establish radio and visual contact. After above contact was established the HORSEFLY plane would describe and point out the target to the fighter-bombers.

(e) The fighter-bombers would attack and the HORSEFLY plane would observe and report the results.

(f) The HORSEFLY planes were flown by air force officers who were responsible for proper description and guidance of the fighter-bombers to the target. An officer of the supported division acted as the observer in each plane and was responsible that the target was enemy and safe to attack. He was also responsible that the pilot had the correct target.

(4) This system worked quite well and resulted in several successful attacks. Targets were few, and most missions were directed

to attack alternate targets. The procedure and communications were proved to be satisfactory. Certain definite limitations were determined as a result of field operations with this system:

(a) The HORSEFLY procedure operates best on a one division front. It should be used on the fronts of the division making the main effort.

(b) The best targets for HORSEFLY procedure are enemy movements forced on the road by aggressively advancing ground troops.

(c) HORSEFLY aircraft can safely operate at a 6,000-foot altitude and to a depth of about five miles into enemy territory.

(d) HORSEFLY procedure cannot be used to attack the opposition holding up the immediate advance, but can be successfully employed to attack delaying forces as they move from one position to another.

(e) A large air effort must be devoted to the operation. Unless the enemy is forced by ground action to move, this effort may be largely wasted.

SECTION V : INFANTRY UNITS

21. GENERAL

a. Infantry combat experience and the various lessons from operations in the period under consideration largely followed the pattern of those outlined in Section V, Training Memorandum No. 3 covering the earlier phases of the Campaign. As in the previous instance, field commanders again reported no "new" lessons as such, but placed further emphasis on a number of those brought out in the earlier period. Again it was demonstrated that our basic, battle-tested principles were productive of successful results whenever applied properly to fit existing and changing conditions. Comparable to the broad, general lessons of the Campaign as a whole (CF. Paragraph 16, Section IV, supra), an outstanding lesson of the Infantry was the need and development of the fullest cooperation and coordination of effort with the other combat

arms. With respect to the Infantry as an individual arm, various commanders have again re-emphasized a principal basic lesson of previous campaigns: the necessity for proper coordination and combined employment of the component infantry elements and support weapons to insure the greatest and most effective combination of fire power directed to meet the situation of the moment. The often-stressed subject of competent and vigorous troop leandership as a primary essential to achieve this end was also reiterated in the comments of commanders of all echelons.

b. The specific subject matter relating to infantry lessons emphasized in reports from field formations generally parallels the various individual topics contained in Section V, Training Memorandum No. 3. Mountain warfare continued from the GARIGLIANO Line to the ALBAN HILLS. It again prevailed intermittently in the later phases of the pursuit and in the advance as the more rugged areas of TUSCANY were crossed and the defenses of the GOTHIC Line were reached in the Northern APPENINES. The same general principles and experience delineated in the study of the previous period of the Campaign were applicable to the later phases: the long-stressed principle of working the high ground and ridges to outflank defended natural approaches and corridors; the problems of transport, communication, supply, and evacuation -- and their solutions under difficult field conditions; and the general principles of infantry tactics and their modifications born of experience in operations in mountainous terrain. All were again brought out in strong relief. One phase of combat not encountered on a large scale since the second phase of the Sicilian Campaign -- pursuit in rugged, mountainous country -- was again experienced. The vital importance of effective patrolling, the use of battle and reconnaissance patrols, especially in the preparatory period preceding the Spring Offensive, were again strongly reemphasized in the reports and comments of combat commanders. Likewise, the basic principles of effective movement, flanking, and envelopment as opposed to frontal attack were continually recognized as fundamental factors in the success of our infantry

operations. Again as in previous experience, town, village, and street fighting; the attack and envelopment of mutually supported strong points, fixed defended posts, pillboxes, and prepared defenses were all given special emphasis in reports of lesson-experience. As the full German retreat developed, the principles and problems of dealing with stubborn delaying forces, of forcing defended routes and blocks, and of destroying or by-passing strong delaying positions were brought out in the Campaign.

c. During the static period of the ANZIO-NETTUNO Beachhead, our infantry was for the first time in this Campaign forced to remain on the defensive for long periods of time. The general previous experience in North Africa, Sicily, and in the earlier phases of the Campaign in Italy had been largely characterized by tactics of attack and the employment of infantry in the offensive role. The Beachhead experience, covering more than three months of static warfare, brough out the prime importance of perfecting the tactics of defense and of applying them to the peculiar conditions that prevailed. Without having learned to maintain this successful defense within the Beachhead perimeter during the critical period under peculiar and difficult conditions, our troops could not have prepared and successfully carried out the break-out attack which contributed so much to the Spring Offensive. Unit commanders and their troops alike must recognize the importance of effective defense measures and tactics applicable to all types of situations. This was one of the great infantry lessons of the Beachhead fighting.

d. Detailed consideration and evaluation of the infantry lessons of the Campaign in the period considered reveal that the various reported lessons were not new, but were often old and familiar lessons re-learned and re-experienced. The individual subjects treated below include only those which have been particularly emphasized in the reports and recommendations of various field commanders. Some of them may repeat, for the sake of their importance, the experience reported in Training Memorandum No. 3. Other subjects already covered in this previous

memorandum and not given special attention in reports of field formations will not be repeated here.

22. INFANTRY PATROLLING

a. General

The subject of infantry patrolling has been treated in every combat lesson publication of this Headquarters from the early period of the Tunisian Campaign to the present. Although the comments and experience in the latter phases of the Italian Campaign do not present new lessons in this subject, they have nevertheless, been given such strong emphasis in current reports of unit commanders that their inclusion here is considered imperative. The importance of the subject is manifest in the terse comment of the Commanding General, 36th Infantry Division, who stated in a report of tactical lessons in the early period:

> . . .Patrolling is one of the most important phases of combat. Greater emphasis must be placed on the training of patrols for both day and night operations. . .(36ID/LL)

Likewise, the report of combat lessons from the same general period published by II Corps restated the same point in almost identical terms (IIC/LL1). As indicated in practically all campaign experience, the requirements of individual training, initiative, and proficiency, as well as planned, coordinated teamwork and collective action in the technique of effective patrolling can be achieved and maintained only through sound basic infantry training and constant refresher training. The training of new men in proficient patrol action is a subject of vital interest to all commanders.

b. Patrol Missions

Of special importance to the success of patrol activity is the fixing of a mission capable of accomplishment in the time allowed and under the prevailing conditions. Simplicity of mission has been found essential to success. Proper allowance in time must be made for the necessary preparations, prior planning, and reconnaissance. In many instances these considerations have been overlooked or neglected

under the pressure of combat. In the lessons of the Spring Offensive, Headquarters Fifth Army reported:

> . . .Too often patrols are sent out on missions bordering on the impossible. The fault lies in the failure to appreciate the detailed preparation necessary to the performance of a patrol mission. Patrols are ordered to secure information far in excess of their capabilities. The result is often the return of a patrol which, unable to accomplish all it set out to do, has failed in its mission. . . Patrols must be given simple missions, capable of performance, and when such is the case they will generally secure more information than they are initially ordered to obtain . . .(5A/LL)

The above principles were again re-emphasized in greater detail by Fifth Army in a special memorandum which directed more intensive troop training in the subject:

> . . .Innumerable cases have been cited in which Commanders or members of their staffs have prescribed patrol missions which have been impossible of accomplishment because of limitations and restrictions imposed on the mission. Often the patrol is ordered to return from its mission by a certain time with a detailed list of items of information which cannot, if the mission is properly executed, be gathered in the time allowed. Too often there is failure to consider properly the time involved in the selection of the patrol, assembly of personnel, equipping of the patrol with special equipment it does not normally carry, prior reconnaissance by the patrol leader, briefing of the patrol members, and the movement of the patrol to the initial point from which the mission is to start. . .(TM14/5A)

With respect to the assignment of patrol missions, a Division Commander further reported in a summary of tactical lessons:

> . . .Company commanders should be assigned the patrol missions and should be allowed to accomplish them in the manner and with the means they think best. Neither the Division nor Regiment should specify the size and equipment of a patrol . . .(36ID/LL)

c. Patrol Leadership

As reported by units of the Fifth Army, combat experience throughout the Campaign has indicated the vital importance of competent patrol leadership. The success or failure of a patrol depends, in the final analysis, on the qualities of leadership possessed by the patrol leader. In a great majority of cases, commanders have selected their best officers and non-commissioned officers to perform this duty. (TM14/5A).

d. Discipline in Patrol Action

The strictest discipline must be developed among troops selected for patrol duty, and must be maintained throughout all patrol action. There must be rigid control to prevent all unnecessary noise, such as talking, coughing, and particularly firing. All movement must be regulated to take full advantage of prevailing conditions. Failure to observe these principles may often nullify the effort of a patrol which, nearly finished with its mission, may reveal its presence and purpose by unguarded, careless movement or violation of discipline by one of its members. Patience is of extreme importance in this respect, and is properly a most vital element of patrol discipline. (TM14/5A).

e. Night Reconnaissance Patrols

Night reconnaissance patrols, as distinguished from battle or combat patrols, should be kept small, and must depend on stealth, control, quietness of movement, and security for their success. Rifle fire should be used by such patrols only when the target is clearly defined and the sights are thoroughly visible. Hand grenades are a most effective weapon for night patrols. (IIC/LL2).

f. Specially Organized Battle Patrols

Experience in the Campaign, especially in the ANZIO-NETTUNO Beachhead, led a number of commanders to resort to the employment of specially organized, semi-permanent patrols of picked men whose principal duty was to perform patrol missions for the general parent unit. A number of advantages accrued from this system. It developed experts in this type of combat activity, and especially effective results were obtained. These "battle" patrols were found to be particularly effective in the preparatory period before the Spring Offensive, and in the general operations in the Beachhead. In the latter connection the Commanding General, 3rd Infantry Division, declared:

> . . .As a result of operations on the Beachhead, I have become convinced that we must have the equivalent of the World War I scout platoon to carry out deep patrols and and raids where skilled, determined men are essential to success. We are now (10 April 1944) organizing such a

battle patrol group within the Division, and in each infantry regiment. All members of these groups are volunteers who want to get into close combat with the German. . . (AGF/147)

Similarly Fifth Army Headquarters reported some five months later in a special memorandum on patrolling that:

. . .Some of the units have constituted permanent patrols whose principal function has been to execute various patrol missions. These "professional" battle patrols usually consisted of one officer and fourteen men. The officers selected have been volunteers, the most aggressive, tough, and rugged officers of the battalions. They have been permitted to select from the battalions men possessing the same qualities. . .(TM14/5A)

Further comment and opinion on the subject is available from the report of a Division G-2, based on wide experience within the ANZIO-NETTUNO Beachhead:

. . .Lateral and close-in security patrols should be left for execution by elements of the front-line infantry battalions, but we have come to the conclusion that reconnaissance for important information must be done by a group of specialists who do nothing else, if you are going to get proper results. A special group of picked men, thoroughly trained and given special rehearsals whenever possible, can be depended upon to do the job properly. . .(AGF/147).

Of equal interest and significance was the comment of the Regimental Commander of the 7th Infantry on this same subject, who also pointed out the important relationship of patrolling to the combat efficiency of infantry units in the line:

. . .Toward the end of our tour in the line here in the Beachhead, our standard of patrolling got materially worse, because of excessive losses among good officer and NCO patrol leaders. A unit bogs down as soon as the standard of its patrolling drops. I think the Battle Patrol is the solution. These men are used about once in every three days; between missions they can rest and rehearse, and can do an effective job whenever they are called on for a patrol mission. . .(AGF/147)

g. Employment of New Men in Patrols

The size of a patrol should not be increased merely to give experience to green men. This jeopardizes the success of the entire patrol. New men should be made up into patrols under an experienced leader, and be sent out on minor missions 200 to 300 yards in front of

our lines. As their skill and confidence increases, the distance from the lines and the difficulty of the missions assigned should be increased. Every company commander must know the capabilities and state of training of all men used for patrol work. (IIC/LL1)

h. Importance of Patrol Action before the Spring Offensive

During the preparatory period before the Spring Offensive, a particular effort was made in all sectors to secure accurate and detailed information as to the location, disposition, and strength of the enemy defenses. This was accomplished to a great extent by continually active and effective patrols which constantly probed the enemy lines, secured information, and virtually dominated No Man's land. Higher commanders have pointed to the value of this patrol activity as one of the important factors in the initial successes of the offensive. From it accurate intelligence data were obtained and effectively used in planning the details of the general attack. The patrol activity in this connection on the ANZIO-NETTUNO Beachhead was especially important and contributed materially to the success of the break-out attack. Headquarters Fifth Army reported on this point in August:

> . . .In the recent attacks from the ANZIO Beachhead, vigorous, aggressive patrolling was largely contributory to the success of the attacks. It is of profound importance that infantry and reconnaissance units receive careful, thorough, and detailed training in scouting and patrolling. . .(TM14/5A)

Likewise the lessons of the Offensive prepared by Fifth Army quoted the significant experience of one infantry regiment:

> . . .One Regimental Commander stated that the success of his organization in the break-out from the Beachhead was due to the vigorous, endless patrolling at night which curtailed the enemy's construction of strong defensive works and deepened No Man's land by 2,000 yards. The enemy in this particular sector eventually abandoned all small outposts. Another effect of this patrolling was the reduction of accurate fire on our positions in daytime which allowed our troops more than average rest. . .(5A/LL)

i. Miscellaneous

(1) Training in map reading cannot be overemphasized in the preparation of men for patrol activity. (TM14/5A)

(2) Patrols must be taught the vital importance of crawling. Many needless casualties and patrol mission failures can be traced to improper crawling or exposure as a result from failure to crawl. (IIC/LL1)

(3) In defense, No Man's land should be dominated by patrol action. Aggressive patrolling keeps the enemy off balance. It enables a commander to "take the punch" out of an enemy attack before it is well started. (GG 3ID, AGF/147)

(4) All company officers should be trained and capable of leading patrols. Although officer patrols should be kept to a minimum, company commanders should strive to give each of his officers patrol experience. (36ID)

(5) Radio has been found to be most useful in maintaining contact with the main body, and can be used to send back timely items of information. The use of a simple, pre-arranged code assists materially in this type of transmission of intelligence. (TM14/5A)

(6) Patrols must be imbued with the desire to accomplish their assigned mission. More intensive training should be given in the training centers in patrolling under combat conditions. (30Inf./LL,AGF/147)

23. MOUNTAIN WARFARE

a. General

Infantry experience in mountain warfare in this Theater has been progressively cumulative. Principles initially learned and applied in Northern Tunisia were profitably followed, improved and extended in the brief campaign in Sicily. Throughout the fighting in Italy, the substance of mountain experience has been further developed and applied in the extensive operations in rugged, difficult terrain. In the latter period of the Campaign, no new lessons have been learned, but the reports and comments of commanders represent the cumulative knowledge gained from long experience. The following paragraphs summarize the main points emphasized by various responsible headquarters.

b. Adequacy of Mountain Training in the United States

Reports of units participating in mountain fighting have

all commented favorably on the standard and soundness of the mountain training provided in the United States. In a summary of lessons from the Spring Offensive, Headquarters Fifth Army reported:

> . . .Considerable mountain operations have been experienced here in Italy. Some units had special mountain training prior to being committed to action. . .The mountain warfare training as conducted in the United States has been considered sound and effective. . . (5A/LL)

It was further pointed out, however, that some divisions which had not had prior special training in mountain operations "did not suffer operationally as a result of this omission." Infantry troops without special mountain training, if adequately conditioned physically and given sound basic instruction in the use of mule transport, packboards, and supply functions, have been found to perform well in mountain operations.

c. Major Principles from Combat Experience

(1) Infantry combat in mountainous terrain generally involves the siezure and holding of commanding heights, ridges, communications routes and centers, and other key terrain features. The broad principles of mountain fighting are essentially the same as those in other normal types of country, but often require special application. Mountain operations do, however, impose special problems and difficulties in supply, transport, and communication. Cumulative experience of the 34th Infantry Division, a formation which had not had special training in mountain warfare prior to its arrival in the Theater, was thus summarized in a report of lessons from several campaigns:

> . . .Mountain warfare involves no new basic principles and in most instances in Italy it has not required special troops. It does require some special equipment -- particularly warmer clothing and light weapons. The extremely difficult terrain encountered in the Italian mountains requires men to undergo extreme hardship and necessitates top physical condition. . . (34ID/LL).

Similarly, Headquarters Fifth Army reported at the conclusion of the Spring Offensive:

. . .Operations in mountains produced particular problems in supply, evacuation, and communication, but there was no difference in the tactical aspects from those in normal terrain. . .(5A/LL).

(2) Advancing forces must work the ridges and high ground, and must avoid natural corridors and approaches. This point has been stressed in the lesson-reports of all previous campaigns in this Theater. The Fifth Army lessons covering the later period of the Italian Campaign include the following significant example:

. . .One division, after the break-through in the MINTURNO area maintained its rate of advance steadily by keeping to the high ground, while the enemy invariably defended the natural avenues of approach, the latter being by-passed by our troops. . .(5A/LL).

The Commanding General, II Corps, likewise summed up the results of this principle after the fall of Rome in a single sentence:

. . .In the long run, speed was made over high ground, and not over roads and flat lands. . .(IIC/LL2).

A month later the same commander again drew attention to this principle in a supplementary report of lessons learned:

. . .In the attack, our troops must stick to the ridge lines and high ground, and avoid draws, valley floors, and other obvious routes of approach. . .(IIC/LL3).

(3) Mountain operations are generally carried out through the action of small units, battalions, companies, and platoons. The individual operations of small combat groups are of especial importance. Elements and detachments frequently must operate separately and may often be isolated from one another. The experience of the 88th Infantry Division was thus summarized:

. . .A unit to operate in the mountains should be trained to a high degree in independent action of small units, plus the addition of pack artillery. . .(5A/LL).

(4) Mountain combat requires the highest standard of individual initiative, resourcefulness, and leadership on the part of commanders and their subordinate officers and non-commissioned officers.

(5) Concentration of adequate strength and fire power at decisive points is especially necessary in mountain warfare. Loose, broad, or extended fronts do not lend themselves to successful operations in mountainous terrain.

(6) The highest standard of physical conditioning of the troops still remains one of the most essential elements in mountain combat.

(7) Infantry troops are most suitable for mountain operations. Specially trained mountain troops are generally required only in difficult sectors.

(8) The time required for the conduct of operations in rugged, mountainous terrain, including planning, preparations, movement, and supply, must be fully considered by all commanders. The logistics involved in such operations differ widely from those applicable to flat or rolling country. This point was emphasized in a summary of experience in II Corps:

> . . .Operations in mountainous terrain are slow. Movement and maneuver of troops require increased time, lengthy reconnaissance, and careful traffic control. Careful planning is also of extreme importance, especially with respect to time. From 24 to 48 hours, after the decision has been made, are often required to bring into action a division reserve unit the size of an infantry regiment. . . .(IIC/LL1).

(9) In mountain operations, it is necessary to leave back a portion of the organic supporting weapons because of the difficulties in ammunition supply. A lesser number of weapons well supplied with ammunition is more valuable than the normal allowance poorly supplied. (IIC/LL3).

(10) Provisional mule trains have been found to be indispensable for supply and for transport of heavy infantry weapons. Basic training of infantry in the fundamentals of pack transport is essential to successful mountain operations. (5A/LL).

(11) Fieldcraft, personal self-care of the individual soldier, and proper precautions against cold and inclement weather must be stressed by all unit commanders. These subjects of training are especially important in mountains, where resupply of fresh clothing, supplies, and medical stores is difficult, slow, and limited. (34D/LL).

(12) Engineer assistance to the infantry in mountain operations is often vital to success. Infantry commanders should learn to make the most of such assistance in furthering their advance and keeping up their supplies through difficult terrain. (AGF/144).

(13) Troops should avoid prominent landmarks, terrain features, trail junctions, and similar locations in establishing their bivouacs and positions. The enemy whenever possible will have registered on such features and will bring fire on them. A platoon commander of the 133rd Infantry reported in this connection:

> . . .During one phase of the mountain fighting my platoon dug-in in the vicinity of a prominent trail junction. That evening Jerry threw some 170's on that junction. My platoon suffered three casualties, but the results might well have been worse. The lesson learned was, avoid as much as possible all prominent landmarks on which Jerry may have "zeroed-in," such as cross-roads, trail and road junctions, main stream beds, and the like. . . .(34ID/LL).

(14) Maintenance of contact is particularly difficult in offensive action in mountainous terrain. Each platoon should have men especially trained in maintaining contact with units on either flank. Reliance must not be placed on reported locations of friendly flank units. Contact must be maintained physically, and if broken, connecting groups should be sent out to locate the flank units. (IIC/LL3).

24. DEFENSIVE OPERATIONS -- ANZIO-NETTUNO BEACHHEAD

a. General

As previously mentioned in Paragraph 21c, supra, the operations within the ANZIO-NETTUNO Beachhead provide the only instance in this Theater since the close of the Tunisian Campaign in which large forces of our troops have been compelled to go on the defensive and to resist major German attacks. The main burden of this defense was carried by the infantry, which was forced to conduct its operations in extremely adverse conditions of terrain which in many instances required modification of normal tactics and improvisation. A pertinent example may be quoted from the G-3, 34th Infantry Division, who reported at the end of April, 1944:

> . . .The 34th Infantry Division was wholly on the defensive throughout April. At no time in its combat history had the Division been on the defensive in such unfavorable terrain.

> Because of the enemy's advantage in observation, movement in the regimental areas was restricted to the hours of darkness, and even the most rearward elements of the Division were dug-in. . .(34ID/LL).

The unusual situation which prevailed throughout the Beachhead period did not produce "new" lessons in the tactics of defense, but it did result in impressing strongly on commanders and their troops the vital necessity of perfecting and maintaining their defenses under entirely new conditions. The peculiar characteristics of the terrain and the general situation which gave the enemy superior ground and observation led to the modification of basic principles to fit the local conditions, and to the special application of these principles in a way not before experienced.

b. Limitations Imposed by Terrain

A brief summary of the terrain characteristics of the Beachhead has been given in Section III, Paragraph 13, supra. One of the chief problems in defensive tactics was the limitation on field excavation and position organization imposed by the conformation of terrain and composition of the ground. The open, flat areas were often critically exposed to observation and fire, and one chief difficulty was caused by ground water. In large areas of the Beachhead it was virtually impossible to dig in to any effective depth without striking water which would flood out the position. This condition was especially severe during the winter rainy season, but even in the later and drier period, it still prevailed. During the middle of April a Ground Forces observer who made special study of the terrain and its effect on defensive positions reported:

> . . .The impossibility, in large portions of the Beachhead, of digging more than one foot below the surface of the ground without striking water, has been previously reported. To date there has been no improvement in this situation. Many platoon positions are located on the banks of streams or ditches because these are the only locations where the ground is sufficiently drained to permit digging of foxholes. . .(AGF/147).

Similar testimony of experience was recorded in the comments of a Battalion Commander whose unit served in the Beachhead from the initial landing:

> . . .The idea of securing all-around defense by organizing positions in depth is sound, but it is not practicable here. Usually the only place where men can dig without hitting water one foot below the surface is along the bank of a stream or ditch. Therefore, everybody in a platoon, and frequently everybody in a company, are practically on a line. However, even with this linear defense, some men are detailed to fire to the flanks and others are prepared to fire to the rear if necessary. . . .(CO1Bn.7Inf./AGF/147).

Likewise the Regimental Commander, 7th Infantry, also pointed to the effect of the terrain on organizing his defensive sector:

> . . .The most unusual thing about our dispositions here is that they are almost entirely governed by the practicability of digging-in. There are only certain locations where the men can dig foxholes. You put them there because those areas are the only places the men can be and live. This leaves you with gaps and other problems that would never occur if you could place your troops where you would like to have them. . . .(CO7Inf./AGF/147).

Experience of a similar nature with respect to the supporting antitank weapons was also recorded by the Executive Officer, 15th Infantry after several months of combat in the Beachhead:

> . . .We found the defense principles given in the manuals to be sound; but we also found that the usual methods of defense could not be followed blindly in this terrain. At first we tried to put in our antitank guns in depth. We had a 500-yard front to hold, and there were not enough antitank guns to cover the frontage and still have depth. That left gaps in the AT defenses that were filled by bringing tanks and tank destroyers well forward. These were such big targets, since they could not be dug-in, that many of them were knocked out by German 88mm guns and Mark VI tanks. As a result we lost some ground to tank-led attacks. Then we put all our antitank guns right in the front line wherever they could be dug-in to cover the front. We placed the tanks and tank destroyers well back but ready to move up to reinforce the antitank guns. After we took this action, we stopped all the tank-led attacks cold. . . .(15Inf./AGF/147).

The flat terrain prevailing throughout large areas of the Beachhead often necessitated re-orientation and readjustment in the tactics of defense that had become habitual among troops who had recently fought for long periods in the mountains. Also, the prevalence of drainage ditches and canals, which afforded the enemy excellent opportunity for infiltration, necessitated special measures of defense. The Operations Officer, 30th Infantry reported early in April:

. . .During the German attacks on our position at the end of February, we had two battalions holding the line. The ground in front of our position was a maze of ditches from ten to twenty feet deep. These ditches were winding and had very steep sides. It was necessary to put two or three automatic weapons to fire down each ditch in order to stop the Germans from infiltrating through at night. The allowance of machine guns was entirely inadequate to do that as well as to provide final protective fires across the flat land between the ditches. . .

. . .We did not dig communication trenches in the places where the ground would have permitted, but we realized now that we should have done so wherever we could. This is just one of the ways in which our experience in the mountains affected our actions here. I think everybody had difficulty in adjusting themselves to the change from mountains to land as flat as a table top. . .(30Inf./AGF/147).

c. Unit Boundaries in Defensive Positions

Defensive operations in the Beachhead demonstrated strongly that boundaries of responsibility between units should not coincide with avenues of approach. Dispositions should be so arranged that such avenues do not become subjects of divided or joint responsibility, but should be included in the sector of one unit. Opinion from the Commander of the 179th Infantry may be quoted as an example from battle experience:

. . .The Germans always seem to attack astride the boundaries between units. I cannot emphasize too strongly the necessity of a close tie-in at limiting points. The two commanders concerned should always meet on the ground near the limiting point, and there agree on the details of cooperation. . .I think our theory of locating boundaries between units in defense is questionable. The boundaries must not run down avenues of approach. One unit must be given complete responsibility for the defense of each road, ravine, or avenue of approach. Split a key terrain feature if you must, but do not divide the responsibility for the defense of any avenue of approach. . .(CO179Inf./AGF/147).

d. Importance of Automatic Weapons

Although the importance of automatic infantry weapons in normal defensive operations is basic and familiar, the peculiar conditions that prevailed in the Beachead not only reemphasized this point, but also demonstrated that in some situations the complement of infantry automatic weapons must be greatly increased and reinforced if the defense is to be maintained successfully. Many commanders reported that additional heavy and light machine guns, and submachine guns were vital to the defense of the difficult positions that had to be held. This necessity was well illustrated in the report of a Battalion Commander of the 180th Infantry:

> . . .We have found it necessary to use a great number of additional machine guns to hold this beachhead. Each rifle company has four instead of two. The two front-line companies each have a platoon from the heavy weapons company located in their areas. Each of those platoons have four water-cooled guns and four light machine guns. That is a total of twelve machine guns per front-line company, and one company found some extra light machine guns somewhere and actually operated seventeen guns in the line. We held our positions during the German attacks of 16-19 February, but we could not have possibly done so if we had had only the T/E allowance of machine guns. . . .(602Bn.180Inf./AGF/147).

With reference to the same subject, a Regimental Operations Officer in the same general sector likewise declared that

> . . .such frontages as we have to hold in terrain like this require extra automatic weapons if you are going to hold with reduced-strength companies. We could hold in daylight or on bright moonlit nights, but we were badly worried about the possibility of the Germans storming the positions on dark nights. Therefore for example, our 1st Battalion had four LMG's per rifle company, eight heavy machine guns in the heavy weapons company, plus nineteen more machine guns which they took over from the outfit they relieved. . . .(179Inf./AGF/147).

Another Battalion Commander likewise stated with respect to automatic weapons in defense, with particular reference to the great German attack of 16-19 February, 1944:

> . . .On defense in terrain like this, you will need all the machine guns you can get. Against such an attack as the Germans pulled in the middle of February, I don't believe we could have possibly held our positions if we had not had them. . . .(AGF/147).

In the 34th Infantry Division, similar experience has been reported. The following extract from the combat lessons compiled by this formation is quoted as illustrative not only of the importance of automatic weapons and training in their use but also the importance of sound training in defensive as well as offensive action:

> . . .A stable defensive position requires an entirely different type of training from that required for offensive action. Riflemen should be trained in the operation of machine guns in emergencies, since it will ordinarily be necessary to employ more than the standard number of machine guns. It is also valuable to have rifle company personnel trained in fire adjustment methods. . . .(34ID/LL).

e. Stamina and Morale -- Proper Relief of Troops

One of the most significant lessons of the period of static defense in the ANZIO-NETTUNO Beachhead was the effect of long, static defense action on the individual soldier. In offensive action, morale is invariably high, and frustrated, mental weariness does not present so great a problem. Long periods of static defense under the conditions which prevailed in the Beachhead resulted in serious undermining of the stamina, morale, and aggressive will to fight on the part of even the strongest and most battle-seasoned troops. Adequate relief from the line, proper intervals of rest and refit, and frequent, intelligent orientation of the men in the world battle situation especially with reference to their own part in it, all proved to be answers to this serious and difficult problem. A Battalion Commander of the 7th Infantry, whose unit fought continuously from the landings of 22 January to the fall of Rome, summarized the problem as follows:

> . . .The biggest defensive lesson from the fighting here is that you cannot leave an outfit in the front line under these conditions for thirty-eight days and have any fighting spirit left. Not in terrain like this where any movement in daylight is suicide. "Foxhole-itis" develops. Toward the close of our thirty-eight day stay in the front lines, we could hardly get our former most aggressive NCO's to move out of their foxholes. Right now I rate may battalion as not over fifty percent as good a fighting outfit as it was before this extended stay in the defensive front line positions. . . .Of course, we have never been on the defensive before, and the sudden change from "dishing it out" to "sitting and taking it" does not help any. . . .(C02Bn.7Inf./ACF/147).

Identical opinion and experience have been reported by various other commanders. An officer of the 168th Infantry, whose unit had not been employed in a defensive role for any length of time, likewise declared:

> . . .One of the most neglected problems, neglected out of necessity, is the physical and mental effect of a defensive position over extended periods of time on the individual soldier. In any defensive position the men must remain for long periods at their assigned stations. In a position in which the enemy is in close proximity, they must remain in their slit trenches throught all hours of daylight, and they must stay in the immediate vicinity at night. The necessity of being constantly on the alert precludes the possibility of sleep at night or rest and diversion in the daytime. . . .(34ID/LL).

As to practicable corrective measures and solutions to the problem of morale and stamina, the Chaplain of the 180th Infantry reported from long experience that

> . . .it has been shown that the greatest thing in maintaining morale is to keep the men informed of what is going on in the war in general and to convince them that what they are doing is of importance in winning the war. Morale dropped here for a time when the men got the idea that they were stymied on this Beachhead and that their sacrifices were not accomplishing a part in winning the war. We started a campaign to get information daily to every last private in this regiment about the progress of the war in Russia and elsewhere. After this there was a noticeable improvement. . . Next to lack of information, and its resultant sense of frustration, the biggest handicaps in a defensive situation like this are physical conditions, rations, lack of bathing facilities, and general living conditions. Frequent reliefs from the front line are necessary. . .(180Inf./AGF/147).

f. Miscellaneous Points in Defensive Action

(1) A major defensive lesson has been the necessity of dominating No Man's land from the beginning. The German consistently works his lines up close, so as to escape mortar and artillery fire. The use of aggressive combat patrols to eliminate enemy outposts and counter-patrol activity is essential to the maintenance of static defense. (3Bn.30Inf./AGF/147).

(2) Improvement of defensive positions must be continuous. Damage from hostile fire and from weather must be promptly repaired. Good practice is to equip each man with four sandbags, which can be carried tucked in his belt to the rear. They are little hindrance to carry and permit the construction of a strong parapet for foxholes as soon as they are dug. (34ID/LL and 180Inf./AGF/147).

(3) The 37mm Antitank Gun has been used effectively in outposts to destroy or neutralize hostile outposts and machine-gun nests, and also enemy battle groups. (30Inf./AGF/147).

(4) Maintenance of the defensive role in static positions requires a greater and more extensive infantry communication system. Wire assumes exceptional importance under these conditions. (180Inf./AGF/147 and 34ID/LL).

(5) During reliefs of units in the frontlines, the practice of the relieving unit taking over the heavy weapons of the unit relieved

has been found to be sound and practicable. It insures against any disruption of prepared protective fires or disorganization of the fixed defense. (AGF/147).

(6) One defect experienced in position organization has been the placing of wire entanglements too far from the forward defense positions. A distance of 75 to 100 yards, depending on terrain, has been recommended by one Division. (34ID/LL).

(7) Foxholes should have some overhead cover to give protection from air-bursts and tree-bursts. Such cover should not, however, restrict the rifleman's field of fire. (IIC/LL1).

(8) In defensive action, the use of all mines, antitank and anti-personnel, must be carefully coordinated, and the locations of minefields must be accurately recorded. It is vital that accurate and up-to-date information be passed to all units concerned, especially units which relieve those in the affected areas. (157Inf./AGF/147).

(9) Houses are not good locations for strong points in flat terrain such as prevailed in the Beachhead. They are prominent landmarks and become excellent artillery targets. (AGF/147).

(10) When a weakness in a position is recognized, immediate measures must be taken to correct the deficiency. A resourceful enemy will soon detect position weaknesses. (3ID/AGF/148).

25. FLANKING AND ENVELOPMENT vs FRONTAL ATTACK

Experience throughout all phases of the Campaign repeatedly confirmed the soundness of the familiar principle of flanking and envelopment. The nature of the terrain and the characteristics of the fighting in the period under consideration (Cf. Sections II and III, supra) brought out the importance of this principle in stronger relief than ever before. After the fall of Rome and the advance into northern Tuscany, Headquarters Fifth Army reported in the general infantry lessons of the Offensive:

> . . .There appears to be no question as to the value of flanking movements as compared to frontal attacks. The latter were invariably found to be more costly in personnel. The old basic principle of fire and movement is still sound. . .(5A/LL).

It is significant in the latter connection that the same point was prominent in the first lessons reported from the early phases of the Tunisian Campaign, in which it has been stated that "in almost every situation the most important single element of infantry combat is the effective use of fire and movement." (TM44/AFHQ/43). Likewise in Sicily, the lessons compiled gave emphasis to the same subject: "Frontal attack was avoided. The basic principle of fire and movement was adhered to, with emphasis on envelopment from the flanks." (TM/50/AFHQ/43). In almost identical language, the lessons from the Spring Offensive prepared by Fifth Army reported in July, 1944:

> . . .Frontal attacks were avoided, unless they were absolutely essential to the success of the operations. Maneuver was invariably resorted to in order to force the enemy from his positions. Even in one instance in the break-through by an Allied division at MT. FAITO, although a frontal assault was ordered, the direction of the attack was not perpendicular to the front, but in a northeasterly direction along the ridge and high ground. This resulted in throwing the enemy off balance, and was a contributing factor to the success of the break-through. . .(5A/LL).

The same principle was brought out in the combined attack of infantry supported by tanks. In the break-out attack from the ANZIO-NETTUNO Beachhead, the following illustrative example was given:

> . . .The attack on CISTERNA was carried to a successful conclusion by the use of fire and movement of infantry and tanks. One infantry battalion made a frontal holding attack, while the other two battalions enveloped the town. Tanks by-passed the town and then struck from the rear. . .(5A/LL).

26. ATTACK OF TOWNS AND FORTIFIED BUILDINGS

In the advance from the line of the GARIGLIANO to the Gothic Line, the large number of strongly defended towns, villages and fortified buildings provided wide experience in the attack of these obstacles. As pointed out in the preceding quotation, flanking and envelopment wherever possible has been the best procedure. The Commanding General, II Corps, tersely summed up this principle in a special report of lessons learned: "Towns must be taken from deep flank and rear." (IIC/LL2). From experience of the 36th Infantry Division, the Commander stated that it has been found desirable in operations against towns to isolate them

before closing on the fortified defenses. (5A/LL). In another division Fifth Army reported that it has become standard operating procedure in the attack of towns for the assault battalions to by-pass the town and the reserve battalions to remain for mopping-up.

Combat within defended towns and villages, including passage of demolitions, street fighting, and the assault of individual buildings, has added no new lessons from recent campaign experience. In large towns, the use of phase-lines and phase-areas has again been demonstrated essential for control and practicable coordination of supported and supporting elements. Commanders have reported one outstanding principle that has been noted in the fighting at CASSINO and in other towns taken during the long advance to the Gothic Line. In the attack on a defended building, the infantry must press the assault immediately after a breach has been made in the building. A battalion commander reported after extensive experience at CASSINO:

> . . .The main thing learned was that you must charge into the building right after a hole has been made. As General Ryder (Commanding General, 34th Infantry Division) has said, "you must take up the slack or else Jerry will." When we were attacking one block of buildings, I gave orders for the tanks to fire on the buildings and then to signal at the end of their firing. The riflemen were to charge these buildings as soon as the signal was given. The tanks fired and gave the signal as prescribed, but the riflemen waited about ten minutes before charging. They were driven back without ever reaching the buildings. Later the same operation was repeated. This time it was carried out exactly as it was originally planned, and it worked. . . .(133Inf./AGF/139).

The commanding officer of the same regiment re-affirmed this point, and reported that

> . . .The outstanding lesson this Regiment learned in the street fighting in CASSINO was that you must follow up grenades, rockets, or shellfire inside a building with <u>immediate</u> shock action. . . .(CO133Inf./AGF/139).

27. <u>NIGHT ATTACK</u>

Experience in the later phases of the Italian Campaign produced no unusual or outstanding lessons in night attack and night operations. The importance of training in night movement and control was again stressed by commanders. The following main points have been extracted

from the reported lessons compiled by Fifth Army and its subordinate units:

a. The launching of night attacks in the first operation involving green troops is not good practice. (5A/LL).

b. Night operations in mountainous country should be confined to limited objective attacks which put the attacking troops on enemy positions just prior to daylight. (IIC/LL1).

c. Night attacks should not be made against an organized position without a complete reconnaissance for mine fields and an accurate plotting of their locations. (IIC/LL3).

d. Except for very limited local operations, reconnaissance in force or night attacks in the mountains during the dark of the moon have been found to be impracticable. (IIC/LL1).

e. Because of the difficulties of control, maintenance of direction, and reorganization, night attacks should be launched on limited objectives only. As in ordinary daylight attack, reorganization after the siezure of an objective must be accomplished rapidly and without bunching. (IIC/LL3).

f. The general and specific lessons reported in Paragraph 31, Section V, Training Memorandum No. 3 are applicable to the period of the Campaign under present consideration.

28. EMPLOYMENT OF THE INFANTRY SUPPORT WEAPONS

a. General

The general lessons enumerated in Paragraphs 27-31, Section V, Training Memorandum No. 3 apply to the later period of the campaign under present consideration as well as to the earlier phases covered by that memorandum. A number of the points covered in this former publication have again been stressed in subsequent reports of battle lessons submitted by field commanders. They are extracted in the following paragraphs as illustrations of experience in the later stages of the Campaign.

b. Principles Emphasized by Field Commanders

(1) Planning and reconnaissance for an attack should include

the necessary terrain study, the employment of support weapons in the attack, and the scheme for the defense of each objective after its capture, to include the defensive fire plan for all infantry support weapons and artillery. When possible, registration of mortars and artillery for these defensive fires should be accomplished prior to the jump-off for the attack. (IIC/LL1).

(2) Assault guns should not be employed habitually as artillery. Their proper place is in close support. The 75mm on the half-track was used by one regimental combat team to fill the gap between the 81mm mortars and the supporting artillery. (5A/LL).

(3) In a fast moving situation, close supporting weapons must continually reconnoiter to the front for firing positions and anticipate forward displacement in time to be in position when needed. (IIC/LL3).

(4) Preceding the attack on CISTERNA, all the caliber .50 machine guns of one division were assembled into a provisional machine gun battalion. These guns were manned by artillerymen. Range tables had been devised by test firing into the sea, and by using artillery methods in indirect fire, a heavy concentration was poured into the town right up to the actual assault. (5A/LL).

(5) Every weapon capable of fire should be used to assist in pinning the enemy to the ground during the forward advance of attacking troops. This should include the small arms, mortars, and machine guns of adjacent units. Adjacent units should make demonstrations or holding attacks at the time of the main attack to prevent enemy artillery massing on the attacking force and to prevent the movement of enemy reserves. (IIC/LL1).

(6) Rifle grenades are not used sufficiently. Additional emphasis and instruction is needed to show men that they can hit enemy emplacements at ranges of 150 yards. Antitank grenades and rocket launchers should be used against enemy emplacements whenever the improbability of tank attack or the available quantity of ammunition make their use permissable. (IIC/LL3).

(7) A tendency has been noted on the part of infantry commanders to call for artillery fire instead of using their organic supporting

heavy weapons. The training of weapons platoons and their use in combat roles should be stressed. (5A/LL).

(8) The concept of fire must include the use of all weapons in gaining superiority, even when the exact location of the hostile weapons is not known. The Germans are adept at camouflage, and their powder is smokeless and flashless. Their positions are usually difficult to detect. Nevertheless, when the enemy who is not visible opens fire, our troops must return the fire immediately with all appropriate weapons on likely enemy positions. A reaction of this sort is a tremendous morale factor, and often causes the Germans to cease firing and withdraw. (IIC/LL3).

(9) The 4.2 chemical mortar has been proved again to be a most effective and valuable infantry support weapon, with both smoke and high explosive. The following points specially reported by Fifth Army are extracted as examples (5A/LL):

(a) Smoke was used effectively against self-propelled guns. The 4.2 chemical mortar is preferred in lieu of the 81mm.

(b) White phosphorus smoke shell from the 4.2 has been used very successfully against prepared and dug-in positions. A company of 4.2 mortars with each regiment proved particularly helpful at VELLETRI.

(c) The 4.2 mortars with high explosive were extremely valuable in the attack on SANTA MARIA, and on other fortified areas in the initial stages of the offensive. Their fire power had not only a material effect on the enemy, but also provided a morale factor of advantage for our infantry.

(d) The employment of massed fire by 4.2 mortars on the Beachhead indicated the value of this type of support. Too often the tendency of commanders of supported infantry has been to parcel out the mortars in platoons, and even in sections of two mortars. This prevents satisfactory fire control, and loses the main effect possible with a rapid and heavy concentration. Normally breakdown of mortar units into elements less than a company should not be made.

(e) In fast moving situations, the 4.2 mortar companies must keep up with the forward elements rather than depend on their extreme range.

29. COMMAND AND LEADERSHIP IN THE LOWER INFANTRY ECHELONS

The fundamental basis of all successful combat lies in the qualities of command and leadership. This familiar axiom is particularly applicable to the lower echelons of the Infantry, and has been given special emphasis in the battle lesson reports of commanders in all Campaigns in the Theater. It was stressed throughout the fighting in Tunisia, reiterated in the lesson experiences of the Sicilian Campaign, and was prominetly mentioned by many commanders in the early period of the Campaign in Italy. The reported lesson from the previous phases of this Campaign, "that there can be no substitute for troop leadership" (Paragraph 23, Section V, Training Memorandum No. 3), again well summarizes the comments of field commanders in the later stages.

A penetrating example may be quoted from the Commanding General, 3rd Infantry Division, who declared during the heavy fighting on the ANZIO-NETTUNO Beachhead:

> . . .In training company officers, impress upon them that they must gain such disciplinary control that will enable them to reach an objective with every man under their command who is not a casualty -- and not to reach an objective with half their men while the other half are straggling all the way back to the line of departure. Too frequently our lieutenants, at least when we receive them, do not understand the imperative necessity for this disciplinary control. They do not properly understand leadership. They do not understand that they are not in command of a platoon of heroes, but in just a platoon of common ordinary men in whom the instinct of self-preservation is very strong. Under strong leaders, our men will do anything. Without strong leadership, your apparent combat strenght is misleading because half of the men may not be in the fight . . .(AGF/147).

Similarly, the Commanding General, II Corps pointed out in the report of lessons learned, compiled after the fall of Rome:

> Squad and platoon leaders must be taught to command their units, and to expect to operate on their own. Once an attack has been launched, it is difficult for the company commander to control closely all four platoons. He will influence the action by his use of the supporting platoon and weapons. His main job lies in planning the action and briefing the platoon leaders. They must carry through the attack. . .(IIC/LL3).

The exercise of individual initiative and the prompt taking of action and acceptance of responsibility cannot be stressed too strongly as essentials

in infantry leadership. This was brought out most strongly in the rapidly moving situations during the Spring Offensive. The Commander of a Corps declared soon after the fall of Rome in a preliminary report of major lessons:

> . . .Too often Commanders of all echelons waited for orders. The rapid advance made the maintenance of communications difficult and resulted in instructions being issued and received which were based on out-of-date information. Under such conditions commanders must act on their own responsibility, initiative, and judgment. Inactivity is inexcusable. (IIC/LL2).

30. MISCELLANEOUS POINTS FROM LESSON REPORTS

a. Movement and maneuver under fire are still vitally important elements in infantry combat. The old adage of "hit the dirt" must not be construed to mean freezing in place. When under enemy small arms fire, men must keep moving forward. If they allow themselves to be pinned down, they will be subjected to mortar and artillery fire. The best way to avoid casualties is to close rapidly with the enemy. Maneuver by rear elements must be employed automatically and immediately. (IIC/LL3).

b. Infantry officers and non-commissioned officers must have a working knowledge of artillery terms and some basic training in the adjustment of artillery fire, so that they can call for fire promptly and call for the type of fire wanted in terms that the artillerymen understand. (AGF/147).

c. Surprise has been gained by speed of movement, aggressive reconnaissance and patrolling, by night attacks, and by the use of smoke. As a general rule, it was found that the enemy fortified avenues of approach over low ground quite strongly and to a large extent neglected the ridges, mountain tops and high, rugged terrain. Attacks over such terrain gained surprise and were successful. When surprise was gained, local attacks on enemy defense lines were found to be effective to a limited extent only, if not supported by other attacks along the line. The enemy was quick to appreciate the point of local attack, and rapidly moved units, generally reserves, from other parts of the line to seal off the attack or penetration. (5A/LL).

d. When a support element is ordered to follow an attack element over ground subject to enemy observation, it should follow by different routes whenever possible. Support elements have been caught many times in mortar and artillery fire drawn by the leading attack elements. (IIC/LL3).

e. Once infantry units have halted even temporarily, the infantry commanders should request artillery fire on prominent terrain features as a further aid in orientation. At least one battery of the corps or division artillery should be requested to register immediately on some prominent terrain feature in front of the attacking forces. (IIC/LL1).

f. The casualty rate in platoon leaders is very high. For this reason platoon sergeants must be trained as reserve platoon leaders. This training can be accomplished effectively only by having platoon sergeants actually command platoons under the supervision of the lieutenants. (5A/LL).

g. When units are operating on the front or flanks of an infantry regiment under command of a higher headquarters, the most careful coordination between the infantry regiment and the other units must be assured. If reconnaissance elements operate in the zone of an infantry regiment without the knowledge of the regimental commander, they are apt to be fired upon before their proper identity can be established. (IIC/LL3).

h. In a sustained retreat the Germans will often shell bivouac areas that they formerly occupied. If recently used German bivouac areas are within artillery range, they should be avoided.

SECTION VI : FIELD ARTILLERY UNITS

31. GENERAL

a. Continued Importance of Field Artillery -- New Experience

The vitally important role of field artillery in the earlier phases of the Campaign indicated in Paragraph 43, Section VI, Training Memorandum No. 3 was continued on an unprecedented scale in the later

period. In general, the periods of stabilization on the GARIGLIANO Line and on the ANZIO Beachhead resolved into artillery battles that exceeded all previous experience in this Theater. The mass of available artillery of all calibers, skillfully controlled and accurately directed, so effectively neutralized the enemy counter-metal that the break-through on the line of the GARIGLIANO and the break-out from the Beachhead were assured. A major lesson was again demonstrated that an army, held up by strong and stubbornly-held defenses, must rely to a large extent on its artillery to assist it forward again. New elements in the artillery experience in this period included the tactical employment of weapons new to the Theater, special countermortar measures, the increased use of six-gun batteries, and the extensive employment of pack artillery.

b. Effectiveness of Fire

The effectiveness of artillery fires in the period considered, especially in counterbattery operations, has been revealed in numerous reports from the corps and divisions engaged. The action of the 13th Field Artillery Brigade in the preparation for the Offensive of 11 May in the sector of the Corps Expeditionnaire Francaise on the upper CARIGLIANO provides an excellent example of complete artillery success, as illustrated in the following report:

> . . .General neutralization of hostile batteries was provided for forty minutes at H-hour, for thirty minutes at H-plus-2, and again at H-plus-4. . .H-hour was fixed at 2300 hours, 11 May. A large part of our artillery had not disclosed itself until then. . .The first German rockets asking for defensive fires were seen about 2310 hours. Hardly any enemy artillery reaction was reported during the first hour. . .
>
> . . .General neutralization was undertaken again at the prescribed hours. In the intervals, partial neutralization of three groups of enemy batteries had been effected. Observation posts reported the virtual cessation of enemy artillery activity during the period of our fires. Our infantry took MOUNT FAITO. On the following two days our counterbattery fires had the same success. On the evening of 13 May our infantry took MOUNT MAJO and a new phase of the battle began. In this phase counterbattery fires principally coincided with fire on highways over which the enemy's batteries were seeking to retreat. . .(CEF/CB)

The pattern of the artillery preparation in the sector of II Corps on the lower GARIGLIANO on 11 May was similar. The report of the Corps Artillery Officer stated that

> . . .the effectiveness of our counterbattery fire also became quickly evident because of the appreciably reduced shelling received from enemy artillery as our forces advanced. . . Reported results of the 112 observed counterbattery missions from D-plus-1 through D-plus-5 included 5 direct hits on pieces; 21 hits squarely in gun-pits; and 16 fires or explosions in position areas. . .(IIC/AIC)

Likewise in the break-out from the ANZIO Beachhead, the artillery of VI Corps virtually dominated the battlefield and achieved similar results:

> . . .After the attack had been carried beyond the enemy artillery positions, the Counterbattery Staff reconnoitered the target area. Their report is not a complete one, but it revealed a holocaust of German guns. . .(AGF/178)

The effectiveness of the defensive fires in support of the infantry on the ANZIO Beachhead was also of prime importance in the critical period of this phase of the campaign. During the static period of the perimeter defense, every artillery piece in the Corps was tied-in to a common grid and could be fired on prearranged concentrations in any sector by broadcasting a single code word. For example, on 17 February a force estimated to be about 2500 German infantry were seen moving south on the ALBANO-ANZIO road by the air observation post officer of the 45th Infantry Division. Within twelve minutes the massed fire of all the corps artillery was placed on a short stretch of the road. During the next hour this mass of fire had been shifted by the air observer to four other successive target locations. These fires stopped the German attack. On another occasion, equally prompt and heavy concentrations of fire were delivered on the German thrust from CISTERNA. In this instance they contributed materially in breaking up the attack.

32. TACTICAL EMPLOYMENT

a. Centralized Control

In Tunisia and Sicily, and in the earlier phases of the Italian Campaign, corps artillery was often employed in furthering the plans of the Division Artillery commanders. Separate artillery combat within the several divisional sectors gave way during the winter of 1943-1944 to a far greater degree of centralized control by Corps and Army. In the later period, especially in the preparation for the Spring Offensive, Army

and Corps Artillery Officers assumed roles of great responsibility. Plans for "isolating the battlefield" before the break-through on the main GARIGLIANO front were coordinated at Army Headquarters, where the responsibilities of the Field Artillery and the Air Force were carefully defined and assigned. At ANZIO, the Corps Artillery Officer became the coordinating agency for all additional support, including naval gunfire and supporting air bombardment. In general, Corps Artillery Officers integrated the divisional artillery fires in the over-all defensive and offensive fire plans. On the line of the GARIGLIANO, lateral liaison between the corps artillery staffs resulted in delivering accurate fires in neighboring sectors to thicken concentrations in those sectors or to deceive hostile counterbattery agencies. Artillery Officers of Corps and Army constantly dealt with the high commanders on matters of artillery policy and plans. An outstanding lesson of the Campaign during the preparations for the Spring Offensive and in the early stages of this general attack was the efficacy and results of centralized control on a large scale.

b. Artillery in the Break-Through and Break-Out

(1) In the preparation for a break-through, counterintelligence measures to conceal artillery positions and the presence of reinforcing units will yield good results whenever the possibility of surprise exists. This situation prevailed on the main GARIGLIANO front, and the artillery preparations were thus described by an observer from the Ground Forces Board:

> . . .After D-day had been decided upon, a program of reconnaissance for position areas with the necessary survey was begun. Each group and separate battalion was given its area, together with a schedule of its preparation. Position areas were selected and prepared before any movement into position was made. During darkness for several weeks prior to D-day the battalions moved into positions a few at a time, being careful that daylight found them camouflaged and dug-in. In many cases dummy guns with fairly complete installations were left in bivouac and former position areas to further the deception. Registration was restricted so that there would be no general increase in fire in the sector, but was so arranged that it was completed prior to the attack. The Division Artillery of II Corps and the Corps Expeditionnaire Francaise had been active for some time, as were also some additional battalions, so this registration worked in conjunction with theirs, thereby making it difficult for the enemy to appreciate the presence of additional artillery.

> The habit of registration at last daylight had been established, so when the additional battalions did this on the evening prior to the attack, no change in routine was apparent. . . .(AGF/156)

(2) In contrast to this policy of deception and concealment on the line of the GARIGLIANO, the opposite course was followed on the ANZIO Beachhead. All guns within the Beachhead had fired defensive concentrations against the major German attacks in mid-February and early March. The enemy, on superior ground with excellent observation of our position areas, already had an excellent idea of the number of batteries against them. In order to deceive the enemy as to our intentions despite his excellent observation, TOT concentrations (Time on Target, Cf. Paragraph 47i, Training Memorandum No. 3) were fired intermittently for a week prior to the break-out attack. These concentrations were directed on positions and gun emplacements at widely different parts of the enemy line, and were delivered sporadically at odd hours during both daylight and darkness. At first, enemy artillery reaction was very marked. Gradually it fell off in intensity until 23 May when the break-out attack was launched.

(3) From the above summaries of preparation on the main front and on the Beachhead, it can be seen that surprise was achieved from employing diametrically opposite methods.

(4) Another important factor in the artillery preparation for a break-through is the exploitation of all intelligence agencies for the securing of knowledge of enemy locations. Such locations include hostile batteries, mortar positions, command posts, assembly areas, routes of the enemy defensive works. In the artillery preparation for the attacks on the main line and from the Beachhead, the outstanding feature was that only known locations were attacked with fire, and not localities that looked inviting on the map.

(5) Organization of artillery observation well in advance was also an important element in the preparation for the offensive. All observation agencies were carefully regulated and organized, from high-performance aircraft to ground forward observers, to insure that all sectors were covered and that unnecessary crowding of observation post sites was avoided.

(6) Routes and positions, within and without the division boundaries, were allotted in accordance with the general artillery plan.

(7) Fire plans were flexible enough to provide for unforseen contingencies. For example, the weather just prior to the break-out from ANZIO was unfavorable, and the planned air support was curtailed at the last minute. The artillery was called on to make up the deficiency, and was able to do so because of the flexibility of its fire plans.

c. Decentralized Control -- The Pursuit Phase

In the pursuit phases of the Campaign which involved operations over difficult terrain with limited road nets (Cf. Section III, supra), control of corps artillery was generally decentralized. As pointed out in the discussion of task forces for the pursuit (Paragraph 19d, supra), artillery support of these specially organized forces was of primary importance. It was shown also in the pursuit phase that the aggressive employment of long range artillery under Corps control is highly effective. The Artillery Officer, II Corps, reported:

> . . .Long range artillery is very useful in the pursuit. It's mobility is almost equal to that of light artillery, except for the slight additional time required for "Prepare for Action" and "March order," and its range permits accompanying fire during long, rapid advances. In mountainous terrain where routes and positions for artillery are impossible in the forward areas, long range units have at times been the only artillery which could give support to advancing troops. Long range howitzers are particularly valuable in view of dead space frequently encountered. . .(IIC/AIC)

An example of the effectiveness of long range howitzers during the early pursuit period when the enemy fell back from the ALBAN Hills may be quoted from the same report:

> . . .Air observation posts continued to take a prominent part in pounding the retreating enemy. In one noteworthy case a 240mm howitzer battery was available at the moment to answer a hurried call from an air observer for fire on the crowded APPIAN WAY leading in to Rome. The observer stated that it was "great sport" to spray the 240mm shells up and down the road and witness the confusion and destruction they created. The damage remained for several days thereafter as mute testimony of the terrific destructive power of those projectiles. . .(IIC/AIC)

d. Employment of Self-Propelled Artillery

Self-Propelled Artillery was fully exploited in both static and mobile phases of the Campaign. In the stabilized periods the M-7 was effectively used on both fronts for roving gun missions. In the advance, this weapon furnished close infantry support in the mobile operations. An illustration of the employment of self-propelled guns on roving missions is quoted from the Artillery Officer, II Corps:

> . . .To maintain deception of the enemy as to the amount of artillery in the sector, and also to reduce exposure of fixed positions from gun-flashes at night, much of the nightly harassing, especially the close-in targets was done under the direction of one field artillery group by a provisional battery of self-propelled pieces, consisting of four 105mm howitzers M-7, two M-10 tank destroyers, and two M-4 tanks. This battery averaged fourteen missions each night, moving from one to another of twenty-six previously prepared and surveyed positions across the II Corps front. . .(IIC/AIC)

Effective employment of self-propelled guns in close support during the advance is illustrated in the following report by the Artillery Member of the Ground Forces Board:

> . . .The 6th Field Artillery Group has again shown how valuable self-propelled artillery can be when used aggressively. This unit has been invaluable to the supported (88th Infantry) Division. The M-7's were able to stay well forward in areas which had not been completely mopped up. By bold and aggressive reconnaissance, its batteries were always in supporting positions. . .(AGF/171)

In muddy terrain, self-propelled guns have been especially useful in support of the division artillery. The M-7 has also been useful for pulling towed 105mm guns and their prime movers out of mudholes and terrain impassable for non-tracked vheicles.

e. Employment of Six-Gun Batteries

Although some six-gun batteries had been employed in previous campaigns in this Theater, the later period of the Campaign in Italy witnessed the extensive use of this enlarged light battery for the first time. The 85th and 88th Infantry Divisions were equipped with batteries of six 105mm howitzers M-2. The Artillery Commander, 88th Infantry Division, reported the following advantages in this increase of organic pieces:

. . .(1) More effective defensive fires.
(2) Wide effective battalion sector of fire.
(3) Greater shock action.
(4) Better support during displacement by echelon.
(5) Less percentage in loss of fire power as a result of one or more howitzers being out of action.
(6) Handling of sheaf simplified by use of center platoon for adjustment fire.
(7) Battalion fire power increased fifty percent; personnel increased less than fifteen percent.
(8) Control of six howitzers by the battery executive is as effective in combat as with four howitzers. . .(DAC/88ID)

The following comment of one of the battalion commanders reflects the unanimous opinion of all unit commanders concerned:

> . . .The six-howitzer battery has proved most successful in the present operation. It has been found that the increase of two sections per howitzer battery does not increase or produce any additional difficulties in regard to mobility. The six-howitzer battery can occupy position and displace as easily as the four-howitzer battery. Reconnaissance for positions is not appreciably affected by the increase in sections. The terrain in the present operation has been characterized by mountains, narrow valleys, crooked, steep trails, and mud. Nevertheless, a six-gun position has been occupied in every displacement. The great advantage of the six-howitzer battery is the tremendous increase in fire power given in support of the infantry. A single battery can frequently cover a target which formerly called for the massed fire of a battalion. Continuous fire support in battalion strength can be given the infantry, even while displacement is going on . . .No additional strain of any kind is placed on communications personnel. Identical basic communication is used in either the four-or six-gun battery. Two more telephones are hooked into the local battery system, in dispersed positions, this being a function of each gun section. . .
>
> . . .The policy was established of controlling ammunition expenditures to fit the targets taken under fire. In some instances savings have been effected by adjusting with the center platoon of a battery and then firing for effect with the battery instead of the battalion. . .In defensive fires there is a tendency to expend a greater amount of ammunition than would be the case with four-gun batteries. However, the added fire power under such emergencies more than justified the extra expenditures. The Division Artillery has been credited with repelling, with massed artillery fires alone, a number of determined counter-attacks, and the additional fire power developed by the extra strength of the six-howitzer batteries has been a contributing factor in this. . .(DAC/88ID)

f. Employment of Pack Artillery

In the difficult, mountainous terrain encountered in large areas during the later phases of the Campaign, pack artillery has assumed greater importance than ever before. The following main points on its employment have been extracted from the combat lessons reported by Headquarters Fifth Army (5A/LL):

(1) Pack Artillery battalion commanders should receive orders at such time as to permit establishment of command-liaison, proper reconnaissance, and considering the disposition and locations of battalions, ample time in which to reach initial positions. In an attack it is imperative that an opportunity be presented for command-liaison prior to formulation of decisions by the infantry commander.

(2) Mule pack artillery should not be expected to march with infantry columns, especially during darkness. Infantry can advance on routes over which the heavily loaded mules cannot. It must be kept in mind that pack gun loads weigh approximately 240 pounds, which when the weight of the Phillips pack saddle and adapters is added, makes the load weigh at least 350 pounds. This is a great deal more than any infantry pack animal has to carry, and is one of the reasons why pack artillery should not be marched as part of an infantry column.

(3) Infantry commanders should bear in mind that the pack howitzer has a range of 9500 yards. The pack battalion is field artillery, and not three separate cannon companies. Its primary mission of infantry support can best be accomplished by being in position to give support on call, rather than being marched with the infantry until opposition is met. The battalion can move forward by bounds, part or all of it being ready to fire if needed, and can still keep up with the rate of march of the Infantry.

(4) Infantry commanders should also remember that the 75mm pack howitzer, not having a low charge to compare with Charge I of the 105mm, is not designed to fire high-angle fire. This makes it impossible to give adequate fire support at close ranges, especially in rugged terrain. By having artillery forward observers and liaison officers with the various infantry elements at all times, proper support can be given by pack artillery from positions in rear of the Infantry.

(5) The re-supply of ammunition is another problem that must be understood. The number of rounds contemplated for expenditure should be weighed against this factor. Each mule carries about six rounds of ammunition. The maximum distance which pack artillery can be from its truckhead in mountainous terrain is one day's round trip for the pack

animals. Greater displacement will require the additional attachment of mule pack trains. During past operations where little resistance was encountered, pack battalions were able to keep themselves supplied satisfactorily. In the face of heavy resistance, this is impossible.

(6) Distances covered by mule pack artillery cannot be measured in map distance. They must be measured in terms of percent of slope and the condition of the footing. Halts for rest for both animals and men must be made on the same basis and not on any set time schedule. Marching about four hours at dawn, unloading and feeding during the middle of the day, and then marching from three to five hours just prior to darkness was found to be by far the best method for making long marches.

g. Employment of the 240mm Howitzer, M-1

(1) This weapon was first used in combat in this Theater in February, 1944. It has proved to be of great value. Its 25,000-yard range has been exploited for counterbattery fire, for road cratering, and for fire on vehicles, tanks, and horse-drawn artillery on the road. The howitzer has been especially effective in destroying bridges, buildings, fortifications and concrete defenses. In connection with the latter type missions, the Commander of the 697th Field Artillery Battalion has reported:

> . . .Heavy masonry bridges require the T-105 fuze for maximum destruction. Near misses on the approaches produce tremendous craters. Projectiles armed with the T-105 have a tendency to penetrate and burst below light span masonry bridges with little effect. The M51A3 with quick action is most effective on bridges of this type. Light concrete pillboxes and reinforced houses can be destroyed with quick or delayed action on the M51A3 fuze. The projectiles armed with the quick fuze will tear great gaps in stone house walls up to four feet thick. Shell armed with delay fuze burst inside such houses, leaving a small hole in the wall. The T-105 fuze penetrates too deeply for any destructive effect on heavily walled houses. . .
>
> . . .Direct hits in artillery gun-pits with quick fuze will demolishe any gun in the pit. Visual evidence of this on six German 170mm guns was noted at ITRI. . .(697/240H)

The 240mm howitzer may also be used for interdiction and harassing roles with great effect when the situation demands. Habitual use for these missions must be avoided, however, because of the ammunition limitations and the necessity for conserving the life of the tubes.

(2) Ground observation posts for the conduct of fire with the 240mm howitzer have been of dubious value. Their establishment complicates the problem of communication. In moving situations they have not been established. Air observation with either normal artillery observation or high performance aircraft has been customary.

(3) Unobserved missions have been held to a minimum.

(4) High angle fire has been used on bridges of heavy construction to secure more direct impact. Its destructive effect has been highly satisfactory. This type of fire has been used only on special occasions because of the excessive labor it requires on the part of the gun crews. The tube must be elevated manually for each round to an angle at which the equilibrator is of slight assistance.

(5) Only two battalions of the 240mm howitzer have been available in the Theater. For this reason, emplacement has been by widely scattered batteries or by individual pieces. Before reconnaissance and selection of position, it has been found desirable to determine the type of mission to be fired, the general ranges to be reached, and the azimuth of the center of traverse. It is difficult to shift a piece for direction while occupying a gun-pit, though this has been accomplished when necessary. Engineer assistance is generally needed in the preparation of positions. Positions should be located at least 1000 yards from crossroads, road junctions, or bridges. Experience in the Italian terrain has shown that more space is generally needed than that indicated in the diagrams shown in the field manual on the service of this piece. Training in the United States seldom included emplacement of the howitzer in defiladed positions against the rear slopes of embankments. In Italy, such locations have often proved to be most desirable positions. In some cases the howitzer has been emplaced so close to the bank that a notch had to be cut for the tube when in the loading position. Approximately 14,000 sandbags have been used in each howitzer position. Comment on position is quoted from the Artillery Officer, II Corps:

> . . .Worthy of mention was the movement into position of a 155mm gun battery and a single 240mm howitzer on the night of 10/11 May. This artillery crossed the GARIGLIANO and occupied positions previously dug-in within 1500 yards of

> the front line. The guns were protected from enemy observation by our smoke only. The 240mm howitzer, while well defiladed, was in a "hot spot" where over-ranging enemy shells directed at MINTURNO were frequently dropping. However, we had long since found that there were no suitable gun positions for the Corps artillery on the flat plains of this sector. The risk taken in this case proved well worth while. These weapons from their "sneak positions" were able to reach the German 170mm positions near ITRI, and the enemy there, knowing that he had been out of range of the areas from which the Long Toms and 240's had been firing, was caught entirely by surprise at H-hour. . .(IIC/AIC)

Obviously in such a situation as above described, and in the mobile warfare that followed, ideal positions could not be realized very frequently. In the rapidly moving situations, positions had to be selected for firm footing, defilade, and space for emplacing the howitzer without much prior preparation.

(6) In mobile situations, reconnaissance for positions has been conducted as far forward as the infantry lines. Pieces were normally placed not more than 2000 yards behind the front lines, and frequently by the time emplacement had been completed, the infantry had advanced as far as 4000 and 5000 yards in front of the selected howitzer positions. In reconnaissance, therefore, the selection of positions well forward has been standard practice. Great care has been observed in the selection of routes, with especial attention to road surfaces, the turning radii of curves, and examination of bridges, culverts, by-passes and fills. The combined prime mover-towed load is Class 50. By the use of winching, Class 30 bridges can be crossed with reasonable safety. Lighter bridges can be crossed if the loads are moved very slowly, but this is always a dangerous risk. On one occasion the Germans had undermined a paved commercial highway without leaving any breaks in the surface. The front wheels of a 240mm carriage broke through after the prime mover had crossed safely.

h. Employment of the 8-Inch Gun, M-1

(1) The arrival of the first 8-inch gun on the main Italian front on 11 May 1944 not only involved the first combat test of a new weapon but also provided the answer to the German 170mm guns which had hitherto harassed the Fifth Army with relative impunity. Capable of a

range of 35,000 yards, the new gun outranged the German 170mm by 3,000 yards. Two 8-inch guns were attached initially to each of the 240mm howitzer battalions. Later, the separate 575th Field Artillery Battalion (less Battery "C") was organized to man the new weapons.

(2) After service in combat, it was found that the dispersion indicated in the firing tables for these guns was equalled if not exceeded, particularly at extreme ranges. Average life of the gun is believed to be between 400 and 500 rounds.

(3) General comment from experience with this new gun is quoted from a report of the Artillery Member of the Ground Forces Board:

> . . .The primary use of these guns was on long range missions to harass command posts and positions of the enemy 170mm guns which heretofore had been out of range of any weapon we had available. The only type of adjustment possible was by artillery reconnaissance aircraft, followed in some cases by transfers of fire. In most cases the wide dispersion at extreme ranges made it impossible to do more than harass or interdict an area. No point targets could be engaged. . . (AGF/168)

(4) Additional comment is available from a Battalion Commander of 240mm howitzers, to whose unit the 8-inch guns had been attached for combat:

> . . .Positions, movements, communications, survey, and supply of the 8-inch gun are practically identical with those of the 240mm howitzer. . .Gunnery technique varies but little from that employed for the 240mm. . .In the computation of initial data, it is necessary to include an allowance for tube wear. In addition, corrections should be made during long fire missions for wear on the tube during the mission. This amounts to a decrease in muzzle velocity of approximately 2 feet per second in every five rounds. . .(AGF/168)

33. OPERATIONAL TECHNIQUE

a. General

Experience in the latter phases of the Campaign revealed little new in the operational technique of field artillery. The general subjects and lesson-experience recited in Section VI, Training Memorandum No. 3 were again applicable to the later period. The following points are included as being particularly emphasized in the reports and comments of field commanders.

b. Forward Observation

This method of fire adjustment is still most prevalent and is of the greatest importance in field artillery operations. It has been in some instances superseded by air observation adjustment and by more accurate adjustment from normal artillery ground observation posts. During training and reorganization great emphasis has been placed on instruction of infantry personnel down to include platoon sergeants, and tank and tank destroyer commanders, in the technique of field artillery forward observation procedure. The results were very satisfactory. When artillery observers became casualties or were in position where observation was not possible, supporting fires were called for and directed by infantry observers using normal artillery procedure. Enlisted personnel of artillery forward observation sections also became proficient in adjusting fire. In the highly compartmented terrain before the GUSTAV Line, it often became necessary to use as many as ten forward observer parties in one battalion, and in such situations non-commissioned observers functioned well. In the mountains it was found desirable to establish a forward rest center during cold and inclement weather, from which forward observation parties were rotated every five or six hours.

c. Naval Gunfire Support

Naval gunfire support reinforcing the fires of the ground artillery has proved to be of great value throughout various phases of the Campaign. It was especially effective during the Spring Offensive in the coastal sectors of the advance. The Artillery Officer, II Corps, reported in summary on this type of artillery action:

> . . .During the battle of 11-17 May, one American cruiser mounting nine 6-inch guns with range of 23,000 yards, and one British cruiser of ten 5.25-inch guns with range of 24,000 yards, were alternately employed in support of the main (GARIGLIANO) front. On 12 May one cruiser heavily shelled the principal road intersection at TERRACINA, adjusting fire with an observer in a Spitfire aircraft. Later that day, an observer in an artillery observation (Cub) aircraft adjusted most effective fire on a German 170mm gun position near ITRI. For the remaining days, the cruisers engaged an average of eight targets daily. Their fire did material damage. Highlights were the pounding of ITRI, SPERLONGA, and TERRACINA, bracketing fires delivered on many enemy gun batteries; zone fire

on four known supply dumps; and straddling fire on the reported command post of the 94th German Infantry Division. Although the cruisers were fired on by enemy guns, they were never hit. Several times the corps artillery neutralized enemy batteries engaging the ships. On one occasion a cruiser transferred its fire temporarily from a planned target and silenced an enemy 4-inch shore battery that had become a nuisance. . .(IIC/AIC)

In the ANZIO-NETTUNO sector, off-shore mined areas prevented the cruisers from delivering close support of the break-out attack from the Beachhead. In the subsequent stages of the advance in this sector, naval gunfire support was effective and rendered valuable assistance to the ground forces. The artillery observer of the Ground Forces Board later reported:

. . .It was not until 1 June that effective naval fire support was obtained. This was delivered by the French cruiser Jean Bertin, which steamed several thousand yards farther west along the coast than its companions and delivered fire well into the main enemy artillery areas. Corps artillery Cub planes provided the observation and all observers participating commented on the accuracy of the fire. . .The most profitable targets for naval gunfire support in this sector were assembly and bivouac areas and routes, rather than pinpoint targets such as hostile batteries. Naval support was used to great advantage in the West sector of the Beachhead until the fall of Rome. . .(AGF/171)

d. Block Plot

"Radial Line Block" proved a valuable aid to the Corps Artillery Fire Control Centers and Counterbattery Sections in providing a means of determining approximately true coordinates of pinpoints located on air photographs. This technique was especially helpful before the acquisition of 1:25,000 maps.

e. Battery Fire Direction Centers

In combat, the posts of battery executives have generally been in dugouts or some type of covered position. The establishment of intra-battery communications has been standard practice. In addition to normal combat control of the gun sections, the battery executives have functioned in a general S-3 capacity for their batteries. Normally the firing battery keeps a firing chart and from time to time receives overlays from the battalion fire direction center. This procedure permits the individual batteries to continue in action effectively in the event that the battalion fire direction center is knocked out. To keep a high

standard of training and proficiency among the battery fire direction personnel, individual battery fire direction centers are at times required to take over conduct of fire for the battalion. Scout corporals and recorders are trained in addition to their other duties as vertical and horizontal control operators.

f. Gunnery

(1) Throughout the period of the Campaign under consideration, particular effort has been made in all echelons to improve the accuracy of fire. Especially on the main GARIGLIANO front prior to the Spring Offensive, deliberate training was carried out to achieve this end. The number of unobserved, long-range missions was reduced. Conversely, observed fires, conducted by air and ground observation, were increased.

(2) High-angle fire was necessary when batteries in positions on low ground engaged enemy targets on successive ranges of mountains which extended through the sectors of advance. This type of fire has been used only when targets cannot be reached with other methods. It has not been preferred to low-angle fire by light or medium weapons. The need of a reduced charge to permit high-angle fire by pack artillery has been commented on by some commanders.

(3) Field conditions have permitted very little ricochet fire to be used, though unit commanders have been aware of its possibilities and have employed it when appropriate. Effects similar to ricochet fire have been obtained from fire directed against rocky mountainous slopes. Stone fragments as well as shell splinter have been observed to cover unusually effective patterns.

g. Long-Range Adjustment by High Performance Aircraft

This type of adjustment continues to have its difficulties of briefing and communication. All fire direction centers have been trained to handle either fire commands or round sensings from the observer, depending upon which system the pilot uses. Many satisfactory missions have been fired, but experience to date indicates clearly that further training for both air and artillery personnel will be required to perfect this type of adjustment. (AGF/QR)

34. ARTILLERY INTELLIGENCE

a. General

The vital importance of accurate and extensive artillery intelligence has again been clearly demonstrated throughout the Campaign. Combat experience has shown that on the whole the initial training of the average artillery S-2 has not been as thorough and sound as that of the average S-3. In many instances S-2's have had to absorb the finer points of artillery intelligence functions during combat operations. Commanders have stressed the necessity of intensive training of intelligence personnel before being committed to action.

b. Counterbattery

(1) In counterbattery operations it has been found practically impossible to compartment sharply the functions of the S-2 and S-3. No sharp line can or should be drawn between the operations of these two sections in counterbattery functions. An entirely separate counterbattery section, dealing only in counterbattery missions and unconcerned with other types of fire or targets, has been found to be undesirable. Throughout Fifth Army a practicable solution has been reached by assigning the responsibility for counterbattery intelligence to the S-2, with the additional title of Counterbattery Officer. Junior officers are assigned to assist the S-2 in counterbattery functions or in other duties as the situation may require.

(2) Successful counterbattery operations are based on the fullest possible cooperation of all units concerned, irrespective of arm or service, in passing in to appropriate artillery command posts pertinent information; on intensified study of the data accumulated; and on piecing together this information for use in directing fire on hostile batteries. In the latter period of the Italian Campaign, counterbattery operations have been organized on a scale not hitherto experienced, and have employed more intelligence agencies than ever before. Counterbattery was of critical importance to the success of the Spring Offensive. It has been operated largely through the medium of shelling reports ("Shellreps"), which have been turned in to artillery units by organizations

of all arms and services within hostile artillery range. On the ANZIO Beachhead, shellreps were received from ordnance ammunition depots and quartermaster bakery companies. Fifth Army adopted a standard form for the recording of counterbattery data, which includes the following items of information:

(a) Time of report
(b) Map location of observer
(c) Direction by flash, sound, or furrow
(d) Estimated distance or location of battery
(e) Location of area receiving fire
(f) Hour and duration of fire
(g) Number and type of guns employed
(h) Caliber and type of projectiles
(i) Nature of fire
(j) Damage sustained
(k) "Flash-bang" - time from flash to sound of gun

In some situations special flash observation posts were organized which provided observation over our own rear areas. Military police on exposed posts were furnished with direction boards to aid them in estimating the direction of enemy fire so that they could turn in shell reports. Handbooks were prepared so that shells could be readily identified from splinters, case fragments, and pieces of rotating bands. Calipers and flexible steel rulers were improvised for this purpose.

(3) Information from shell reports also gave indications as to which hostile batteries already located, were active. They also served to direct the attention of photo interpreters to special localities. Photo interpretation provided the bulk of identifications. This function was well carried out by an expert interpreter stationed with the AAF Photo Reconnaissance Unit. His extensive files of comparative photographs proved to be of special value.

(4) Location by sound was a secondary prolific source of locations of enemy battery positions. It was found, however, to be not entirely reliable in mountainous terrain, and could not keep up with a rapid advance.

(5) Location by flash technique gave excellent results. It was aggressively used.

(6) German draped camouflage proved to be highly deceptive, and air observation posts could rarely locate silent hostile guns. This proved equally true of observation from artillery/reconnaissance aircraft.

Both types of aircraft were able, at times, to provide excellent oblique air photographs. Prisoner of war and civilian interrogation, and special intelligence agencies also provided good information of enemy batteries. The antiaircraft artillery radar stations were also helpful.

c. Countermortar

Systematic countermortar programs have been in use by British artillery formations for some time. At the beginning of May 1944 the 45th Infantry Division on the ANZIO Beachhead initiated a divisional countermortar program in which existing counterbattery facilities and personnel were employed. Mortar reports ("mortreps") were employed much the same as shell reports, and appropriate columns of the adopted shellrep form were used to record pertinent data. All means of observation and intelligence within the division were coordinated. Experience showed that the best means of silencing hostile mortars is counter fire with friendly mortars. The 83rd Chemical Battalion (4.2 mortars) was tied into the division artillery net and established a hastily improvised fire direction center. Observed missions were fired by artillery air observers, and by ground observers from field artillery and chemical units. Approximately one-half of all countermortar missions were assigned to the 4.2-inch mortars. Similar countermortar programs were soon adopted by the 85th and 88th Infantry Divisions, and by the 894th Tank Destroyer Battalion during the period in which it functioned as an artillery group headquarters. The 3-inch tank destroyer guns firing high explosive, 90mm antiaircraft guns using time fire, and 81mm Infantry mortars have all been used as countermortar weapons, as have also divisional artillery guns. Division countermortar programs have since been generally adopted throughout the Theater.

d. Counterflak

Counterbattery programs against known hostile antiaircraft artillery positions, fired just prior to and at the close of friendly tactical bombing missions, were first employed during the defensive period on the ANZIO Beachhead. These counterflak missions were essentially harassing fires. As a rule one gun per target was used on such missions.

Unobserved counterflak fires were generally supplemented by observed missions directed by air observers on any hostile antiaircraft batteries which opened fire on the friendly bombers. The effect of the counterflak fires on the enemy antiaircraft batteries in reducing the intensity and accuracy of their fire was most favorably commented on by the air force officers involved.

e. Organization of Field Artillery Intelligence

(1) Among artillery staffs which had not experienced combat, an impression appears to have prevailed that the S-3 is generally charged with general executive responsibility while the functions of the S-2 are more specialized and compartmented. Successful field artillery units in Italy have developed closely cooperative, smoothly functioning S-3 -- S-2 teams. The functions of these two staff sections cannot be separated and independent; close, interdependent and interlocking action of both is essential to successful operations. The following outline provides an example of procedure as followed in the Campaign. Well in advance of action, the S-3 will calculate the amount of ammunition that will be required in the planned operations. Concurrently the S-2 will begin advance arrangements for air-photo coverage and map supply. As the time of action approaches, the S-3 begins his consideration and plan of positions and fire possibilities. In close cooperation, the S-2 will consider and plan observation posts and zones of observation. The S-3 will include in his plans all the fire possibilities of the auxiliary and reinforcing artillery weapons, such as tank destroyers, tanks, antiaircraft artillery guns in the ground role, infantry cannon company weapons, and assault guns. The S-2 will insure that all the observation facilities for these reinforcing units are integrated in his artillery observation plan. In general, the functions and activities of these two staff sections, in organizing intelligence and planning for its use, both before and during combat, must be integral parts of the common cooperative effort of both.

(2) Organization of field artillery intelligence in advance of action should be followed by full exploitation of normal and auxiliary observation posts. Observers in these posts normally provide more than

half of the operational intelligence data received at division and higher headquarters. Evaluation of intelligence by artillery battalion S-2's of the information they pass back to higher headquarters is valuable and should accompany their intelligence reports and messages. Fact and interpretation should be kept separate.

35. FIELD ARTILLERY COMMUNICATIONS

Field Artillery communications in the latter stages of the Campaign have not presented any new aspects or lessons. Flexibility, improvisation, and fitting the communication plan and operations to the existing situation have continued to be the main points of interest from combat experience. The following comments in general have been extracted from the published lessons of Fifth Army (5A/LL):

a. Experience has shown that any attempt to standardize completely communication for all units is in error. Special situations arise constantly which necessitate special equipment. Switchboards and extra radios SCR 193, 608, and 610 should be kept in reserve by Corps and Army to meet special requirements.

b. Artillery communications often provide the only link between the front line and command headquarters.

c. In a fast moving situation, wire cannot be recovered by artillery units with their existing authorized personnel and equipment.

d. A number of air adjustments by high performance aircraft have failed because of communication failures.

36. ARTILLERY AIR OP

a. General

The outstanding value of artillery air observation aircraft has been again demonstrated fully in the later period of the Campaign. The air observers no longer constitute an auxiliary agency of fire control, but have become one of the most important observation facilities available to all field artillery units. All divisions and field artillery groups maintain a system of constant air observation post patrols along the front lines of their sectors from daylight to dark in order

to locate targets of opportunity and to discourage enemy artillery activity. This system of patrols is generally accomplished by consolidating under centralized control all the artillery battalion air sections of the division and groups for operations from a common field. The patrol flights are coordinated by the division or group air officers. The patrol system and its centralized control do not, however, interfere with special flights for individual battalions or prearranged missions.

b. Communication

(1) At each division or group airfield an SCR 608 is located to maintain continous communication with the headquarters fire direction center and to act as net control station to coordinate air observation missions. The aircraft use a common frequency, and experience indicates that several concurrent missions can be fired without jamming if proper radio procedure is followed.

(2) A hostile aircraft warning system has been developed which utilizes ground observation of light antiaircraft units displaced well forward as well as the radar warning system of the Antiaircraft Artillery Information Service. The warnings are received by SCR 593 receivers and are relayed by SCR 608 to all observation aircraft in the air in time to enable the observers to land or escape before the enemy aircraft arrive.

(3) Although communications details may vary within individual battalions, provisions are made whereby any artillery air observer can call for and direct fire from any battalion. In this manner the division observers can obtain fire from corps units, and the corps observers are able to call for the fire of heavier, long-range units, or fire from any unit that may be in position to reach the desired target.

e. Adjustment of Naval Gunfire by Air OP

Artillery observation aircraft pilots have had considerable experience in the adjustment of naval gunfire. The main problem has been adequate communication, and it has been satisfactorily solved by installing an SCR 610 on board the warship. An SCR 193 is normally located at the artillery airfield as an emergency relay link, but these have been rarely needed. Normal artillery sensing procedure has been used by the observers.

As between Allied warships and U.S. artillery air observers, a standardized procedure has been adopted in the Theater for such joint operations.

d. Adjustment of 4.2 Chemical Mortar by Air OP

Adjustment of the 4.2 Chemical Mortar by artillery air observers has been successfully conducted on a number of occasions. The Air OP Officer, 45th Infantry Division, reported:

> . . .Our experience with adjustment of 4.2 mortars has been, on the whole, successful. An SCR 610 with division artillery frequency is generally placed with each mortar platoon, and enables us to keep in contact with them directly. . .To date, all our firing has been on a "countermortar" campaign. The 4.2 mortars are easy to adjust. . . .(45ID/AOP)

e. Use of Photo Locations and Photo Maps

In static situations considerable use has been made of photo locations. Enemy targets, such as hostile batteries, have been taken under fire by air observer adjusting from the photo location with respect to visible terrain features. A psychological advantage has been noted through providing the observer with latest cover photographs, actually showing the location of the targets; however excellent results have been obtained by the use of locations transferred to "basic cover" photographs maintained at the airfield. Such procedures require close cooperation from the corps and division photo interpreters.

f. Operational Altitudes of Observation Aircraft

The recent deviation from the old doctrine of observation aircraft operating at minimum altitudes is of especial interest as a development from the campaign. The Air OP Officer, VI Corps reported that

> . . .After considerable experience with attacks from hostile fighter aircraft, most pilots agree that altitude is a protection rather than a hazard, because enemy fighters concentrating on the Cubs at low altitude come in too low for antiaircraft fire and frequently make their attack undetected. . .(VIC/AOP)

The Air OP Officer, Fifth Army also reported that "the artillery observation aircraft have been operating between 8000 and 11000 feet to avoid light flak and to enable them to adjust fire on enemy gun positions on the reverse sides of numerous razor-back ridges." (5A/AOP)

37. MISCELLANEOUS POINTS FROM FIELD ARTILLERY EXPERIENCE

a. Angledozers. Tractors with scraper blades were found to be indispensable to artillery units during the winter and spring in Italy. A minimum of one per medium or heavy battalion was required.

b. Meteorological Corrections. Predicted meteorological data have proved superior to standard or "spot" data. Radio-sonde winds from the antiaircraft artillery stations and predicted temperatures and densities from the air force stations have been broadcast regularly in the Theater. Correction of the weighting factors for high velocity weapons has been necessary, and the older series of graphical firing tables proved to be inaccurate in certain cases.

c. Calibration. Fifth Army has established relative calibration of artillery weapons by use of the portable T6 field chronograph equipment. Speed and accuracy have been gained as a result.

d. Illuminating Shell. First attempts to use illuminating shell were made during operations on the ANZIO Beachhead. Three-inch naval shell in tank destroyer guns was employed. These trials indicated the possibilities of this type of projectile, the need of which has been long-felt in artillery operations.

e. Command Post Lighting. The 1½ kilowatt and 3 kilowatt generators issued to units for lighting command posts have proved to be unreliable. The development of sturdier and more reliable equipment for this purpose is desired by all unit commanders.

f. Ammunition Handling. Proper training and discipline in the handling and stacking of ammunition is of the utmost importance. The Artillery Officer, Fifth Army declared:

> . . .This subject is vital. There must be extreme care in limiting the amount of ammunition placed at a gun position, and it must be protected. . . .The artillery of one division lost one complete battery of 155mm M1 howitzers by not applying properly the principles of ammunition dispersal and protection. . . .(AGF/168)

g. Precision Adjustment. More emphasis should be placed on precision adjustments, particularly with heavy artillery, for the purpose of destruction rather than neutralization.

h. Map Supply. The issue of maps must be coordinated closely by the Army artillery officer. All units must use the same editions, unless the Engineers specifically state that the latest edition can be used concurrently with a preceding issue.

i. Photographic Requirements. Photographic requirements should be anticipated and requests should be made for delivery well in advance of the time they will be required.

SECTION VII : ARMORED UNITS

38. GENERAL CONSIDERATIONS

a. The main points of lesson-experience emphasized by field commanders with respect to the combined operations of armored units with infantry, tank destroyers, and other arms have been treated in detail in Section IV, supra. The following material relates only to the individual action of armored units as a separate arm.

b. In the period under consideration prior to the Spring Offensive, terrain conditions prevailing in Italy presented little or no opportunity for the employment of armor in mass. Before the offensive was launched, neither the 1st Armored Division nor the various separate tank battalions could be used in their normal offensive roles. Operations during this period were largely confined to small unit action, special missions, defensive operations on the Beachhead, and various secondary roles. This situation is well illustrated by the comment of a Group Commander in a report of combat lessons:

> . . .In mountainous terrain such as that over which the units of this Armored Group have operated in Italy, employment of tanks in mass has been impossible. Seldom have tactical units larger than the tank company been used. To date, entire tank battalions have not been employed as such under group control.

> For the most part, tanks and tank destroyers have been confined to existing roads because of extremely steep and rocky terrain and the presence of stone terraces, walls, deep gullies, and soft stream beds. . .(2Amd.G/CL)

c. Opportunity was first presented for large-scale armored operations after the landing of our forces in the ANZIO-NETTUNO area. The temporary period of static and defensive warfare that developed in the Beachhead, however, again prevented for some time the normal offensive role of armor. It was not until the breakout attack in conjunction with the Spring Offensive that the 1st Armored Division and the separate tank battalions were committed to offensive combat in the normal manner. In the operations that followed, continuous offensive armored action prevailed throughout the advance in Tuscany until the approaches of the Gothic Line were reached.

d. The static period of the ANZIO Beachhead presented a number of lesson-experiences with respect to armor in the defensive role under peculiar conditions and in various secondary missions.

39. EMPLOYMENT OF TANKS IN MOUNTAINOUS TERRAIN

a. Tactical Limitations Imposed by Terrain

As indicated in the preceding paragraph, tank operations in the mountainous terrain of Italy were largely confined to the action of small units. Lack of maneuver space because of the rugged, close country, inability of units to avoid becoming road-bound, and observation afforded the enemy by mountain ranges and commanding peaks all materially influenced the tactical employment of armor. An observer from the Ground Forces Board reported after detailed consultation with numerous unit commanders:

> . . .Doctrines set forth in the employment of tanks has always favored the employment of tanks in large numbers. However, from the lessons learned in actual combat here during inclement weather in mountainous country, employment of tanks in greater strength than a company has it limitations. The most deciding limitation is the lack of terrain to maneuver in. Tanks must remain on roads where they are able to move . . .Throughout engagements in the mountains tanks were used in very small numbers. The nature of the terrain dictated such employment, as it has been impossible to move tanks across country. . .Where tanks could support infantry attacks from fixed positions, it was possible to use a few

more, but even then the field of fire was usually so narrow and the suitable positions so scarce that not more than one platoon could be used. In this type of employment the tanks would be brought into previously selected positions at night. They would fire on objectives with the first morning light during the initial phases of the infantry attack, and then withdraw to defiladed positions after the infantry had passed beyond supporting range. Or, they would remain in supporting position to repulse enemy counter attacks. . . (AGF/140)

b. Employment of Tanks on Roads

Terrain conditions often confined the operations of tanks almost entirely to roads and small areas closely adjacent to them. The Ground Forces Board observer reported that often the mountains precluded the use of tanks anywhere except on roads and that

. . .occasionally a spot large enough for the tanks to get off the road could be found, but for the most part in this period (March 1944) the roads in both the American and French divisional areas were cut out of the sides of the mountains, slopes which varied from 30° to the perpendicular. . . (AGF/140)

Operational technique of tank action confined to road nets in this type of terrain was thus reported by a Group Commander in a summary of combat lessons:

. . .When terrain conditions confine the tanks and tank destroyers to roads, a very narrow front results and seldom can more than one or two platoons be used. While one to three tanks advance, the others take overwatching positions and fire on enemy gun flashes, houses, or other objects that might conceal strongpoints or antitank guns. Often it is advantageous to fire on suspected enemy locations without waiting actually to see the target -- the enemy is clever and thorough with his camouflage. When the leading tanks reach advantageous points still within support of the overwatching tanks the leading vehicles take overwatching positions and allow the formerly overwatching tanks to advance under their protection. Thus, fire and movement is adhered to, even under these roadbound conditions. In such action the availability of additional tanks to displace forward with full loads of ammunition is an advantage, for those which were first overwatching may have expended much of their load as well as those which made the first advance. . .(2Amd.C/CL)

Movement and maneuver of tanks on the narrow roads, especially in negotiating sharp turns became increasingly important in these small unit operations. A Battalion Commander described briefly his experience:

. . .Roads in many cases were so narrow and winding that it became necessary to back up the tanks and then go forward again in order to negotiate the turns. The tanks frequently found it very difficult to turn around on the roads, and when under enemy observation they were protected by overwatching tanks during the turn-around. Each tank often took approximately five minutes to turn about after finding a spot wide enough to back up and execute the turn. . . (AGF/140)

c. Value of Small Unit Operations in Mountains

Although the terrain prevailing in many parts of the zone of operations has been considered entirely unsuited for the action of tanks in the conventional role, the Campaign showed conclusively that even in adverse conditions and in close road-bound areas, small unit tank operations can be of great value and usefulness in the advance. A group commander made this point in a current report:

. . .Many experienced tank commanders say that this country is no country for tanks. This is undoubtedly true, but when used in small numbers and adapted to the situation prevailing, they have a definite usefulness and have been highly praised by the infantry units which have been supported. . .(AGF/140)

d. Necessity of Adequate Engineer Support

Mountainous terrain and action confined to road areas have rendered adequate engineer support and assistance to tank operations of vital importance. In many instances armored units could not have operated at all without aggressive and close support of engineers. A battalion commander made the following comment:

. . .In this country the use of roads for tank operations is of utmost importance. The retreating enemy realizes this and does a thorough job of demolitions, leaving road blocks, destroyed bridges, landslides, and mines. Our engineers have done a remarkable job in repairing the roads and clearing the mines. Bulldozers are used well forward, often under enemy fire. Without such assistance, tanks would be of no use whatever in the type of terrain over which they did operate very successfully. . .(AGF/140)

e. Surprise Gained by Employment of Tanks in Mountains

Fifth Army has reported that surprise may be achieved successfully by employing tanks in mountainous terrain where their use is not expected. In the compilation of lessons learned, the following example has been given:

. . .The Germans do not look for tanks in mountains. At TERRACINA considerable surprise was gained by taking elements of the 760th Tank Battalion up a mountain trail in order to flank and force the enemy position instead of going down the road which was a defile between the mountains and the sea. . . (5A/LL)

40. RECONNAISSANCE

a. General

All commanders have reiterated the importance of thorough and careful reconnaissance prior to all armored operations, whether in mountains or in open terrain. It is essential that the full implications and detail necessary to reconnaissance be understood by elements of all echelons. It has been pointed out that planning and reconnaissance are interdependent, and both must become a continuous process during all periods of action. The Commander of the 2nd Armored Group declared in a report of lessons from combat that

. . .reconnaissance continues to be the most important prerequisite to a well planned attack, and timely knowledge of the situation as it develops is of utmost importance in the control and coordination of the separate elements of a command. Nothing can take the place of foot reconnaissance well forward prior to an attack. In moving situations, foot reconnaissance is often too slow. In the latter situation, Cub planes are ideal for such work. . .(2Amd.G/CL)

Similarly a battalion commander also reported with respect to small unit operations along the main GARIGLIANO Line:

. . .The vital importance of reconnaissance was emphasized time and time again. The meaning of reconnaissance planning and continous reconnaissance must be fully understood by all concerned. Map reconnaissance is very important in planning, but interpretation of aerial photographs may be misleading if the information is not impartially confirmed. Reconnaissance could be improved if it were organized on a larger and more comprehensive scale. Very frequently reconnaissance information most desired and of most importance is the information that comes in just a few hours, or sometimes just a few minutes, before the action affected by the reconnaissance is to be initiated. This "close to action" information over a considerable front is seldom available to the tank battalion commander. . .(AGF/140)

Further comment on the necessity of adequate reconnaissance is quoted from another battalion commander, with special reference to small unit operations in close country:

> . . .Reconnaissance is absolutely necessary, if any time at all is available, to perform any given mission. One particular reason here is that in this terrain the enemy can choose his ground, and you have to devise the means to choose yours . . .Reconnaissance of roads by platoon and tank commanders is essential. Near the enemy, this is usually done at night, but when necessary it may be done in daylight within enemy observation if the men go singly or in pairs. The enemy usually hesitates to fire on unprofitable targets lest he give away his own position. . .Tanks are definitely limited in their movements in mountainous terrain, and positions for tanks are difficult to find. Reconnaissance before the tanks move into position is absolutely necessary, and since the tanks may often be used beyond the infantry lines, patrols at night should be made. By sending several reliable enlisted men or an officer, with the infantry patrols, valuable information may be obtained. Full dependence may not be placed on reports of infantry patrols alone, since these patrols are not seeking information relative to the use of tanks. Men who understand the capabilities and limitations of tanks must be used for such patrols and reconnaissance. . . (AGF/140)

Experience of the 1st Armored Division in the break-out operations from the ANZIO Beachhead likewise re-emphasized the importance of thorough reconnaissance prior to the attack. Fifth Army reported in brief:

> . . .Gaining knowledge of fixed defenses through constant reconnaissance and patrolling is 75% of the problem. The 1st Armored Division reports that during the Beachhead breakthrough they had considerable knowledge of the enemy defenses on their left, and experienced little difficulty in this sector. However, on the right where they had little such knowledge, the task was much more difficult. . .(5A/LL)

b. Employment of the Armored Reconnaissance Company

The following material has been extracted from the reports of the Commander, Reconnaissance Company, 1st Armored Regiment, on combat experience and lessons learned during the Spring Offensive (AGF/172):

(1) In maintaining contact with infantry on our flanks, more time in advance of attack is needed to establish contact with the infantry and set up radio communication.

(2) If reconnaissance elements are to operate as point vehicles in the advance guard formation, light tanks are essential for this purpose because of mined roads, snipers, and artillery fire.

(3) In an attack with tanks in which the reconnaissance elements are to maintain close contact between the combat commands, light tanks are essential for protection against artillery fire, especially against concentrations of fire such as were encountered at CAMPOLEONE.

(4) If operations are scheduled for a certain area, reconnaissance elements should be sent out well in advance of the main body to reconnoiter the road nets and trails during daylight hours.

(5) Maps should be issued in sufficient time prior to the operation to allow breakdown issue to the inner units of the organization. There should be available at least four sets of maps per platoon.

41. EMPLOYMENT OF TANKS IN TOWNS AND VILLAGES

The established principle that tanks should not be used in towns and villages where the crooked, narrow streets and thick-walled buildings provide the enemy with excellent opportunity for tank traps and antitank gun positions has been proved entirely sound. However, in the fighting in Italy, it has been found necessary and effective under certain conditions to employ tanks in towns and villages. In any case, such employment must be closely supported and combined with close infantry action. Similarly the doctrine that routes through towns should be avoided, and towns by-passed by armor is also sound; but again, in the existing regions traversed, this has often been rendered impossible because the only route available for armor has often led through the town. Experience in Italy has demonstrated that the basic principles must in such cases be modified to fit local conditions, and proper precautions and care in tactical employment, especially through the medium of close infantry support, must be exercised to offset the unusual hazards to armor. A group commander has summed up his experience as follows:

> . . .The doctrine which teaches that tanks should by-pass hostile towns and villages is correct, but in Italy the roads invariably lead through the hearts of towns and routes around them seldom exist. If the attack is to be continued beyond the village or town, there is nothing for the tanks to do but go through. A case of this kind requires careful consideration and the maximum coordination of all arms. Artillery can destroy many of the houses and keep the defenders down; air reconnaissance can spot vehicles in and beyond the town; the tanks can deliver direct fire at medium range, but the infantry must enter the town first close behind the artillery barrage. The tanks can overwatch the infantry and fire on targets much closer to them than would be safe for the artillery. Yes, there will be times when tanks must enter villages and towns, but never before the infantry. At CASTELFORTE tanks were present in such numbers around the town that the antitank guns hidden in the buildings were afraid to open fire. It would have been suicide to have attempted to enter the town with tanks in column. . .(2Amd.G/CL)

Likewise the Commander of the 751st Tank Battalion reported after extensive operations through town and village-dotted terrain:

> . . .If possible, tanks should not use the main routes into towns but should work in over the secondary streets. Infantry should be right with the tanks, which can fire over the heads of the infantry when machine guns and other small arms open up on them. . .(5A/LL)

Another Battalion Commander also reported after the fall of Rome and during the advance into Tuscany that

> . . .it is disastrous for tanks to go unattended by infantry into small towns with narrow, winding streets where they are easily boxed in and knocked out. . .(5A/LL)

Further experience from combat in towns and villages has been reported by the Ground Forces Board observer after detailed discussion with participating commanders:

> . . .Throughout the fluctuating battle for the town (name omitted) the tanks have been used in close support of the infantry. These tanks have made from five to six sorties daily, each lasting about two hours. Six or seven tanks are usually employed in each sortie. Deployment has varied. A favorite method is for two tanks to cover another three which move and engage targets from positions between houses. At the same time one or two tanks give flank protection and carry out a diversionary shoot. . .Tank crews are briefed before sorties from aerial photographs and large scale diagrams of the town. A precise destination in the town is allotted each tank, and each is given a target or a definite covering task. . .
>
> . . .An enemy behind solid walls is difficult to dislodge. The walls must be first destroyed. By continuous fire at heavily fortified buildings, the 75mm HE shell with delay fuze will finally reduce the strongest building. . . (AGF/140)

42. THE USE OF TERRAIN IN TANK OPERATIONS

a. Alternate Routes

Whenever possible, alternate routes should always be available in the event that tanks become disabled in such positions as to block the continued advance of following vehicles. Unless there is an alternate route or terrain suitable for movement off the road, the assistance of tanks in an attack cannot be relied on, since the disabling of one tank at a critical point may hold up an entire unit's tank attack. Every

piece of commanding terrain must be considered and utilized as far as possible. (COlAmd.G/AGF/132). Likewise, in planning armored operations, full consideration should be given to alternate routes of action, in the event that enemy antitank defenses make the original line of attack impracticable. This latter principle becomes part of the established doctrine of fire and movement. (753TBn/LL).

b. Assembly Areas

Assembly areas should be selected with full consideration of the enemy's capabilities of observation and artillery fire. Tank crews should remain in their vehicles until it is established that the enemy has not discovered the area or is prepared to range in on it with his artillery. The Commander of the 760th Tank Battalion reported that

> . . .the Germans will range in on assembly areas. After an assembly area is occupied, tank personnel should wait for a time before leaving their tanks, because the Germans will frequently wait a few minutes for the crews to enter the open before opening fire with their artillery. . .(AGF/132)

In an assembly area, only one tank should be used for radio communication, and this vehicle should be located at an average of 600 yards from the main area containing the unit. Transmission should be kept at a minimum. Extended transmissions by radio enable the enemy to locate the position of the transmitter. (COlAmd.G/LL)

c. Cover and Concealment in Forward Areas

In forward areas it is vital that tank personnel know the proper use of cover, camouflage, and the natural means of concealing vehicles and movements. In many cases, nets are not used to proper advantage, and reveal rather than conceal positions and vehicles. A unit commander observed after extensive experience in Italy:

> . . .Troops frequently do not understand the importance of staying on single trails and tracks in bivouac areas. Vehicle drivers must understand that the tracks they leave tell a story to the enemy. When dispersion cannot be obtained, proper and effective camouflage principles must be followed. . . (AGF/132)

d. Firing Positions in Close Terrain

When a tank attack is confined to the general axis of

reorganization, including the fire support of all weapons, must be made prior to the attack. . .Aggressive action forward should be carried out when the enemy is disorganized. The time for this is immediately following the repulse of a counterattack. Armor can be used with the most telling effect under these conditions. Bold, forward action at this time will produce most effective results. . .(TFA/AGF/132)

44. USE OF DEMOLITION SNAKES IN ASSISTING ARMOR

During the Spring Offensive, demolition snakes were used for the first time to assist the armored units through minefields and strong points. The results of these weapons varied, and valuable lessons were gained through the experience from their first use in combat. Fifth Army has reported the following:

. . .The 1st Armored Division used snakes at several points during the break-out attack from the ANZIO Beachhead. Experience has shown that they must be assembled close to the front, and the entire operation must be well planned and coordinated in advance. One great drawback to the use of snakes is vulnerability to artillery fire and mines, which may explode the snakes prematurely and create heavy casualties among our own troops nearby. Two enemy strong points close to the line of departure were completely disorganized during the break-out from the Beachhead by snakes being pushed into the positions and detonated. . .(5A/LL)

Details of the two outstandingly successful operations with snakes are of value and interest as examples of how these weapons can be effectively employed. The Commander of Combat Command "A", 1st Armored Division, declare shortly after the successful break-out attack:

. . .The initial attack out of the Beachhead perimeter was rapid and successful. In Combat Command "A" the assault was materially aided by the use of demolition snakes for the first time. Since these weapons were entirely new, some details of their use and results will be of interest. They were used against two critical strong points generally consisting of wired-in machine gun nests and heavily defended trenches covered by mined approaches. Two snakes were used on each one. In each instance one snake was dragged up by a medium tank and placed in position. The pre-selected position had been marked by stakes that had been accurately located for direction by azimuth. The snake was then pushed into firing position by a second tank, the distance having been checked by odometer in accordance with pre-calculations. It was then detonated. The second snake in the meanwhile had been dragged up until its head reached the beginning of the furrow created by the explosion of the first. It was then pushed through the furrow by a third tank and brought into position beyond and in prolongation of the furrow. There it was detonated. A two-hundred-yard furrow, wide enough for the passage of a medium tank was blasted out by the two snakes. The entire

a road because of close terrain, it is essential that suitable firing positions be located well forward from which stationary tanks can overwatch the advance as long as possible. In mountainous terrain, especially when the enemy occupies commanding heights, reconnaissance for these positions must be made dismounted and the tanks should be moved into position only a short time before the attack. Very often it is desirable to occupy these positions at night to support a daylight attack. (2Amd.G/CL)

e. The Importance of Considering Space

The importance of considering the available space for routes, maneuver, and general action, especially in close and mountainous country, has been emphasized by many tank unit commanders. An armored regimental commander brought out this point in a report of lessons learned in the period of the Spring Offensive:

> . . .A tank battalion commander has the following to say on this subject, and his views have received general concurrence: "Where terrain conditions severely limit maneuver and routes of movement particular care should be taken by all commanders to avoid committing more tanks than can be used effectively on the contemplated mission. Time for reconnaissance and air-photo and map study should be ample whenever at all possible, for such determination by each echelon of command. It will be found, under such conditions, that the number of tanks to be committed can best be determined 'from the bottom up,' that is, by determining the number of platoon missions, available cover, probable direct fire support missions, and fields of fire; thereafter the number of companies to be committed may be determined. . .During the latter part of February (1944) this battalion erred in pushing more tanks at the enemy than could be profitably employed on the usable terrain. No possible advantage can accrue from such an error. The resultant exposure of the excess vehicles caused unnecessary casualties; and any phychological effect on an intelligent enemy by a mere showing of numbers would back-fire by his knowledge that we were merely being tactically clumsy. He knew the terrain as well as we did. . .(1st Amd.Rgt./AGF/152)

43. REORGANIZATION AND COUNTERATTACK

The Commanding General of a special armored task force which operated prior to the opening of the Spring Offensive commented on the subject of reorganization of armored units to meet enemy counterattack:

> . . .The enemy will invariably counterattack. Upon reaching an objective it is vital that the tank units reorganize quickly. If reorganization is accomplished prior to the counterattack, the enemy will suffer his heaviest casualties. Plans for this

operation from its start (the snakes having been previously assembled) to the detonation of the second snake required only 35 minutes. The operation was conducted under cover of artillery preparation, and no tank or personnel causalties were sustained. Similar procedure was carried out with snakes at the second point. The results were excellent. The detonations not only cleared adequate gaps in the mined approaches but also killed or stunned the enemy personnel in the strong points, and initial waves of infantry riding on medium tanks were able to mop up the positions without appreciable opposition. It is regretted that more of these weapons were not used by both Combat Commands in this operation. . .(CC"A"/SR)

In contrast to the highly successful operation with snakes above outlined, the attempt to use these weapons at ISOLA BELLA proved ineffective because the snakes were assembled too far in rear of the forward positions in which they were to be used. Fifth Army reported on this instance as follows:

. . .An attempt to use snakes was made at ISOLA BELLA, but without success. They were assembled too far behind the line of departure, and in the long move across country all of the hitches became broken. In future operations they should be assembled close up behind the line of departure, and their installation should require only a short, straight forward tow without turning or twisting across country. . .(5A/LL)

45. DEFENSIVE ROLE OF ARMOR ON THE ANZIO BEACHHEAD

During the static defensive period of the ANZIO Beachhead, the 1st Armored Division was mainly employed as a Corps Reserve, with the primary mission of providing the main counterattack force against large-scale enemy assault. Its general role was to provide powerful support at any point of the perimeter line that might be seriously threatened. Positions were prepared at all critical points along the line, and the tanks, assault guns, and attached tank destroyers were held ready to occupy them in any locality and at any time that the necessity should arise. This armored reserve was also charged with clearing out any salients that the enemy might drive into the perimeter line, and flexible plans were accordingly prepared in detail for dealing with such eventualities in all critical sectors. The armored reconnaissance elements also had the mission of maintaining continual patrols along the coast and also along the Mussolini Canal on the right flank of the Beachhead positions. Armored elements were also used in strong raids to disorganize and disrupt the enemy lines, and on two occasions strong attacks of the armor in force were launched to relieve enemy pressure on the left flank. One of these

attacks served successfully to break up a powerful German attack that threatened a critical sector of the line. (CSlAmd.Div./SR)

46. EMPLOYMENT OF TANKS AS ARTILLERY

A few tank units had been employed in their secondary role as artillery in the previous period of the Campaign covered in Training Memorandum No. 3. In the later period, especially during the static period of the ANZIO Beachhead, tanks were for the first time used extensively in this role, and the results proved to be successful and desirable under the conditions prevailing. The Chief of Staff, 1st Armored Division, informally reported after the break-out attack:

> . . .During this period (defensive phase of the Beachhead) the tanks, assault guns, and attached tank destroyers were used frequently in their secondary role of reinforcing artillery. This constituted the first extensive use of tanks in this role, though the destroyers had been in considerable use as artillery previously in the main southern line on the Fifth Army front. . . .The assault guns of the armored infantry and tank units were also organized and employed as "batteries" with good results. Every weapon in the division was employed whenever possible to reinforce and sustain the fire power of the units supporting the line. . . .(CSlAmd.Div./SR)

Experience and comment from the Commanding Officer, 1st Armored Regiment, with emphasis on training of armored units in this secondary role, is also available:

> . . .Medium tanks have done a great deal of firing on the Beachhead as conventional artillery. Tankers of the old school will be horrified at this. The experience has proven highly worthwhile, however, both from the standpoint of damage inflicted on the enemy and from the standpoint of morale. Our guns have proved to be remarkably accurate at extreme ranges -- as great as 14,000 yards -- and have frequently been used on targets which the 105mm gun-howitzer could not reach. From the standpoint of morale it has proved worthwhile because it has provided effective employment for the tankers during many periods when conditions have prevented the use of tanks in their primary role. Medium tank platoons have operated as batteries and have usually been attached to artillery battalions. In some cases, however, tank companies have operated their own fire direction centers. Medium tank officers have regularly done their own forward observation.
>
> . . .It is believed that all medium tank units should be trained and equipped to operate in a secondary role as conventional artillery, in as much as experience indicates that there are bound to be many periods during combat when terrain conditions and enemy defenses will preclude the use of tanks in their primary assault role. The equipment of medium tanks should include such items as telephones, protractors, range-deflection fans, plotting boards, firing tables, etc. . . (AGF/152)

Further comment on experience with armored units in the secondary role as artillery just prior to the break-out attack from the Beachhead is extracted from another report of the same Commander:

> . . .Most of our work now (April 25, 1944) is firing indirect fire as artillery. We have been firing up to 16,000 yards with these tanks by digging them in to get the necessary elevation. There was a time when we could outshoot any other weapon on the Beachhead. . .We are organized to operate our own fire direction center although right now the artillery with whom we work does it for us. I feel that it is highly desirable to be well-trained in indirect fire for the role of reinforcing artillery. However, the tank crews must first be properly trained in direct fire with all their weapons. I will say, however, that tank gunnery has improved in my regiment since we have been shooting indirect fire. I attribute this to the fact that the gunners are getting accustomed to laying more carefully, both for range and deflection. . .(AGF/148)

47. MARCHES AND MOVEMENTS

a. General

Operations throughout the Italian Peninsula have afforded extensive experience in the movement of armored units through difficult terrain and over limited and inadequate road nets. Operational movements and marches have served to bring out the importance of this phase of action in the training of tank units, and commanders have emphasized repeatedly the necessity of thorough training of all echelons in such functions as warning orders, road priorities and discipline, use, and marking of routes, and traffic control as applied to armored units.

b. Specific Points of Lesson-Experience

The following specific points have been extracted from reports of various battalion commanders whose units operated with the 2nd Armored Group in Italy (2Amd.G/Ind.):

(1) During relatively static conditions, such as prevailed before the Spring Offensive, warning orders for movements and marches were issued from eight to forty-eight hours before the movement. Under these conditions, most warning orders were written, and units were directed to obtain traffic clearance from the Corps Traffic Control Center. During the moving situation that followed the opening of the Spring Offensive, warning orders were oral. Time in such warning orders varies from

instructions to "move when ready" to several hours, depending on the situation and road conditions.

(2) In stable situations, road priorities and clearances were normally established through the Corps Traffic Control Center. Movements for elements of battalion strength were handled through the armored group headquarters. Company movements were arranged by the battalions concerned. When the situation changed to one of movement during the Offensive, the establishment of road clearance and priorities was made to fit the tactical situation of the moment. It often became necessary to rush an armored unit to the front line, and in such cases, special priority was always sought. In such instances it became necessary to instruct the commander concerned to report or rendezvous at a certain point in the shortest possible time, and to make the best possible movement that traffic conditions would allow. Such situations, which were rendered unavoidable by tactical necessity, often made traffic conditions difficult because of the many units using the limited roads. Whenever possible, routes were reconnoitered in advance by reconnaissance elements of the tank battalions.

(3) Experience has shown that when the tactical situation permits, the best time for starting an armored column for a march or movement is at daybreak. Faster time can be safely made without mishap, drivers have better visibility, and traffic is generally lighter at this hour.

(4) The poor condition of most roads and the few first-class highways prohibited the movement of tanks by transporter in most cases. In several instances transporters were used, but the necessity of taking the tanks off the transporters where deviations occurred and then placing them back on, tied up traffic and lost more hours than would have been required had the tanks proceeded on their own traction. This experience does not detract from the usefulness and necessity of transporters. The poor road net and peculiar terrain conditions simply made them impracticable in many instances.

(5) When there was sufficient time between the warning order and the movement, battalion reconnaisssance elements reconnoitered routes and posted guides and markers where any confusion as to direction might arise. Military police and tape were often used to guide units around

by-passes or through particularly difficult or dangerous portions of the route. During a night movement guides were equipped with masked flashlights if the movement was to be conducted forward of the light line.

48. MISCELLANEOUS POINTS FROM TANK EXPERIENCE

a. Drivers must be instructed that during night operations it is safer to avoid shifting gears. Travel must be performed at a slow and even speed. In moving from a front line position to the rear at night, a disengagement of the clutch in order to shift gears will cause flames to come out of the exhaust. This is often spotted by enemy observers and soon brings down artillery fire.

b. Some gunners have a tendency to be too anxious to fire on distant targets which are moving towards them. Gunners must be taught to be patient, to wait until the target reaches suitable range, and then open up with the assurance that the target can be hit with one or two rounds.

c. Valuable use can be made of aerial photograph interpretation for tank operations if a trained interpreter is with the unit headquarters and has the equipment with which to work.

d. More instruction is needed in recording information at observation posts and in the return of correctly filled out S-2 reports. Unit S-2's, especially those of the battalion level, must make all possible use of, and forward to higher headquarters, all papers, maps, overlays, and similar items left on the field by the enemy.

e. The dissemination of information in armored units, both up and down, and laterally, should be improved.

f. Small terrain features should not be overlooked or their importance neglected in planning an attack. The enemy fights in any type of terrain, and will hold to the last, any area of commanding ground.

g. Liaison officers of tank units should be considered as staff officers and emphasis must be placed on their training as such.

h. The 75mm tank gun has been proven to be excellent for close-range direct fire on enemy machine gun nests and infantry strong points. Tanks in Italy have been invariably used whenever possible for direct fire missions.

i. Armored units should be withdrawn at night for refuelling and replenishment of ammunition. The tanks should remain in position as armored pillboxes only as a last resort of tactical necessity.

SECTION VIII : TANK DESTROYER UNITS

49. GENERAL

During the period under consideration, the operations of tank destroyer units were more varied than they had been throughout the earlier phases of the Campaign. More opportunities occurred for the employment of destroyers in their primary role of direct fire weapons against enemy armor. They were also used frequently as assault guns in close support of attacking infantry, and in this role engaged enemy observation posts, machine gun nests, strong points, and pillboxes with direct fire. The various types of action varied from immobile employment during the static period before the line of the GARIGLIANO and on the ANZIO Beachhead to highly mobile pursuit action during the Spring Offensive. In the latter stage, parts of the terrain fought over were sufficiently open for the employment of tanks, and when such conditions prevailed, the destroyers often engaged enemy tanks in considerable numbers. In Section IV, supra, the general experience in the employment of tank destroyers with the other combat arms has already been described. The following paragraphs will deal mainly with the particular problems and field experience which relate to tank destroyer battalions as individual units.

50. EMPLOYMENT OF TANK DESTROYERS AS ARTILLERY

a. General

Since the publication of Training Memorandum No. 3, in which the experience of destroyers in the artillery role to 1 February 1944 was briefly discussed (Paragraph 59, ibid.), no new or outstanding principles of employment in this role have been developed. However, certain details have come into sharper focus as a result of later experience, which are treated in the succeeding sub-paragraphs.

b. Organization of Tank Destroyer Units for Artillery Missions

Under ordinary circumstances when a destroyer battalion was committed to action with all three of its gun companies engaged in the primary antitank role, each company usually held one platoon in company reserve in rear of the main positions. In such cases it was normal to register the reserve platoon of each company as a separate four-gun battery for indirect fire. In some cases the indirect fire of these four-gun batteries was conducted by the tank destroyer battalion; in other instances the destroyer "batteries" were tied-in to a field artillery fire direction center. When a destroyer battalion was committed to action with two companies in the primary role and one company in reserve, it was found to be advantageous to divide the reserve company into two six-gun "batteries" for indirect fire. In such cases the company was capable of operating its own fire direction center, and officers and non-commissioned officers who could be spared as a result of special organization for indirect fire were employed in observation posts or as relief personnel for twenty-four hour operation of the company in the artillery role.

c. Observation Posts

In stabilized situations, the reconnaissance company of the tank destroyer battalion was extensively employed in manning observation posts for indirect fire operations. Experience demonstrated that combat seasoned tank destroyer personnel possessed of intimate knowledge of the capabilities and limitations of destroyer weapons were able to adjust the indirect fire of a company rapidly and effectively. The high velocity and flat trajectory of the 3-inch tank destroyer gun presents problems in adjustment and fire for effect that differ from those of the howitzer. For example, it was found that uneven ground in the impact area has little effect on the adjustment of plunging fire of a high-angle weapon, but a small correction in range with the 3-inch destroyer gun will often result in lost rounds when firing on terrain with only slight rolling conformation. Battalion commanders have been unanimous in their praise of the usefulness of the artillery observation aircraft for adjusting tank destroyer fire in the artillery role. Because of the relatively small burst of the

3-inch shell, it has often been difficult to sense rounds from ground observation posts, especially in terrain covered with brush or vineyards. On the ANZIO Beachhead operations were conducted on unfavorably low ground without natural features commanding observation. The only points on the ground where observation could be satisfactorily obtained were in buildings, and many of these were destroyed by enemy artillery fire. Under these circumstances artillery air observation posts were used extensively to direct the fire of tank destroyers in their secondary role. Some battalion commanders felt that these observation aircraft should be included in the organic equipment of tank destroyer battalions. A majority opinion, however, among unit commanders holds that such addition in equipment is unnecessary because divisional or corps observation aircraft can always be made available when necessary. Tank destroyer battalions habitually sent one of their own officers up with the aircraft pilot to observe and adjust fire.

d. Tank Destroyer Postions for Indirect Fire

In the selection of gun positions for indirect fire, the differences in characteristics between the 3-inch tank destroyer gun and other light artillery weapons must be fully considered if maximum effective fire is to be obtained. These principal differences include flat trajectory, relatively long range, 360° traverse, high velocity, some armor protection for the crew, and unusually large muzzle flash. Consideration must also be given to the type of mission to be assigned to the destroyers. Generally they are best used for road interdiction, harassing fires, and area fire in enemy rear areas, rather than for close support of friendly infantry. Also, the fact that the destroyers when employed as artillery are engaged in a secondary role, and must be able to abandon such missions for their primary task on short notice, must be kept in mind, especially in the matter of position selection. Positions have been normally sought well forward behind a low mask. The immediate vicinity of the guns should be free of trees so as to permit full use of the wide-angle fire that is possible with the turret-mounted gun. When time has permitted, the destroyers have been dug in to minimize damage to radiator, tracks, and other vulnerable parts as a result of

counterbattery fire. Such retaliatory fire must be expected if the positions are occupied longer than a day or two. Maximum range can be appreciably increased by digging in the rear of the vehicle in order to increase elevation of the piece. Dug-in positions should be prepared so that the destroyers can be driven into them from the rear. Fox-holes and pits for ammunition should not be dug in or near the rear approaches to the gun positions which must be kept clear at all times to permit prompt movement of the destroyer in the event that it is necessary to assume the primary antitank role. This consideration of eventual primary missions while the destroyers are engaged in the secondary role also requires that covered routes from the position be available and usable in all weather conditions whenever possible.

e. Targets and Missions

Tank destroyers have been used as artillery for a wide variety of missions. One battalion took over the sector and responsibility of the artillery of a division, and with six platoons of tanks and two batteries of 105mm self-propelled guns attached, functioned for more than a month as task force artillery in support of four antiaircraft artillery battalions which were serving in the line as infantry. All tank destroyer battalions throughout the Campaign have engaged targets varying from precision adjustment on enemy observation posts in houses to participation with all thirty-six guns in large-scale prearranged fires on area targets.

f. Fire Control and Gunnery as Artillery

In some cases the tank destroyer battalions have been tied-in to field artillery battalion fire direction centers for the conduct of fire. In other instances destroyer battalions and companies have operated their own fire direction centers. Experience has demonstrated that all battalions in this Theater are capable of assuming the role of artillery with their own fire direction centers, with certain limitations with respect to equipment and personnel. For example the Table of Organization and Equipment does not provide the destroyer battalion or company with personnel or equipment to organize and maintain the communication system required when operating as artillery. By drawing additional wire,

telephones and switchboards, and by training their own wire crews from rear-echelon personnel, the destroyer units have successfully operated the necessary communication nets when functioning as artillery. Provision for inclusion in the tables of organization of additional trained personnel for fire direction centers, including metro-message computers, horizontal and vertical control operators, will enable these units to fire both observed and unobserved missions more efficiently. Up to this time, metro-message No. 4, designed for high velocity guns, has not been used in this Theater. Almost without exception destroyer units have ignored metro data, and there can be no doubt that the accuracy of their unobserved missions has suffered from this omission.

g. Instruments and Equipment

Tank destroyers equipped with only the azimuth indicator and also those equipped with the panoramic sight have been used as artillery. Those with the panoramic sight have been found superior for normal artillery missions. Observers' instruments of greater power than the normal binoculars are necessary. A survey set such as is issued to the field artillery battalions would free the destroyer battalions from dependence on other units for the running of necessary surveys. The need of additional wire and communications equipment has been mentioned above. Improvised night-lighting devices have worked satisfactorily. Tank destroyer battalions in this Theater have always been able to handle their own ammunition supply, but this has been largely the result of additional transport being authorized over and above the Table of Equipment allowance. At present much of this additional transport is being recalled and turned in. In the future it will be likely that destroyer units engaged as reinforcing artillery may have to call on supported units to assist in supplying ammunition to their guns. It is standard operating procedure that none of the basic load of ammunition is used for artillery missions. The destroyers must be supplied at all times for eventual reversion to their primary role.

51. TANK DESTROYERS IN THEIR PRIMARY ROLE

a. General

In the later phases of the Campaign, especially during the Spring Offensive, tank destroyers have been more extensively used than in previous periods in Italy in their primary role as direct fire weapons. Although the following points from combat experience do not represent new or unusual lessons, they have been sufficiently emphasized by various commanders to warrant detailed inclusion in this study.

b. Self-Propelled vs. Towed Antitank Guns

(1) Battle experience throughout the period of the Campaign under present consideration indicates that the self-propelled antitank gun is tactically superior to the towed weapon. The chief advantages of the former weapon are mobility and armored protection for the crew while in action. Although it presents a higher silhouette and requires greater preparation for dug-in positions, the other advantages have been found to outweigh these lesser disadvantages.

(2) During the first three months of the period considered, one battalion in Italy employed towed three-inch guns. The use of these weapons was so limited that the battalion was converted at the first opportunity to the self-propelled 76mm gun motor carriage, M18. While equipped with towed guns, the battalion was primarily used for indirect fire. During operations on the Fifth Army front on the GARIGLIANO where the enemy was on the defensive in mountainous country, this battalion had practically no opportunity to engage enemy tanks. Later, after it had been transferred to the ANZIO Beachhead, it deployed its guns in normal antitank positions, but in the relatively quiet southeastern sector where it was assigned, the battalion again had little opportunity to assume an active combat role.

(3) A most conclusive lesson on the relative merits of towed and self-propelled guns can be drawn from the action of both types of units during the great German attack on the ANZIO Beachhead in February 1944. An Allied antitank regiment equipped with the equivalent weapons to the 57mm and 3-inch guns occupied forward antitank positions in the critical

sector of the attack. When the first heavy German assault with strong armored formations supported by infantry drove down the ANZIO-ALBANO Road, the forward positions of this regiment were overrun by the shear weight of the attack. Losses in antitank guns and crews were exceptionally heavy. At the same time, a battalion of self-propelled tank destroyers was engaged in the same general sector of the attack. It lost a number of destroyers, but managed to withdraw approximately half of its weapons while heavily engaged under intense small arms and artillery fire. In doing so it destroyed and disabled a large number of enemy tanks, and maintained substantially defensive positions during its withdrawal and continued to sustain the supported infantry. Conversely, no towed guns could be withdrawn from the positions overrun by the enemy attack.

(4) The armor protection afforded the crews of the self-propelled destroyers has been found to be of advantage in many instances. On numerous occasions it was found that intense artillery and mortar fire which usually accompanies a hostile attack will prevent the crews of towed guns from effectively manning their weapons during the attack. In the case of self-propelled destroyers, the armor protection has been found to overcome this problem. The entire experience on the ANZIO Beachhead led to the conclusion that the greater ease of concealment of the towed guns and their greater strategic mobility have been outweighed by other advantages of the self-propelled weapon.

c. Concealment and Camouflage

The necessity of digging-in the destroyers, of careful use of camouflage, and the enforcement of camouflage discipline have been repeatedly demonstrated throughout the Campaign. Observance of these principles was of especial importance in the ANZIO Beachhead where the situation required that guns be placed in the open to cover the approach of possible armored attacks. In a number of instances positions were selected on open ground, the M-10's being dug-in and emplaced at night, and covered with shrimp-type camouflage nets. These guns were placed well forward close behind friendly infantry, and some of them remained in position for almost two months without being discovered by the enemy. The crews were strictly

prohibited from making any movement during the day, and supplies were carried in by hand at night from a point on a nearby road to eliminate tracks leading into the positions.

d. Cover Positions and Prepared Firing Positions

Whenever the nature of the terrain permitted, the tank destroyers were concealed in depressions in the ground or behind rolling hills with firing positions dug into the reverse slopes near the crest. In such locations they were shielded from observation and could move laterally along the front without being seen to occupy any one of a number of prepared firing positions selected to repel possible armored attack. In some instances the cover positions were located in wide ditches along lateral roads, from which the destroyers could move under partial concealment, to previously dug firing positions. It was found that guns so emplaced were not discovered by the enemy and drew no concentrated artillery fire.

e. Close Liaison with the Supported Infantry

The need of close liaison and communication between the infantry and supporting tanks and tank destroyers has been discussed in Section IV, supra. The necessity for this liaison and communication is present in equal degree in static situations when the destroyers are dug-in well forward. Friendly and enemy patrol activity prevails in such situations even though no major effort many be made by either side, and it is important that the tank destroyers know what friendly patrols are operating in the immediate front, the exact location of all outposts, and above all, the infantry plans. On more than one occasion the infantry withdrew at night without notifying the closely supporting destroyer units in advance of their intentions, with the result that the destroyers had difficulty in withdrawing and were needlessly exposed. Experience demonstrated that small infantry units may often forget to keep the supporting destroyers informed on all matters of mutual importance. The lesson is that destroyer commanders must have close liaison with the infantry at all times, and the liaison officers must be constantly alert and active to keep the destroyer units informed of the plans and impending movements of the supported infantry.

f. Careful Ground Reconnaissance

Careful reconnaissance of the ground was carried out whenever possible and proved to be of greatest value in every case. In some instances it was not possible to precede the vehicles by foot reconnaissance because the destroyers moved up with the friendly infantry and assisted in taking the ground traversed. In several cases of this sort, in spite of careful study of good maps and in some instances despite aerial reconnaissance, the destroyers sank into ground that was believed to be solid and became hopelessly stuck. In such cases, some of the immobilized vehicles were recovered at night; others were lost as a result of enemy counterattack before they could be retrieved. Artillery air observation aircraft were used on a number of occasions for reconnaissance and proved to be of great value. When foot reconnaissance proved impossible company commanders and platoon leaders were flown over the area in which they were to operate. They were unanimous in attesting the value of this type of reconnaissance. Wide experience has demonstrated, however, that nothing can take the place of careful foot reconnaissance in determining routes and terrain passable for the destroyers.

g. Use of Buildings for Concealment and Protection

Frequent use has been made of substantially-built houses and buildings for concealment and protection of tank destroyers. This was especially true in the relatively flat and open country on the ANZIO Beachhead. In this area, where the Germans had good observation commanding all unwooded areas and the only alternative was well-dug-in camouflaged positions which required much time, scattered farmhouses and buildings often proved to be excellent for cover and protection. Their use was found to be a good expedient even though the buildings made good targets for hostile artillery. The large number of buildings in this area and their scattered pattern on the ground often facilitated the concealment of whole companies of destroyers, permitting the siting of one or two destroyers behind each building with interlocking fields of fire in the same general area. On one occasion six German tanks attacked along a road close to which a company of destroyers were located in concealment

behind buildings as above mentioned. The company commander called for artillery fire, which made the tanks "button up," and partially blinded them. He then moved his destroyers simultaneously from behind the scattered buildings in the vicinity and destroyed all six enemy tanks before they were aware of the destroyer threat. No losses were sustained by the destroyer company.

52. ATTACHMENT OF TANK DESTROYERS TO SMALL INFANTRY UNITS

a. Improper employment of tank destroyers in Italy has stemmed largely from the common practice of attaching portions of destroyer battalions to small infantry units. Frequently a division to which a destroyer battalion is attached has sub-attached one destroyer company to each of the three infantry regiments. Infantry regimental commanders in turn frequently would sub-attach a destroyer platoon to each of his three battalions. The infantry battalion commanders, in their turn, would often complete the chain of decentralization by dividing the attached destroyer platoons into two sections and sub-attaching these sections to each of his companies in the line. As a result of this practice, the tank destroyer battalion commander, and often his company commanders, lost control of the tactical employment of their units and weapons, and became relegated almost entirely to supply and administrative functions. Thus the services of highly trained, expert officers in their own arm were virtually wasted, and furthermore, the tactical employment of their weapons was often assumed by commanders of small infantry units who were not fully versed in the capabilities and limitations of the tank destroyers. As a result, improper missions were often assigned to the small destroyer units, and the massed and effective weight of the tank destroyer battalion became dissipated over wide sectors, when it might have been more profitably employed under the trained knowledge of its own commander.

b. It is recognized that terrain and peculiar conditions arising under tactical situations often preclude the employment of whole battalions of destroyers, and some decentralization and breakdown is necessary. However, the problem remains: How best to achieve effective teamwork and

coordination of effort between the infantry and the destroyers. A long step in this direction was the adoption of a policy throughout the Theater which does not permit, except in extreme necessity, the attachment of tank destroyer units below the level of divisions. The effect of this policy has been to place elements of tank destroyer battalions in support, but not attached directly to, small infantry units as the situation may require. Thus the destroyer battalion commander and his company commanders retain their proper measure of tactical control. This policy has resulted in fewer losses in destroyers from improper use, and in their more effective employment without lessening their support and cooperation in the team-play of the infantry-tank destroyer combination. The close support that infantry demands and is entitled to receive at all times has not been weakened, but has been strengthened.

53. MISCELLANEOUS POINTS FROM TANK DESTROYER EXPERIENCE

a. Essential Cleanliness of Vehicles

A number of destroyers were burned in action when hit by high explosive shell or by armor-piercing shot. It is to be expected that some vehicles will burn, and there is no way to eliminate that possibility. Quite a number of destroyers, however, have taken one or more hits without burning. Battalion commanders are unanimous in the opinion that the most important precaution that can be taken to lessen the hazard of fire is to keep the vehicles spotlessly clean inside and free from all excess oil on exterior parts. It is known from experience that those vehicles that were hit and did not burn were all especially clean and free from trash and excess oil. Every effort should be made to indoctrinate crews with the vital importance of vehicle cleanliness.

b. Cover for Open Destroyer Turrets

Several destroyer battalions have experimented with improvised covers for the vehicle turrets. These experiments have ranged from heavy timbers laid over the top and covered by sandbags, to light armored plates salvaged from halftracks and hinged to the turret. All commanders agreed that any top cover must be capable of being jettisoned quickly and

should not be used when the destroyers are engaging or are preparing to engage enemy tanks. Such cover provides protection from artillery air bursts and from hand grenades. Disadvantages also accrued from the use of these improvised protective turret covers. In one instance the gun crew of an M-10 was lost when the vehicle was hit and burned. The driver and assistant driver escaped through their hatches, and it is believed that the gun crew might have escaped also had it not been for the improvised cover which was on the turret. The weight of opinion of battalion commanders holds that a turret cover, fitted as an integral part of the destroyer, would be more of a hindrance than a help.

c. Need of Additional Liaison Officers

A tank destroyer battalion attached to a division normally has one company in support of each infantry regiment. Under this arrangement one liaison officer is required at division headquarters and at each regimental headquarters. Liaison must also be maintained with at least one and at times two of the battalions of each infantry regiment. The destroyer companies have been able to keep up part of the necessary liaison with the infantry battalions by using the company executive and good noncommissioned officers. This is the most that a destroyer company can provide, and in some cases the company cannot always do this, since casualties may prevent such use of essential personnel. As a result the destroyer battalion headquarters must assume the burden of liaison with the division and all three infantry regiments. The Table of Organization provides but two liaison officers for the battalion headquarters. In Italy it has often been necessary to use the commander of the headquarters company for liaison duties, and also the battalion executive. At times it has also been necessary to employ platoon leaders from the reconnaissance company for this important duty when they could be spared from their primary functions.

d. Necessity for Continual Crew Training

Experience in Italy has demonstrated the absolute necessity of continual crew training of M-10 drivers and gunners. Casualties must be expected, and when a destroyer is knocked out, members of the crew are also likely to be lost or out of action for some time. Replacement weapons

and vehicles have been much more readily available than have been replacement crews. Several battalions in Italy have conducted almost continuous drivers' and gunners' schools at battalion rear echelons. For such training vehicles have been borrowed from ordnance stock, or destroyers not in action have been used. This system of continuous training proved to be of great value and advantage, and provided combat-trained replacement crews on short notice.

SECTION IX : ANTIAIRCRAFT ARTILLERY UNITS

54. GENERAL

With respect to antiaircraft artillery, experience in the Italian Campaign during the presently considered period is logically divided into two separate phases: antiaircraft defense in the static role before the Spring Offensive, of which the actions on the ANZIO Beachhead are probably the outstanding examples in this Theater to date; and the antiaircraft defense required in a rapidly moving situation which prevailed during the offensive from the line of the GARIGLIANO to the Gothic Line. The following paragraphs outline the major lesson-experiences considered appropriate for recording in this study.

55. ANTIAIRCRAFT ARTILLERY IN THE STATIC DEFENSE ROLE -- ANZIO BEACHHEAD

a. Planning for the Assault Landings

Amphibious landings prior to those at ANZIO, and the ANZIO operation have definitely confirmed that sufficient antiaircraft artillery must be included in the landing forces to defend properly the beachhead against both high and low level bombing and against straffing attacks. Rough weather and attending unloading difficulties resulted in insufficient initial antiaircraft defense of the Beachhead. Experience has shown that antiaircraft units must be landed early in the amphibious operation to cover and protect the beaches and following units. Such early landed elements should include heavy and light antiaircraft guns, automatic weapons, smoke, balloons, and early warning facilities. When the beachhead has been extended sufficiently to prevent hostile artillery fire on port

and unloading areas, searchlight units are desirable to provide illumination of hostile aircraft, especially those at low altitudes.

b. Organization and Control

All elements of the antiaircraft defenses of the Beachhead were centralized under an Antiaircraft Artillery Brigade containing an appropriate number of groups. In this operation it was conclusively demonstrated that antiaircraft artillery weapons are most effectively and economically employed under such centralized control. The skilled coordination which can be effected by these centralizing headquarters produced the maximum results with the weapons available. Attachment of antiaircraft artillery units to divisions or lower units, especially under conditions as prevailed in the Beachhead, results not only in greater difficulty in achieving a properly coordinated defense, but also ultimately lowers the efficiency of the units from lack of proper technical and tactical supervision. Only the higher antiaircraft artillery commanders and their staffs are professionally qualified to supervise the training, operation, and tactical employment of antiaircraft units, and by control, inspection, and supervision insure that they possess satisfactory standards of technical proficiency.

c. Effectiveness of the Defense

Antiaircraft action on the ANZIO Beachhead proved beyond doubt that a properly coordinated antiaircraft defense conducted with a sufficient number of latest-type weapons and adequate ammunition can defeat aerial attacks of great severity and frequency. Such attacks were experienced at ANZIO. It is well established that the German Air Force employed to a maximum the equipment and resources available in a determined effort to dislodge the Beachhead forces. After the SCR 584 sets were received in the area, antiaircraft fire consistently broke up his formations, turned them from their objectives, and caused hostile planes to drop their bombs wide of their targets. This effective fire also inflicted heavy losses among enemy aircraft. Every evading measure and decoy device known was used by the German Air Force over the Beachhead without success, and German artillery commanding the area even laid down fire on our antiaircraft

artillery positions during air raids. It can be officially stated without reservation that the antiaircraft defense that was established and maintained was a major factor in holding the beachhead, especially in the early critical period.

d. Employment of Radar

(1) Equipment. Gun battalions which landed at ANZIO were initially equipped with the SCR 268 as the gun-laying radar. The enemy soon employed radar counter-measures including "window" dropped from aircraft, ground jamming stations, and "spoofing." Against these measures the SCR 268 was useless. Shortly after the landings, sufficient SCR 584 radars arrived in this Theater to equip all gun battalions. These were rushed to the Beachhead, where after considerable adjustment and removal of manufacturing deficiencies, they were placed in operation. To a large degree the training of operators and unit maintenance personnel on these sets was effected during combat. The sets proved to be entirely adequate, and German counter-measures were ineffective. It should be noted that in this instance of emergency, immediate movement of the new and untested sets to the Beachhead was justified by the critical situation then prevailing. However, whenever tactical situations permit, new sets of such equipment should be thoroughly checked and manufacturing faults corrected and adjusted before issue to front line units. Similarly, training of the operating and maintenance personnel should be completed before the units are equipped.

(2) Long Range Early Warning. Long range early warning is essential to an adequate antiaircraft artillery defense. On the Beachhead, its importance was of vital necessity. Difficulty was experienced, because of excessive angular travel, in picking up targets with the SCR 584 when they were closer than 10,000 yards. Sufficient long range early warning facilities should be made available to enable antiaircraft artillery radars to initiate search for targets while the latter are still at least 20,000 yards from their objectives. It is also important that good communications exist between the Sector Operations Rooms (Air Force) and the Antiaircraft Artillery Operations Rooms. Radio alone was found to be inadequate.

Two or three parallel telephone lines laid over different routes were required to maintain proper communication because of line damage sustained during bombing raids and periods of hostile artillery fire. The broadcast frequency of long range warning should be disseminated to other troops that would benefit therefrom. An example is the benefit to artillery air observation aircraft which may receive such warning and take refuge from hostile aircraft before they attack.

e. 90mm Antiaircraft Gun Defense

A sufficient number of gun batteries to insure 360° coverage should be assigned and limited to primary searching and engaging sectors. Others may also be assigned primary searching and engaging sectors, and some should be left free to conduct 360° search and to engage any selected targets. At ANZIO it was found that the best results were obtained with four batteries (radars) assigned to primary sectors, six batteries assigned to primary and secondary sectors, and two batteries left free for all-around search and engagement. In April a fourth gun battalion was added to the defense. Without such definite and fixed assignments, all or most of the antiaircraft fire may be drawn into one sector by means of a hostile feint attack, and then when the defenses are so engaged, the enemy may press his main attack through a different sector. Such a plan for assigning sectors and definite missions for each battery also provides for adequate defense against simultaneous attacks from several directions. Although the assignment of primary and secondary sectors is not a new technique, the soundness of this procedure was conclusively demonstrated at ANZIO.

f. Fighter -- Antiaircraft Artillery Defense

The ANZIO Beachhead was designated as an Inner Artillery Zone by night and as a Gun Defended Area by day. Subject to conditions of weather, landing strip conditions, and other commitments, air fighter cover was provided by day. The Gun Defended Area Regulations insured coordination of friendly fighters and antiaircraft artillery during the daylight hours, and placed primary responsibility for the antiaircraft defense on fighter cover when present, but did not seriously restrict antiaircraft artillery fire when friendly fighters were not available. During the hours of

darkness, primary responsibility passed to the antiaircraft artillery, and night-fighters furnished support by operations outside the limits of the artillery defended area. These arrangements permitted maximum effectiveness of both fighters and antiaircraft artillery throughout the operations on the Beachhead.

g. 40mm Antiaircraft Gun Defense

Although the 90mm gun is capable of conducting accurate "unseen" fire at enemy targets by means of the SCR 584 radar, the 40mm gun has no such means at present. At night, or under conditions that precluded visual observation, 40mm fire was conducted by means of barrages. The effectiveness of the barrage as a deterrant to attacking aircraft had been recognized prior to the ANZIO operation, but because of the lack of destructive effect and the high ammunition expenditure, it was not seriously accepted fully by all U.S. antiaircraft artillery commanders. At ANZIO light antiaircraft barrages at "unseen" targets proved highly successful in forcing attacking formations of aircraft to turn away from their objectives or to fly at altitudes above the barrages where they became suitable heavy gun targets. Although still to be used only when observed fire is impossible, the effectiveness of barrage fire has been clearly demonstrated.

h. Antiaircraft Automatic Weapons Barrages at ANZIO

Seven major automatic weapons barrages were used in the defense of the ANZIO Beachhead. These included: The General Barrage, the ANZIO Barrage, the NETTUNO Barrage, the ANZIO-NETTUNO Barrage, the NETTUNO Airfield Barrage, the Airfield Barrage, and the Forward Area Barrage. Each of these automatic weapons barrages consisted of six rounds per gun at three seconds' interval at 50° elevation. For the forward area barrages guns were pointed to fire inward over the area occupied by the fire unit. The first round was fired from this initial position, and each successive round at one handwheel turn to the right. Time interval was effected by making two handwheel turns to the right and then reversing one handwheel turn to the left. Initial directions were assigned each gun by platoon commanders. Barrages were generally fired on the order of the

Antiaircraft Artillery Operations Room. Forward area barrages were fired only on the order of the Brigade Commander or the Antiaircraft Defense Commander, ANZIO.

i. Counterbattery Fire in Support of Antiaircraft Artillery

Before and during enemy raids on the ANZIO Beachhead, German artillery commanding the area often supported their air attack by firing on our antiaircraft artillery positions. To neutralize this hostile fire, arrangements were completed whereby on such occasions friendly field artillery conducted counterbattery fire at the request of the Antiaircraft Defense Commander.

i. Equipment

Adequate supplies of equipment, including gun and radar power plants, balloons, hydrogen, and other materiel must be made available for adequate conduct of antiaircraft defense. Shortage of Theater spare parts for the balloons at ANZIO necessitated withdrawal of spare parts from balloons at PALERMO, Sicily, to such an extent that the balloon defenses at the latter port became inoperative for a short period. The necessary state of readiness of antiaircraft defenses require that power plants for guns and radar be in operation almost constantly. Difficulty was experienced at ANZIO in the supply of necessary parts for these power plants.

56. THE MOBILE CAMPAIGN FROM THE GARIGLIANO TO THE GOTHIC LINE

a. Centralized Control

With the launching of the Spring Offensive, antiaircraft artillery units assumed a mobile role in the advance from the GARIGLIANO to the Gothic Line. In this operation, centralized control by Antiaircraft Artillery Brigades again proved essential for economy of weapons and for efficient tactical supervision. Where situations properly require that antiaircraft artillery elements be placed in direct support of other ground force units, the continued control by antiaircraft artillery commanders is still essential. In this connection the Antiaircraft Artillery Commander, Fifth Army reported:

> . . .When necessary in mobile situations to decentralize operational control, antiaircraft artillery units can be placed by brigade or group commanders in "direct support" of other mobile troop units, and the same result may be achieved as though they had been attached. The advantage is that the higher antiaircraft artillery commander, by retaining command, can relinquish or resume control at any time that the situation demands. . .

Similarly the Commanding General, 35th Antiaircraft Artillery Brigade observed in a report of operations that

> . . .experience has shown that in practically all cases where an antiaircraft artillery battalion is attached to a division there is a noticeable decline in the discipline, training, and general effectiveness of such battalions. When these battalions revert to antiaircraft artillery command, considerable time is required to bring them again up to the necessary standards. The practice of attaching one battalion of automatic weapons to a division is not necessarily sound. On occasion this will result in an excess of antiaircraft artillery with the division, and at other times additional antiaircraft units may be required. From the viewpoint of cooperation of units working in close proximity, permanent attachment to divisions is desirable. From the viewpoint of technical training and supervision, establishment of a well-coordinated Corps defense and maximum flexibility, attachment to divisions is not desirable. . .

b. Early Warning and the Operations Rooms in the Mobile Role

With the breakthrough on the GARIGLIANO front, provision for early warning of all units became difficult. Two reasons for this difficulty were apparent. First was the slow movement of the Sector Operations Room (Air Force) and its radars; second was poor communications during mobile operations between the Sector Operations Room (Air Force) and the Antiaircraft Artillery Operations Room. The Air Force Fighter Wing solved the first of these problems by providing three operations rooms permitting one to be on the move while the other two remained operational. The second difficulty was not so easily solved. During movements, wire communication was impossible, and lack of experience, clear frequencies, and mountainous terrain rendered radio communication far from satisfactory. Two clear frequencies were assigned each sector operations room, one for transmission and the other for reception to and from the Antiaircraft Artillery Operations Rooms. More attention was given to the proper and suitable physical locations of the Antiaircraft Artillery Operations Rooms. Difficulty was also experienced with transmission within the antiaircraft

artillery net. This was often occasioned by weak transmitting power of the SCR 543 and the lack of dependability of the SCR 593 receiving sets. Finally by careful siting of radios, and with more operational experience under the conditions prevailing, communications were improved and became generally satisfactory.

57. GENERAL CONCLUSIONS FROM ANTIAIRCRAFT ARTILLERY EXPERIENCE

a. The defensive ability of the antiaircraft artillery at ANZIO proved itself beyond any doubt. Against an enemy air force whose strength is no greater than the Germans had available for use against the beachhead the antiaircraft artillery, when given sufficient modern weapons of all types, ample ammunition, centralized control, and adequate long range early warning, can be expected properly to defend a beachhead or any vital area regardless of the experience or determination of the enemy air force.

b. Antiaircraft units should remain under centralized antiaircraft artillery command. Attachments to divisions should be exceptional. Automatic weapons battalions may be placed in direct support of ground force units when engaged in a moving situation, but command of these units should remain under the appropriate antiaircraft artillery Brigade or Group Commander.

c. When planning for an amphibious operation due consideration should be given to insure that sufficient antiaircraft artillery is made available on the beach at the earliest practicable time. It should be borne in mind by all planners that of all the antiaircraft artillery weapons only heavy guns equipped with radar are capable of conducting accurate fire at night or on "unseen" targets. Hence, heavy guns with their radars, must be in position to fire by dusk of the first night.

d. Adequate long range warning must be made available and gun radars assigned sectors of search. It was found over the ANZIO Beachhead that during periods of intense aerial activity more than 50% of the enemy aircraft entering the defended area were first picked up by antiaircraft radars. Unless definite sectors are assigned radars may be lured away from

normal fronts and permit the unobserved entry of other enemy aircraft.

e. Until such time as means are developed to permit light antiaircraft guns to deliver aimed fire at "unseen" targets, barrage fire must be used. The principles of barrage fire have been taught to all antiaircraft artillery units since the opening of this Theater of Operations. It was, however, always considered a means to be used only as a last resort because of the excessive expenditure of ammunition with limited destructive effect. Action at ANZIO proved that barrage fire is feasible and that satisfactory results can be obtained though better means of fire control should be devised.

f. The rapid northward movement of the Fifth Army demonstrated the difficulties to be encountered by the Sector Operations Rooms and Antiaircraft Artillery Operations Rooms in a moving situation. Often radio will be the only available communication. Definite clear frequencies must be assigned, radio operators well trained, and Antiaircraft Artillery Operations Rooms established at terrain features insuring reception from the Sector Operations Room. Antiaircraft Commanders must insure that transmission within the antiaircraft artillery net can be satisfactorily performed using relay stations if direct communication is not possible.

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NOTES AND MEMORANDA

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