RESTRICTED

FIRST UNITED STATES ARMY

Report of Operations

1 August 1944 * 22 February 1945

ANNEXES

4 · 5 · 6 · 7 · 8

FIRST UNITED STATES ARMY

Report of Operations

1 August 1944 ★ 22 February 1945

ANNEXES

4 · 5 · 6 · 7 · 8

ANNEX NO. 4

ARTILLERY

SECTION REPORT

Annex 4

Table of Contents

I. Introduction

The field artillery and tank destroyers with the First U. S. Army exercised a strong influence on the course of the historic battles fought in Western Europe between 1 August 1944 and 22 February 1945. The graphic words of one captured German officer—merely one among many such statements—testify to the battle role of modern artillery more effectively than a volume of facts and figures "* * * We could see the American planes in time to dive into a trench. We had a chance to hit American tanks with our 88's. But when our positions were smothered, without warning, by an American artillery concentration—then, not even the birds or rabbits could escape. It caused most of our casualties, and the shell-fragment wounds were twice as deadly as bullet wounds." An explanation of this power is not hard to find. Weapon for weapon, our American artillery matériel is the best in the world and was provided in adequate amount. Current doctrine, as developed at the Field Artillery School and improved upon in the theaters, has everywhere proven sound in battle and has been applied with increasing effectiveness; and the confidence in and awareness of both higher commanders and the supported infantrymen in the flexibility and decisive power of their artillery has grown steadily with each passing day. The frequent shortage of artillery ammunition stands, alone, as a limiting factor in the artillery support rendered during the operations covered by this report.

The story of the artillery in battle cannot be told by itself, and no such effort is here made. The story of the artillery in battle is inseparable from the story of the battle itself. This annex is limited, therefore, to (1) the highlights of field artillery and tank destroyer action, intelligence, and supply, (2) the critical analysis of certain aspects of artillery doctrine and special operational techniques and procedures, and (3) the lessons learned in combat. The length of the campaign covered by this report and the varying types of terrain, weather, and resistance encountered combine to justify the confident and conclusive statements that appear throughout this annex.

II. Organization and Employment of the Artillery with the Army for Combat

A. GENERAL

From an operational viewpoint, the foremost duty of the army artillery officer is to be closely abreast of the tactical situation at all times so as to be able to make timely and sound recommendations to the army commander concerning the organization and employment of the artillery with the army for combat. Set forth hereinafter are certain of the considerations that influenced such decisions between 1 August 1944 and 22 February 1945.

First, last, and always, the organization for combat and employment of the artillery with the army was invariably dependent upon 'the situation," that is, the availability of means; the mission of the army as a whole and that of each of the corps; the nature of the terrain and scheme of maneuver; the season and the weather; the location, status of maintenance, morale, and general readiness for continued combat of the available artillery; the relative size of the corps sectors; the status of ammunition stocks; the enemy capabilities and probable intentions—to mention only a few of the factors bearing continuously on "the situation." It should be noted that these are the same factors that influence the organization for combat and the employment of the corps within the army, the divisions within the corps, and the regiments within the divisions. Thus is emphasized the statement that "the story of the artillery in battle is inseparable from the story of the battle itself." Since the story of the battle is not the purpose of this annex, only a few of the above-mentioned factors are discussed. The fact that others are not discussed should not be construed to mean that they are unimportant; in many instances, considerations not mentioned here influenced decisions to a major degree.

B. ARTILLERY AVAILABLE

Although there were variations from time to time, approximately the following field artillery and tank destroyer units, exclusive of organic divisional artillery, were assigned to and available for operations with the First U. S. Army during this period: 32d FA Brigade Hq and Hq Btry, 11 FA Group Hq and Hq Btries, 5 Bns 105-mm Hows (Towed), 3 Bns 105-mm Hows (SP), 13 Bns 155-mm Hows, 4 Bns 4.5″ Guns, 7 Bns 155-mm Guns (M1), 3 Bns 155-mm Guns (SP), 4 Bns 8″ Hows, 4 Bns 240-mm Hows, 2 Bns 8″ Guns, 1 FA Obsn Bn in addition to the organic observation battalion with each corps, 3 TD Group Hq and Hq Cos, 3 TD Bns (3″ towed), 6 TD Bns (M10), 2 TD Bns (M18), and 2 TD Bns (M36). In view of the relative impotence of the German artillery (IV below) and his continuing shortage of ammunition, this imposing array of field artillery and tank destroyer units was more than adequate to accomplish all assigned missions.

C. CORPS ARTILLERY

Except for the 32d FA Brigade (to which 2 group headquarters, 4 battalions of 240-mm howitzers, and 2 battalions of 8-inch guns were normally attached) and the "spare" observation battalion, all of the above-listed field artillery and tank destroyer units were habitually attached to the corps. Of the units attached to the corps—

a. The following units were considered "normal attachments": 3 FA Group Hq & Hq Btries, 4 Bns 155-mm Hows, 2 Bns 155-mm Guns (M1), 1 Bn 8″ Hows, and 1 Bn 4.5″ Guns. Only in unusual circumstances were any of these "normal attachments" detached from the corps; moreover, it was more or less understood that, when the tactical situation required the detachment of one or more of the "normal attachments," it was a temporary expedient only and that the detached units would be reattached at the earliest opportunity. As a result, the corps developed a marked sense of responsibility for and interest in the "normally attached" units, which made for improved operational efficiency, administration, and supply.

b. The remaining field artillery battalions (5 Bns 105-mm Hows, 3 Bns 105-mm Hows (SP), 1 Bn 155-mm How, 1 Bn 4.5″ Guns, 1 Bn 155-mm Guns (M1), 3 Bns 155-mm Guns (SP)) were available for attachment to the corps so as best to further the current tactical plan.

c. The tank destroyer battalions were habitually attached to divisions by the corps, whereas tank destroyer groups were retained under corps control. The same principle of "normal attachment" was carried out to the fullest possible extent with regard to the tank destroyer—division association. Divisions habitually were assigned to, and from, and within the First U. S. Army with their "normally attached" tank destroyer battalion. M36 tank destroyer battalions invariably were attached to armored divisions and the number of tank destroyer battalions usually permitted one "spare" battalion in each corps above and beyond the primary requirement of one per division. (See VIII below, for a discussion of the employment and control of tank destroyers.)

The five battalions of 105-mm howitzers were very useful, not only for the reinforcement of the corps making the main effort but also for such special purposes as manning rocket launchers or captured equipment and for experimental employment in one way or another.

For the most part, corps artillery commanders employed the armored (SP) battalions, both 105-mm and 155-mm, with the armored divisions. This type af artillery rendered outstanding service and was much sought after by subordinate artillery commanders. (See C, IX below, for a discussion of the employment of the 155-mm Gun (SP).)

The additional 155-mm howitzer, 4.5-inch gun, and 155-mm gun battalions were available at all times to "add their weight" where needed most. Moreover, when gun tubes required replacement, the extra units were useful as replacement battalions. These extra battalions served in a similar capacity when units were withdrawn for type "A" ordnance inspections.

D. 32D FA BRIGADE

The 32d FA Brigade proved to be a most flexible and useful organization, both operationally and administratively. The bulk of the heavy artillery (4 Bns 240-mm Hows and 2

Bns 8-inch Guns) was normally attached to the 32d FA Brigade which was itself attached from time to time to one of the corps. Given good communications and reasonable sized corps sectors the optimum employment of the 32d FA Brigade was believed to be to retain it under army control and to locate it centrally behind and between the two corps carrying the main weight of the action. There were several situations, however, when the 32d FA Brigade remained attached to corps; from time to time elements were also detached from brigade control. When under army control, the brigade commander was generally given broad (frequently verbal) missions only by the army artillery officer. Thereafter, the brigade commander received his operational guidance, so to speak, from the supported corps by maintaining close and direct liaison. Except for the problem of positions areas, which was somewhat troublesome at times, the above concept of operations proved sound in combat.

III. Highlights of Field Artillery Operations

A. CAMPAIGN OF NORTHERN FRANCE

1. Pursuit

This campaign was one of continuous pursuit and exploitation of the Cobra breakthrough at St. Lo. Except as noted in the three succeeding paragraphs, the rapid separate advance of the corps offered little opportunity for the massed employment of artillery. In all cases, the organic and attached artillery of the spearhead armored and follow-up infantry divisions proved sufficient to break the light enemy resistance encountered. The bulk of the corps and army artillery advanced by bounds to successive positions of readiness, but was seldom within range of the enemy.

2. Mortain Counterattack

By early August, the initial impetus of our break-through had slowed sufficiently to permit the bulk of the artillery with the army either to be in firing positions or in assembly areas within supporting range of the front. Consequently, when the German counterattack struck at Mortain on the 7th of August, little time was lost in bringing the full weight of the artillery with each of the three corps, as well as that of the 32d FA Brigade, effectively to bear in the battle area. In the north, the V Corps Artillery directed its fires so as to prevent the shifting of troops southward in support of the counterattack. Meanwhile, the XIX Corps Artillery and the 32d FA Brigade to the north and west were firing directly in support of the 30th Division Artillery, which had been heavily reinforced by the attachment from VII Corps of two battalions of 155-mm guns and one battalion of 4.5-inch guns. The massed weight of these fires was successful not only in checking the initial German attack, but also at a later time in inflicting heavy casualties on the Germans attempting to withdraw from their self-made trap. An innovation in field artillery technique was employed by the 30th Division Artillery during the action at Mortain. Base ejection smoke shells were loaded with medical supplies and fired successfully into the area of a surrounded infantry battalion.

3. The Falaise—Argentan—Chambois Pocket

This operation was the sequel to the German withdrawal from Mortain and resulted in the entrapment of a sizable portion of the German Seventh Army west of the line Falaise–Argentan. For a period of almost a week, while the British and Canadians were fighting south to join up with First Army, artillery and air power combined virtually to seal with fire the steadily narrowing escape routes. All roads leading east from the area were kept under constant fire both day and night. As a result, and despite the delay of physically completing their encirclement, only a small portion of the enemy managed to extricate themselves.

4. Mantes–Gassicourt Bridgehead

The attack of the XV Corps to secure a bridgehead over the Seine River north of Paris afforded the third opportunity for the employment of massed artillery fire. At the time it came under First Army control, the XV Corps Artillery was astride the river and was supporting the enlargement of the bridgehead. Prior to the completion of this part of the operation, however, the XV Corps sector was assigned to the XIX Corps, whereupon the XIX Corps Artillery was moved into the bridgehead to relieve the XV Corps Artillery. While the relief of the XV Corps was

under way, the corps artillery of both corps plus attached elements of the 32d FA Brigade were massed on an extremely narrow front. As a result, the XIX Corps attack and the expansion of the bridgehead moved rapidly and the well-neutralized enemy defense line was overrun with little difficulty.

5. *Push to Siegfried Line*

The initial attack of the Siegfried Line did not occasion the massed employment of artillery, since many of the defenses were unmanned and the resistance was weak. Division artillery with attachments, particularly the 155-mm gun (SP), were more than adequate either to destroy the strong points encountered or to dislodge the enemy from the fortifications. However, as the momentum of our attack slackened, enemy resistance, artillery as well as infantry, increased materially with the result that the rapid resumption of more normal activity by corps and army artillery, under centralized control, soon followed.

B. ARTILLERY IN A SERVICE ROLE

During the period from 20 August to 31 October 1944, the army artillery and certain battalions then attached to corps were immobilized and used to supplement the supply, transportation, and communication facilities of the First Army and the several corps. The army commander charged the commanding officer, 32d FA Brigade, with this mission, which was implemented by (a) reorganizing immobilized field artillery units into provisional trucking battalions, (b) organizing a provisional signal company to assist the Army Signal Officer in recovering cable in rear areas, (c) supplementing the overstrained line of communications by the loan of officer couriers and air OP sections to the army ordnance officer, quartermaster and surgeon, and (d) furnishing officers and enlisted men for use on guard and labor (mostly ammunition handling) details.

Of the above-listed activities, the trucking activities were possibly the most impressive, in terms of results accomplished. On 10 September a total of 18 field artillery battalions were hauling supplies for the First Army, with approximately 450 heavy (2½-ton, or better) trucks and over 200 light (¾-ton) trucks so engaged. Although the number of available trucks fell off sharply during the last half of the month, when numerous battalions were returned to action, approximately 17,200 tons of supplies were hauled some 16,700 miles during September 1944.

During the last week of September, the commanding officer of the 422d FA Group took over the trucking activities, with a total of six field artillery battalions. Further trucks were withdrawn during the month of October as additional battalions were recommitted to action.

The total tonnage for the entire period from 20 August to 31 October amounted to 28,000 tons hauled a distance of approximately 32,000 miles.

The provisional signal company, during the period 27 August to 1 October 1944, retrieved a total of 2,873 reels (718 miles of spiral four cable) and 1,547 poles.

C. CAMPAIGN OF GERMANY

1. *Reduction of Aachen*

Prior to the 2d of October attack to complete the encirclement of the town of Aachen, the artillery with the VII and XIX Corps were regrouped and attached, in part, to the divisions making the main efforts. The heavy artillery with the 32d FA Brigade had the mis-

sion of reinforcing the fires of the XIX Corps with long-range fires on communication and supply centers. The coordination effected in this operation involved a carefully prepared counterflak program, a counterbattery and long-range interdiction preparation prior to the attack, planned support fires following H-hour, and a plan of close liaison between corps and divisions in establishing successive "no fire" lines.

The rapid action of the artillery in neutralizing enemy artillery positions and producing effective close support fires on enemy strong points were among the major contributing factors in the final closing of the Aachen salient on 16 October by the 1st and 30th Infantry Divisions. The accurate location of enemy gun positions was attributed to the excellent performance of well-placed sound bases from the 8th and 13th FA Observation Battalions.

Simultaneously with the closing of the Aachen salient, the 1st Infantry Division, supported by artillery units from both the VII and XIX Corps, launched an attack to reduce resistance within the town of Aachen itself. Self-propelled tank destroyers and 155-mm guns were employed most effectively in the ensuing street fighting. Following the expiration of the ultimatum, 12 battalions of light, medium, and heavy artillery fired a total of 169 tons of ammunition into the city during the afternoon of 11 October. Active enemy resistance finally ceased on the 21st of October; meanwhile, the city had been pulverized by division and corps artillery.

2. *Battle of the Hurtgen Forest*

The battle of the Hurtgen Forest was long, slow, and tedious, and one in which the normal capabilities of artillery were severely restricted both by terrain and by inclement weather. In turn, the 9th, 28th, 4th, and 8th Infantry Division Artillery and the 5th Armored Division Artillery were in direct support of attacks by each of these divisions. Corps artillery of both the V and VII Corps also participated. For the most part, the "Indian fighting" in the dense tree growth prohibited rendering effective close supporting fires for the advancing infantry. Although effective in counterbattery action, in the destruction of certain defended localities, in hampering the movement of reserves, and in breaking up such counterattacks as could be detected before they were launched, the artillery was generally incapable of assisting effectively and continuously the immediate advance of the infantry. From an artillery viewpoint, the battle of the Hurtgen Forest stands unique among the operations in Western Europe, to date, in this regard.

3. *Drive to the Roer River*

While the struggle in the Hurtgen Forest continued, the VII Corps launched a major attack, heavily supported by air and artillery, to drive east from Aachen to the Roer River. The artillery with the VII Corps, in coordination with the XIX Corps Artillery (Ninth Army) to the north, opened the attack in the area northeast of Aachen with a counterflak preparation designed to protect the supporting medium and heavy bombers. The unusual effectiveness of this counterflak preparation is evidenced by the fact that air force commanders stated later that the losses were only a fraction of those expected. The counterbattery preparation for the attack completely silenced the opposing artillery. Ten minutes preceding the infantry jump-off approximately 1,800 rounds of 4.5-inch rocket fire were used to saturate a heavily defended strong point. The artillery with the attacking divisions were particularly active in providing close support fires, and local enemy counterattacks were repulsed in every case before they reached our own infantry. Advances were rapid behind continuous artillery support until the objectives were reached.

D. THE GERMAN COUNTEROFFENSIVE AND THE DRIVE TO THE ROER RIVER

1. The German Counteroffensive

On the 15th of December, the dispositions of the artillery with the army varied widely in the several corps sectors. To the north the artillery with the VII Corps had just completed a series of forward displacements in support of the corps drive from Aachen to the Roer River. Control of the corps artillery was centralized with only nominal attachments to the divisions. The sector was narrow and fire possibilities permitted the massing of almost the entire corps artillery at any point along the front. In the center, the artillery with the V Corps was also disposed offensively. The attack of the corps to capture the Roer River dams was in its fourth day; the advance through the Hurtgen Forest was slow; and extremely heavy artillery fires were counted upon to keep it moving. The corps artillery was located to the north and in the center of the corps sector with practically all of its fires capable of being converged on the area of the dams. In the south, the 99th Division Artillery supported a defensive sector. On the right flank of the First Army, the extended front of the VIII Corps could not be reinforced along its entire length by the artillery available to the corps. A mixed group had been attached to the 4th Infantry Division Artillery to support its sector at the southern army boundary. The remainder of the corps artillery had been kept to the north, prepared to defend the penetration of the Siegfried Line which VIII Corps held in that area. The 32d FA Brigade, under army control, was located in the VII Corps sector, with a portion of the brigade sited so as to support the V Corps attack.

The enemy attack against the VIII Corps front on the 16th of December overran forward OPs and sound bases, thereby depriving the corps artillery of most of its observation and counterbattery facilities. This was a particularly severe loss since weather was not favorable to Air OP operations. Despite these reverses the artillery continued extremely active, and succeeded in checking, if only temporarily, the initial impetus of the attack along the most of the front. In the north, enemy pressure from front and infiltration from both flanks forced the forward positions of the 106th Division Artillery to be abandoned with resultant heavy loss of personnel and matériel. Corps artillery started displacing to prepared positions in the rear as forward units came under direct enemy attack. South of Monschau, artillery observers reported alarming indications of pending enemy action, and adjusted fires against this build-up. Although the artillery was plentiful in the north, and the threat in the south was severe, it was decided that no major shift of artillery could be made until the enemy intentions in the Monschau and Julich areas had been clarified.

The morning of the 17th broke clear with unlimited visibility along the entire army front; Air OPs, Arty/R, and ground observers were confronted with so many targets that only the most lucrative could be attacked. Ammunition rationing was canceled as artillery fires reached a peak; despite this, the enemy elected to accept his losses and pressed his day-old attacks while launching new ones. In the southern portion of the VIII Corps sector, fighter bombers and artillery fire caught the panzer columns and partially dispersed them before they could press home the attack. In the center, the 28th Division Artillery continued effective support while executing a series of successful withdrawals, most of which was in the face of enemy small-arms fire. The VIII Corps Artillery was forced to withdraw en masse; by night most of the units had closed in new firing positions and had reestablished communication with the Corps FDC. In the V Corps sector, as the 99th Division Artillery fought its way back through infiltrating enemy infantry, the 2d Division Artil-

lery shifted half of its fires almost 3,200 mils covering the withdrawal and checking the enemy advances; it then withdrew in good order. By late evening both units were back in action.

Of all the artillery operations covered by this report, the action centering in the Monschau sector on the 17th–18th December best illustrates the decisive effect of massed artillery fires. Here a thin cavalry screen with adequate artillery support stopped an all-out German armored and infantry attack, and caused the German command to alter the plan of attack in this area. The action started at 0500 hours with a two hour counterpreparation by the 62nd Armored Field Artillery Battalion, which delayed the German attack for more than four hours. The first and second attacks came in rapid succession shortly after daylight. Neither was successful. By this time the fires of four battalions of 105-mm howitzers, six battalions of 155-mm howitzers, one battalion of 4.5-inch guns, two battalions of 155-guns, two battalions of 240-mm howitzers, and one battery of 8-inch guns had been added to those of the armored battalion. Although the third attack was made in much greater strength, it was so decimated by artillery fire that only one battalion of infantry succeeded in breaching the cavalry line; it was mopped up in short order.

Bad weather, which was due to last for the next five days, set in on Monday, December 18th. This loss of observation was serious but, in partial compensation therefor, the newly introduced Pozit fuze was released for operational use and served to bolster the effectiveness of artillery fires. (See D, IX below.)

Although the situation which confronted the 7th Armored Division as it moved into battle at St. Vith was critical, from an artillery viewpoint it could have been worse. Four field artillery battalions were still in action in that general area. However, two groups of reinforcing artillery, which had been made available by the VIII Corps, were contacted temporarily but could not be controlled. Nevertheless, the 7th Armored Division Artillery was not without corps artillery support. Heavy massed TOTs from the VIII Corps Artillery were placed on enemy armored columns between Schonberg and St. Vith, slowing the enemy advance sufficiently to allow the 7th Armored Division to win the race to St. Vith. In the center of the VIII Corps sector, centralized control of the 28th Division Artillery became impracticable, and the battalions withdrew with their respective combat teams. North of the penetration above St. Vith, the 30th Division Artillery "dropped trails" and opened fire immediately upon arrival from the Ninth U. S. Army. From positions at Elsenborn, the defensive fires of the artillery from the 1st, 2d and 99th Infantry Divisions broke up three major enemy attacks while their supported infantry counterattacked and dug-in for a stable defense. Armed with 4.5-inch rockets, the 18th Field Artillery Battalion placed defensive concentrations on Rohren dispersing enemy concentrations in the town. The shift in the V–VII Corps boundary made the VII Corps Artillery responsible for supporting the 8th and 78th Infantry Division sectors. However, with positions areas in its sector at a premium, the V Corps Artillery elected not to displace its artillery for the time being from the new VII Corps sector.

By December 19th, resistance in the VIII Corps center was dissolving rapidly and, although no break-through in force was as yet apparent, separate penetrations menaced artillery position areas from St. Vith to Bastogne. The VIII Corps Artillery Commander was forced to select one of two courses of action—either to pull into the uncertain St. Vith salient or to drop back west of the Arlon-Bastogne highway and seek position areas from which to support a future corps front. Unfortunately, the magnificent stand which the 7th Armored Division was to make at St. Vith could not be foreseen. On the 19th and 20th the westward withdrawal was started (more or less independently by each unit) with hopes that a rendezvous could be made to the rear; however, continued enemy pressure prevented the fulfillment of this plan. The 7th Armored Division Artillery Commander assumed control of all artillery in the St. Vith area and organized it to support the conglomeration of units defending the town. Artillery fires were shifted and massed around the perimeter of the defense. Only those targets

which constituted a direct threat were engaged, since the ammunition shortage was expected to become acute. Along the Malmedy–Stavelot line, the 30th Division Artillery laid down heavy Pozit TOTs to hold Malmedy and to clear Stavelot. Around Elsenborn enemy action had compressed in an area measuring only 10 kilometers from east to west, and 7 kilometers from north to south, 16 battalions of artillery with sectors of responsibility running from north of Monschau to just east of Malmedy. Further dispersion of units was impossible; to the north and west were swamps and dense woods; to the south and east was the enemy. The confused criss-cross pattern of fires was clarified by minor adjustments in position areas and the assignment of zones of defense. All fires in the sector were coordinated by the commander of the 2d Division Artillery, to which the counterbattery section of the V Corps Artillery had been attached.

During the period from the 21st to the 24th of December, artillery operations in the V Corps sector gradually settled down to routine defensive fires with increased activity at irregular intervals as the enemy sought to find a weak spot in the line. The XVIII Airborne Corps became operational in the First Army on 20 December, and the artillery with the corps was active initially on six widely separated, nonsupporting fronts. Although operational, the corps FDC exercised no direct control over the negligible amount of artillery available to it. Two of these fronts were in the 30th Infantry Division sector. To the east, artillery fires were purely defensive, whereas in the west, artillery fires aided in the capture of Stoumont and were instrumental in trapping a strong enemy armored force awaiting gasoline resupply at La Gleize. A third center of activity was just south of the Ambleve River where elements of the 82d Airborne Division Artillery were engaged lightly as their combat teams drove back infiltrating enemy patrols. On the fourth front—the St. Vith salient—enemy attacks were turned back at heavy cost to the enemy as the artillery within the salient made good use of every round of the dwindling ammunition supply. Artillery previously sited for the defense of St. Vith was concentrated against it when the town fell, to prevent the enemy from making good use of this important road center. By the morning of the 22d there were less than 20 rounds of ammunition per piece. Fortunately the 82d Airborne Division, in making contact, had opened the supply roads and the long awaited ammunition trains arrived. The 5,000 rounds of 105-mm howitzer ammunition received was little enough when divided among the weapons covering the multipoints of attack, but it brought the artillery to life again in time to disperse the main effort of the attackers. The next day a difficult daylight withdrawal was made possible by the continuous fire of the artillery as it displaced by echelon. The fifth area of operation was to the south of Vielsalm as the enemy shifted armor west and attacked north along both banks of the Salm River. Artillery and tank destroyers supported a determined stand which bested the German "Tigers" and shunted their attacks on to the west. Further west, to the north of Samree—the sixth front—armored field artillery batteries supported their battle groups in a series of vicious tank battles for control of the roads leading north. To the far west, behind this section, the artillery with the VII Corps counterattack force completed its concentration by December 23d. The 84th Division Artillery and a portion of the Corps Artillery were engaged, but the remainder were in positions of readiness. On the 24th, the weight of the entire artillery was thrown into the fight to stop the German Fifth Panzer Army. That night prisoners of war said that artillery fire had destroyed the "pride and joy" of the German Army.

Events of the following nine days were to prove that the 24th of December had marked the climax of the German break-through. The VII and XVIII Corps Artillery massed fires at the corps boundary halting the German penetration north of Manhay on the 25th, and erasing it on the 26th. The First Army now presented a firm front from Marche to Monschau which was supported at all points by an adequate amount of artillery. Behind the Meuse River the 4th and 5th AGRA's of the British XXX Corps formed a second line of artillery defense. First Army had as a mobile reserve the 5th Armored Division and the

British 51st Highland Division with their artillery not yet committed. The German Army, however, still retained the initiative, and continued to launch piecemeal attacks, at one time or another, against almost every unit along the front. Except for the overwhelming concentrations placed on each attack delivered, artillery fires were normal to a stable defensive front. Particular emphasis was placed on long-range harassing and interdiction fires.

2. *Reduction of the Ardennes Salient*

On the 3d of January, artillery opened First Army's resumption of the offensive to the east. In the V Corps sector an intense 35 minute preparation preceded a strong demonstration against the shoulder of the enemy penetration. The VII Corps attack, itself, was made without artillery preparation. Artillery was generally quiet until noon when the volume of on call missions became sufficient to bring all of the weapons into action. By nightfall the enemy main line of defense had been smashed, his reserves had been dispersed, and his artillery silenced. During the days following the jump-off artillery fires conformed to what previous combat had shown were normal to a moderate rate of advance.

During this period artillery operated under the most adverse climatic and terrestrial conditions yet encountered. Heavy snowfalls blanketed the entire area of the Ardennes Forest causing narrow winding roads of ice and became impassable to all but the resourceful. Notwithstanding this, artillery displacements kept pace with the advance.

3. *Capture of the Roer Dams*

The artillery lessons learned in previous fighting in the Hurtgen Forest were put to good use in the second drive to capture the Roer River dams. Without waiting for the infantry to request specific supporting fires, huge area concentrations were used to smash through the dense tree growth and either stun or kill the defenders along the routes of advance. Ammunition expenditures were lavish but worth the price. Whereas previous daily advances had been measured in meters, they were now registered in kilometers.

IV. Field Artillery Intelligence

A. ENEMY ARTILLERY ACTIVITY

From the first week in August until the middle of September the hostile artillery employment and coordinated effort was extremely light. During this period, the enemy artillery withdrew the maximum number of artillery weapons to the south and east. Many battery positions, however, were overrun rapidly, and some were found with the artillery pieces in good mechanical condition. Single self-propelled weapons and antitank guns employed both in a field artillery and antitank role featured the enemy artillery action. An increased amount of artillery firing was noted in some few instances, particularly during the German counterattack at Mortain on the 7th of August and the fighting in the Falaise–Argentan area immediately thereafter. In no instance, however, did the volume of enemy artillery activity equal what it had been immediately prior to the St. Lo break-through.

Hostile firing continued to be sporadic and scattered as the First Army advanced across the Seine River and northward through France and Belgium. The change of direction to the east on September 4th and the subsequent attack along the Meuse River toward the Siegfried Line brought a slight increase in the hostile shelling. This increase became very evident as the German border was approached and penetrated in places; in fact the enemy artillery activity soon approached that encountered in Normandy during the latter part of July. More medium caliber concentrations were received and the over-all picture showed that a considerable amount of reinforcing artillery was being employed.

On the 1st of October the number of enemy artillery battalions in the Aachen area was estimated to be 25; this total had increased to 34 by October 21st, when Aachen fell. Moreover, a definite improvement in the tactical employment of enemy artillery was observed during this three-week period. Massing of fires as well as the coordination of widely separated batteries were noted. Heavier caliber weapons were used and these included both field and railway artillery. Some counter-battery fires were received and all indications showed that a more "artillery conscious" enemy was defending Germany. The ability of the enemy to switch the bulk of his fires from one critical area to another also became apparent. This was illustrated when an attack was made by the V Corps in the general direction of Schmidt on 2 November and later, on 16 November, when the drive to the Roer River by the VII Corps was resumed.

Units of the Volks artillery were first encountered around the first of December. These artillery units of brigade and corps size added to the bulk of the enemy weapons on the First Army front. The steady build-up of enemy artillery reached a high of about 68 battalions at this time and all but 13 were noted in the Aachen area. The above total remained in effect up to the 15th of December and the only shift of activity was southward opposite V Corps when this unit attacked in the Simmerath area on December 13th.

The German Sixth SS Panzer Army and Fifth Panzer Army launched a coordinated attack against the First Army front on the 16th of December. Three corps made the initial assault following a carefully planned artillery preparation. It was learned from captured artillery documents that the 47th Panzer Corps was supported by a total of twenty-three artillery battalions. Organic division artillery, Volks Artillery Corps, antiaircraft artillery battalions, and Werfer regiments all participated. Shelling of the heaviest type was directed against front line troops, artillery positions, command posts, and communication centers farther to the rear for approximately

two and a half hours. The degree of neutralization accomplished, the casualties caused, the harassing of command post and communication centers, and the interruption of wire communications all combined effectively to assist the initial advances of the enemy.

A moderate to heavy fire support was maintained for about one week against the northeastern corner of the salient. Concentrations of from 150 to 200 rounds were reported in the area near Elsenborn (K9008); these were principally in the form of preparations and supporting fires for attacking units. Farther to the south near St. Vith and to the west near Grandmenil (P5290) the artillery fire was less intense. It was apparent that the concentrations against the V Corps were fired by artillery that had displaced little if at all, whereas the units that advanced in the Ardennes salient were never again able to employ their concentrated fire power to the same degree as on 16 December.

With the stopping of the German counteroffensive, the German artillery shelling became noticeably weaker. Single weapon missions by either assault weapons, tanks, antitank guns or artillery pieces featured the greater part of the enemy fires. Although the majority of these concentrations were directed mainly at our leading elements, a few were fired at deep-in targets such as towns, road junctions, and battery positions. As the enemy was forced back to St. Vith and on toward the Siegfried Line, this defensive fire became almost negligible—the direct opposite of the powerful and effective support that was employed one month earlier.

Mention should be made of the increased employment of Werfer units in the German counteroffensive. Three brigades, containing seven Werfer regiments, were identified by prisoners and captured documents. Their effect was not of major significance since at no time was the supply of rockets adequate.

B. S–2 ORGANIZATION AND PROCEDURES

The seven months of combat covered by this report proved that established S–2 procedures and organization were sound. All intelligence agencies for locating enemy targets —including air and terrestrial observation, sound and flash ranging, photo interpretation, shellreps, prisoner of war and civilian interrogation, and captured documents—were integrated and exploited to the maximum in the collection, evaluation, and dissemination of artillery intelligence. Several points are deemed worthy of particular note.

The augmentation of S–2 personnel in the corps artillery headquarters was justified many times over. Plotting and evaluating battery positions reported by the many intelligence agencies, as well as keeping a file of targets such as command posts, communication road nets, supply points, and assembly areas over a 24-hour period, proved the wisdom of adding the extra S–2 personnel.

The attachment of either a photo interpretation team or one of reduced size to corps artillery and the field artillery brigade fire-direction centers was found to be sound. Supplied with all A quality front line cover in the form of "semirush prints," these teams were able immediately to verify artillery positions and other enemy installations reported by intelligence agencies.

Although the recommendation was not carried out specifically at either corps or division level, the advantage of maintaining an officer of the artillery section in the office of the G–2 was borne out continuously in the experience of the army artillery officer. Not only was this officer able to keep the G–2 informed of intelligence gathered through artillery channels, but he was able also to report remunerative targets, gathered from such sources as fighter-bombers, radio-intercept, agents and higher headquarters, direct to the corps and brigade FDC's without delay.

C. SHELLREPS

These reports were extremely valuable in furnishing clues as to the whereabouts of active enemy artillery locations. All units were indoctrinated in the worth of these reports. Very complete reports were received, moreover, from engineer and ordnance units as well as from cavalry and infantry organizations. Small-sized leaflets were issued to advertise the usefulness of such reports. As a further means of exploiting the possibilities of the shellrep, several corps artillery commanders furnished infantry regiments with trained shellrep teams; others prescribed the use of such teams both by division and corps artillery battalions.

D. PROPAGANDA LEAFLETS

Commencing about the middle of September, propaganda leaflets were fired at the enemy via artillery shells at the rate of approximately 1,000 per week. The leaflets were prepared by the psychological warfare combat team attached to this headquarters. The value of the messages was proven by the statements of prisoners to the effect that these leaflets caused many to desert outright and others to adopt passive action until surrounded and captured.

E. MAPS AND TRIG CONTROL

The rapid advance as well as the changes in direction across France and Belgium presented a problem in map distribution which might have become critical. Actually, a shortage developed only in the 1/25,000 scale maps in a limited number of areas. Fortunately, these sections were covered with 1/50,000 scale maps which proved very useful because of the rapid action. Captured 1/25,000 scale maps of Germany were reproduced with the Lambert grid and had been issued by the time the German border was reached. This series was revised later to include recent aerial photographic intelligence. After the middle of September, maps of all scales and in ample quantities were available except for the 1/50,000 series. Many of the 1/25,000 series along the Siegfried Line were overprinted with enemy defenses furnished by the Army Photo Interpretation Section.

Trig control to include the area of the Rhine valley was issued prior to 1 August. This data was invaluable in establishing survey control for artillery firing. Additional data to include an area of western Germany to Berlin was also issued to artillery units during this period.

V. Continued Development of Special Operational Techniques and Procedures

A. ARTY/R

During the pursuit across France the majority of the experienced Arty/R pilots, who had functioned so effectively during the Normandy Campaign, were either returned to the zone of the interior or were otherwise lost to First Army. Replacement pilots had little time to learn or practice the procedure. As a consequence, when the front reached the Siegfried Line, it became necessary to train a new group of pilots. Nevertheless, by the middle of October the results obtained from Arty/R were equalling those at the time of the Normandy Campaign. Pilots became particularly adept in the destruction of pinpoint targets with heavy artillery. Air-ground communications continued to present a major problem and accounted for well over half of the unsuccessful missions. The replacement of the SCR 522 radio by the SCR 624 provided the solution to this problem. Although many productive missions were still being fired, at the close of this period the number of Arty/R missions was reduced at least 50 percent because of the increasing number of days of inclement weather.

B. AERIAL PHOTOGRAPHY

The operation of the Army Photo Interpretation Section improved steadily throughout the period. Augmentation of the operations and distribution sections of this agency reduced to a considerable degree the time required to disseminate enemy artillery locations found on photographs.

The policy of flying front line cover of the target area was set up on the basis of daily coverage of the army front to a depth of approximately 7,000 yards. However, this plan was often restricted by weather, since a ceiling of 20,000 feet is necessary in order to fly satisfactory cover with photo reconnaissance aircraft. To offset this limitation, partial cover was obtained during every possible opportunity and was supplemented by low altitude vertical photography taken from tactical reconnaissance airplanes especially equipped for this purpose.

The distribution of rush prints (one set to APIS, and one set to each corps and division within 24 hours after TOT) did not include the corps artillery headquarters or the 32d FA Brigade because of the delay entailed in making additional sets. To alleviate this situation, "semirush prints" were produced and delivered to these artillery units from 12 to 36 hours later.

Basic cover was periodically selected for re-

production and distribution down to and including field artillery battalions on the basis of two sets each.

During the advance across France, it was impossible to carry out the normal front line cover plan because of the rapidity of the action. Due to the time interval from TOT to the receipt of interpretation by the units it was found more desirable to divert the photographic effort to flying road strips. It being impracticable to maintain continuous wire communication, the army artillery officer's radio net was frequently the only means of disseminating the results of interpretation to the troops during this period. From time to time it was even necessary to establish relays. When the front stabilized, however, interpretation was again transmitted to the corps and the 32d FA Brigade FDC's both by radio and by telephone. The coordinates of all enemy field artillery and heavy antiaircraft positions were transmitted by telephone as soon as received.

Certain corps and divisional artillery Air OP sections were equipped with K–20 cameras and executed many useful and supplementary photographic sorties. Frequently, when weather conditions prohibited Tac/R operations, the "Cubs" were able to photograph areas of pressing interest. Both vertical and oblique photographs were taken. In addition, grids were furnished by the army artillery officer to permit the production of gridded obliques.

Changes and modifications to night photographic equipment produced photography which was comparable in quality to normal daylight photographs. During the Ardennes offensive a number of very successful night sorties were flown which contained valuable intelligence. Forty-eight enemy guns were located by photo interpretation of four photographs taken in one sortie. Although the effort of approximately one squadron was not adequate to permit extensive coverage of the army front, missions were planned carefully so as to include the areas of most vital interest. Results of night photo interpretation were disseminated through the usual Army Photo Interpretation Section radio and telephone communication channels.

The changeover from the K24 Camera (5x5 print size) to the K22 Camera (9x9 print size) was made on all P–51 Mustang aircraft of the 67th Tactical Reconnaissance Group and later on all P–51 tactical reconnaissance aircraft in the theater. With the advent of the larger oblique, which permits easier reading, the infantry became enthusiastic users of the ungridded prints which facilitated planning and terrain study. As a result, each corps was given a standard distribution of 40 ungridded sets for infantry use. Field artillery battalions were issued 5 gridded and 2 ungridded sets. The ungridded set was especially helpful when concentration numbers of the critical points along the front were applied and annotated on the prints.

The process of making gridded obliques from vertical photography was successfully developed. These obliques were very valuable in special situations when aircraft were unable to fly in a requested area at the required altitude due either to excessive flak or unsuitable weather.

Total oblique sorties flown and prints distributed for the period are shown below:

	Aug.	*Sep.*	*Oct.*	*Nov.*
Successful sorties flown, including gridded oblique projections:	9	10	23	13
Prints distributed	7,426	16,338	25,517	31,476
	Dec.	*Jan.*	*Feb.*	*Total*
Successful sorties flown, including gridded oblique projections:	6	6	16	83
Prints distributed	22,526	36,046	73,304	212,633

C. COUNTERMORTAR

The absence of formidable German artillery throughout the Normandy Campaign had served to focus the attention of both infantry and artillery commanders on the German mor-

tars which were used in great quantity and with good effect. Certain experiments employing available personnel and equipment, aimed at countering the German mortar, were initiated late in July. After being suspended for almost two months, these experiments were resumed late in September with the objective of determining an effective countermortar technique within the means available to the field artillery observation battalion. A technique was devised employing a short sound base manned by the personnel of the observation battalion closely tied with the division artillery fire direction center. Tests in combat produced excellent results but the tactical employment was necessarily limited, since it could be had only at the expense of lessened counterbattery capacity.

D. COUNTERFLAK

Counterflak artillery fires, which were conceived initially only for the protection of large "carpet" bombings, were extended to the point that practically all close-in air activity on the army front was furnished this protection. The air force rendered enthusiastic cooperation in this development. Effective counterflak support was found to be dependent upon:

a. Up-to-date knowledge by the field artillery of the location of enemy antiaircraft weapons. This was achieved by publishing periodic hostile flak lists prepared by the Army Photo Interpretation Section.

b. Close coordination at the division level by the field artillery and the air support party, in order that effective counterflak fires could be delivered in support of impromptu fighter-bomber operations.

VI. Air OP

A. GENERAL

During this period the field artillery Air OP's continued to play a vitally important role in combat, by providing continuous daylight observation of enemy activities except when inclement weather kept them on the ground. The general organization for the control and tactical employment of Air OP sections proved to be sound in that it permitted a maximum of operational flexibility. Certain statistical data for air OP operations during this period are shown in appendix 1.

B. MAINTENANCE AND SUPPLY

The 23d Mobile Reclamation and Repair Squadron of the Ninth Air Force Air Service Command furnished continuous support to First Army Air OP sections throughout this period. Support by such an agency proved to be essential to successful operation in combat.

The experience of this campaign demonstrated that Air OP sections can maintain high standards of first-and second-echelon maintenance under the varying conditions of combat. However, due to the continuous operation of Air OP's and frequent movement of airstrips, mechanics were usually unable to undertake major repairs to aircraft or engines. Whenever an aircraft received major damage the 23d MR & R Squadron evacuated the aircraft to the squadron for repair or salvage. This system relieved Air OP personnel of the care of aircraft damaged beyond normal 2d echelon repair. Units were normally able to obtain immediate replacement of unserviceable aircraft and engines from the 23d MR & R Squadron.

It was necessary for the 23d MR & R Squadron to displace seven times between 1 August and 22 February. Each displacement was accomplished with a minimum of interference to the operations of the engineering and supply sections.

During this period the engineering section repaired and returned to service a total of twenty-five L–5 type aircraft and two hundred and eighteen L–4 type aircraft. In addition three L–5 aircraft and forty-one L–4 aircraft were salvaged for component parts.

In addition to normal supply functions, the supply section exchanged all parachutes once each month, in order to permit inspection and repacking. This was a sizable task involving more than 500 parachutes each month. Since the 23d MR & R Squadron was not equipped to accomplish the inspection and repacking, it was necessary to designate specific air force depot units for this purpose. A total of ninety-three L–4 aircraft engines and seven L–5 aircraft engines were issued during the period. The efficient supply service furnished by this squadron was the direct result of very carefully controlled salvage policy whereby the maximum number of damaged and unserviceable parts were reclaimed.

C. ORGANIZATION AND EQUIPMENT

The precombat training of pilots and mechanics was adequate in general. The training of air observers, on the other hand, was insufficient to permit them to function efficiently when first committed to combat. This situation necessitated further training for these individuals after the unit was actually engaged in combat. The policy of attaching replacement pilots to units for operational training pending assignment to replace battle losses served to alleviate this condition as far as replacement pilots were concerned.

As a result of the continuous operation of Air OPs during this period it was necessary to make provision for the periodic resting of pilots and air observers, in order to forestall excessive loss of life and equipment due to fatigue. To accomplish this a Rest and Recreation Center was established in Liege, Belgium. Units were authorized to have each pilot and air observer at this center for a period of three days each month.

D. HIGHLIGHTS OF OPERATIONS

Air OPs flew more than 25,000 combat missions between 1 August and 22 February 1945. Of these 36 percent were adjustment of fire, 54 percent reconnaissance and 10 percent other combat missions. In addition to combat missions, 860 training and 6,591 administrative missions were flown. An average of 217 aircraft were operational with the army during this period. Appendix 1 shows an analysis of monthly Air OP reports received from First Army units. It is interesting to note that the average hours per pilot in armored divisions are consistently greater than those of the pilots of all other types of field artillery units. The effect of the bad weather prevailing during the months of October, November, and January is clearly shown by the sharp decrease in the number of operational hours and missions flown.

The principal combat missions flown during this period can be broken down into two general types—adjustment of fire and reconnaissance.

a. Adjustment of fire missions included the routine registration of batteries, firing on targets of opportunity, surveillance of fire, and marking targets with smoke for fighter bombers.

b. Reconnaissance missions included routine patrol flights, photographic missions, flying infantry assault commanders prior to an attack, and camouflage checks of friendly installations.

During this period it was normal procedure to operate battalion Air OP sections under the centralized control of division artillery and field artillery group commanders. Under this system Air OPs were operated from the division artillery or group airstrip thereby permitting centralization of messing and operations. It is normal to set up an operations CP at the airstrip where pilots and air observers are briefed for missions. An SCR–608 radio (SCR–508 in the armored divisions) is used to control Air OPs when in actual operations. Battalions may call upon the operations officer for air observation at any time. During static periods it is normal to maintain one Air OP in the air on patrol throughout the day. All available pilots and air observers are rotated on these patrol missions which are usually of one hour duration.

Early in September during the rapid advance across France of the 3d Armored Division it was necessary to furnish two additional Air OP sections from the 32d FA Brigade to assist with the Air OP requirements of this division.

During the early stages of the German break-through, several artillery airstrips were overrun. In several instances when the extremely bad weather precluded flying aircraft to the rear or sufficient time was not available to evacuate by truck, aircraft were burned on the airstrips. The rapidity of the German advance in one sector resulted in the abandonment of 13 aircraft in flyable condition. Artillery concentrations were directed on these aircraft and confirmation of destruction was obtained from special photographs taken by Tac/R. Although a total of 27 aircraft were lost as a direct result of the break-through, no aircraft in flyable condition fell into the hands of the enemy.

During this period the number of aircraft lost due to enemy air action was only 20 percent of all losses. Enemy antiaircraft fire was much more effective and accounted for approximately 40 percent, flying accidents accounted for 30 percent and the remaining 10 percent was attributable to aircraft being struck in midair by artillery shells and to ground accidents.

VII. Tank Destroyer Operations

A. EMPLOYMENT OF TANK DESTROYERS

Tank destroyer tactics and techniques were influenced primarily by the varying conditions of terrain and enemy activity. This section seeks to outline the more important considerations of tank destroyer employment during this period and to relate them to the situation then extant.

At Mortain the massed employment of enemy armor was first encountered. Both towed and self-propelled battalions were used in stopping this powerful attack. The self-propelled battalion demonstrated its superiority over the towed unit in conclusive fashion by sustaining less losses while destroying more enemy tanks. The mobility of the self-propelled weapon permitted a more flexible and resilient defense whereas the towed gun, once in position, was unable either to maneuver against targets outside of its narrow sector of fire or to escape when threatened with being overrun. This battle further demonstrated that tank destroyers must be afforded close infantry protection; otherwise they will be knocked out by infiltrating enemy infantry.

During the action at the "Falaise Pocket" the open country and the disorganization of the enemy permitted the towed gun to more nearly equal the self-propelled gun in battlefield effectiveness. Towed guns were frequently emplaced on dominating ground from which they effectively attacked enemy weapons at ranges sometimes in excess of 5,000 yards.

During the push across France and Belgium, the self-propelled battalions were employed in an assault gun role close behind the infantry to assist in overcoming strong points holding up the advance. The ability of these weapons to occupy positions rapidly encouraged their use in their secondary role as artillery. Moreover, as the supply of artillery ammunition lessened, tank destroyers took over more and more indirect fire missions from the divisional artillery. The three-inch guns were used to deepen the divisional zones of fire and to undertake night harassing and interdiction missions. As a consequence, tank destroyer gunnery technique was refined by the application of metro corrections.

The attack of the Siegfried Line required the formation of tank-tank destroyer-infantry-engineer teams. Prior to the assault by the infantry and engineers, direct fire by tank destroyers pinned the enemy to their fortifications. The destroyers were also used effectively to reduce the smaller fortifications by direct fire and to silence the larger pillboxes by firing into embrasures.

In the reduction of Aachen the tank destroyers again provided close assault gun support to the infantry, by knocking out machine gun nests and strong points located in houses. This action highlighted the importance of providing infantry protection for the destroyers in order to protect them from antitank rockets and grenades.

The attack through the Hurtgen Forest presented numerous difficulties for tank destroyer battalions, both towed and self-propelled. The thick growth of trees and the poor road net reduced fields of fire and made movement slow and difficult. The towed units were frequently employed in the indirect role and on several occasions were used in conjunction with cavalry to hold quiet sectors of the line. The self-propelled battalions continued their assault role and developed even closer teamwork with the infantry. On several occasions, however, ground gained by the infantry was lost to counterattacking enemy tanks due to the fact that tank destroyers could not be moved forward quickly over the difficult intervening terrain.

The score sheet for First Army tank destroyer units during the German counteroffensive in December 1944 was most impressive. A

total of 218 tanks, 46 SP and AT guns, and 43 miscellaneous weapons and vehicles were destroyed for the loss of 119 primary weapons, of which 86 were towed guns. It is clear that, during the battle of the Ardennes, the self-propelled battalion again proved its superiority over the towed battalion for both offensive and defensive action. The lack of armored protection and the poor mobility of the towed gun resulted in heavy losses of personnel and equipment. On the other hand, by exploiting its mobility, the self-propelled weapon was able to maintain a cohesive front against enemy armor and to escape being overrun in small local actions. During the Ardennes action, it was reemphasized that a defense in depth with adequate reserves is required when enemy armor is employed in mass.

B. STAFF ORGANIZATION FOR THE CONTROL OF TANK DESTROYERS

Prior to the cross-channel assault, this headquarters conceived that the training, supply, employment, and control of tank destroyers should be the function of the artillery officers (commanders) at army and corps levels, and preferably within the division. The following extract from letter, this headquarters, file 322–Arty, subject: "Field Artillery Anti-Tank Sub-Sections," dated 27 May 1944, is cited:

"2. In view of (a) the fact that field artillery and tank destroyer units are, by their very nature, mutually supporting, especially in their secondary missions, (b) the relative preponderance of field artillery as compared to tank destroyers in all echelons, and (c) the fact that army, corps, and division commanders will invariably have their organic artillery staff officers readily available, it is logical that the artillery officers, at least of army and corps, should be charged with the tank destroyer responsibilities cited above. While it is not desired to restrict division commanders, it is felt that assignment of similar responsibilities to division artillery commanders is likewise both appropriate and desirable."

The above concept was adhered to by this headquarters and, in general, within the several corps which were assigned to the First Army. Numerous experienced division commanders, however, found it more desirable to charge their G–3 with the responsibility for the employment and control of attached tank destroyer battalions. Their views were not without logic. Three missions for tank destroyers were evolved during the course of the campaign—antitank, artillery, and assault gun. Of these, only the artillery mission required control by the artillery commander, whereas the other two required intimate and continuous coordination with the infantry. In effect, a tank destroyer-infantry team developed, and the tank destroyer dispositions and movements frequently became, of necessity, a function of the infantry dispositions and movements. Therefore it followed logically that the divisional G–3 should be responsible for the employment of attached tank destroyers.

C. PARTIAL CONCLUSIONS AND LESSONS LEARNED RELATIVE TO TANK DESTROYERS

From the foregoing, it is considered evident that during the course of the operations covered by this report the unusual versatility of tank destroyers resulted in their employment not only in their primary role, but also as artillery, as infantry, as tanks in close support, as assault artillery, and as cavalry. This, together with the wide variation in methods of employment

and staff control by experienced commanders, even in the primary role led to the general conclusion that the ultimate form and role of the tank destroyer battalion is dependent upon many factors which will have to be carefully evaluated. It is believed, however, that the campaign brought forth several points deemed worthy of careful consideration:

a. Competent opinion differed as to whether the division G–3 or the division artillery commander should be charged with the responsibility for the control and employment of the attached tank destroyer battalion(s).

b. The self-propelled tank destroyer weapons were superior to the towed weapons.

c. There was every indication that a self-propelled tank destroyer battalion should be organic in both the infantry and the armored division.

d. Tank destroyer battalions were habitually attached to divisions. Consequently, there was no tactical function for tank destroyer group headquarters. Although useful in the training and preparatory stage, during combat, tank destroyer group headquarters were employed for the most part on security or administrative missions.

e. Of the varying secondary roles played by the versatile self-propelled destroyers, their increasing use as assault guns was possibly of outstanding significance. This may be explained by:

(1) The relative absence of enemy armor in strength, and

(2) The German practice of making shallow penetrations with a small number of tanks. In order to counter such tactics the destroyers were placed well forward; hence, were readily available to assist the assaulting infantry.

VIII. Field Artillery Ammunition

A. EXPENDITURES

1. General

In analyzing field artillery ammunition expenditures for the period 1 August 1944 to 22 February 1945, it is emphasized that for other than the period of rapid exploitation (18 August to 9 September) the restrictions imposed by limited ammunition supply serve to render the report inadequate as a basis for planning future operations of a similar character, except for the percentages of types of shells, charges, and fuzes employed. As stated in a previous report covering the period D-Day to 31 July 1944, ammunition savings must not be construed to mean that ample ammunition was always made available or that savings might not have been fired on renumerative targets. Savings will invariably accrue when a rationing system is in effect, due to the maintenance of reserves by all subordinate echelons against an unpredicted emergency late in the ration period.

2. Reports

Complete ammunition expenditure reports are published in annex 9 (Ordnance) to this report. The material presented here is confined, therefore, to (a) certain comments on the type of artillery action which influenced the rate of expenditures, and (b) certain condensed statistical data for the 105-mm howitzer, 155-mm howitzer, and 155-mm gun —the most representative weapons to highlight the trends noted.

3. (1 August–5 August)

Artillery expenditures remained light as the enemy continued to withdraw his forces, as best he could, following our successful attack and break-through. The Germans had little opportunity to organize successive positions or to cover their retreat with artillery.

4. (6 August–17 August)

Expenditures increased slightly over the previous three weeks, thereby reflecting the intensified action while the Falaise–Argentan pocket was being reduced. Aggressive harassing and interdiction fires were also employed.

5. (18 August–3 September)

With the resumption of our advance, ammunition expenditures again lightened. Towards the end of August the rapid advance of the First Army dictated a temporary policy of not employing the army heavy artillery, thereby reducing the ammunition tonnage to be brought forward. Not being operational, these and other units were organized into provisional truck companies, which bolstered the overburdened First Army supply agencies.

6. (4 September–16 September)

Although First Army continued to receive an ammunition allocation from Headquarters Twelfth Army Group, expenditures were so light during the enemy's withdrawal that rationing to the corps was discontinued on 3 September. The rapidity of our advance had caused such difficulties in maintaining supplies that availability of ammunition, in itself, governed expenditures to the extent that rationing became meaningless. During the week of 10–16 September, the expenditures increased somewhat, when enemy resistance stiffened as our forces penetrated the Siegfried Line in a number of places. Greatly extended lines of supply aggravated the already difficult resupply problem.

7. (17 September–1 October)

Consistent with previous experience, as the situation became more stabilized ammunition expenditures increased. Artillery fires included the reduction of fortified localities along the Siegfried Line, interdiction and harassing fires, counterbattery fires and missions against large concentrations of enemy infantry, which were largely responsible for

breaking up continued enemy counterattacks. The artillery under corps control was employed generally throughout the army front for the first time in several weeks. The limited amount of ammunition on hand and in the immediate resupply system initiated the decision, on 21 September, to reinstitute an ammunition rationing policy.

8. (2 October–14 October)

Following a heavy air preparation, the XIX Corps launched a coordinated attack on 2 October against the fortifications of the Siegfried Line, which was designed to complete the encirclement of Aachen and to join forces with VII Corps. Throughout this period the artillery with the army fired in support of continued attacks to reduce enemy resistance in Aachen. Expenditures were heavy, as expected.

9. (15 October–28 October)

During this period, which saw the fall of Aachen on 21 October, ammunition expenditures reveal a sharp decrease which was brought about by drastic rationing due to extremely limited amounts of ammunition in the resupply system. Ammunition expenditures for the week 22–26 October show further decreases over the previous week as only the most lucrative targets were attacked, since the necessity of conservation of ammunition was paramount.

10. (29 October–11 November)

Activity on the First Army front remained relatively quiet, except for limited objective attacks by the V Corps, the 28th Infantry Division, attacking 2 November in the vicinity of Schmidt with the support by artillery of both V and VII Corps. From 6 November–11 November the major effect of the artillery with the army was in repulsing determined and repeated counterattacks in the Hurtgen-Vossenack-Schmidt area. Rationing of ammunition continued to be rigid throughout the period, resulting in limited expenditures.

11. (12 November–25 November)

The First Army launched a coordinated offensive on 16 November in the zone of VII Corps in the vicinity of Eschweiler and Stolberg in conjunction with the attack of the XIX Corps (Ninth U. S. Army). The V Corps joined in a limited attack 20 November. Expenditures were greater not only because of the stubborn character of the fighting but also because unexpected increased allocations were received. During this period the VIII Corps expenditures were held to a minimum, which reflected the character of the action on this extended and quiet front.

12. (26 November–9 December)

For the seven days from 26 November to 2 December both the V and VII Corps were particularly active in support of daily attacks and retaliation fire against enemy counterattacks. Artillery fires kept strong pressure on the enemy during the second half of this fourteen day period. However, expenditures lightened somewhat as the artillery with the army regrouped in preparation for the VII Corps attack on 10 December to continue the advance to the Roer River.

13. (10 December–15 December)

With the continuation of the attack by the VII Corps on 10 December and the attack of the V Corps on 13 December along with increased allocations of ammunition, artillery fires increased steadily in intensity to the end of the period.

14. (16 December–31 December)

On 16 December the enemy attacked in the Ardennes against the lightly held junction of the V and VIII Corps sectors. The offensive resulted in a break-through and penetration to some 30 miles in depth before it was contained. Restrictions on expenditures by the VIII Corps were removed on 17 December and for all corps on 22 December. Reserve stocks plus increased allocations from Twelfth Army Group made the higher expenditures possible. However, the fluidity of the situation plus generally poor observation and difficulty of resupply served somewhat to restrict the firing. It is considered that the expenditures during this period present a good picture of unrestricted firing in very active operations.

15. (1 January–20 January)

Ammunition allocations were again instituted on 3 January as the VII and XVIII Corps initiated attacks in conjunction with Third Army to reduce the "bulge." Meanwhile, heavy defensive, harassing and interdiction fires were maintained by the V Corps. From 13 January to 18 January expenditures increased along with the gradual reduction of the "bulge." The corps artillery of all corps was very active during these six days with missions fired against enemy counterattacks, tank and vehicle assembly areas, supply and escape roads and counterbattery. Divisional artillery was likewise particularly active, both in repulsing enemy counterattacks and in supporting our own attacks.

16. (21 January–11 February)

This period was marked by continuing attacks by the V and the XVIII Airborne Corps against light to moderate resistance as the enemy forces withdrew. The VII Corps was pinched out 24 January, but assumed responsibility for the XIX Corps sector (Ninth Army) on 5 February. The V Corps succeeded in taking the western ends of the Roer River dams as the period closed. The activity of the artillery with V Corps from 5 February to 11 February was extensive with daily missions in support of the attacks to secure the Roer River dams and to mop up resistance to the west of the river.

17. (12 February–22 February)

Expenditures during this period were extremely light as the VII and III Corps (relieved the XVIII Airborne Corps on 13 February) consolidated defenses along the west bank of the Roer River, the flooded condition of which hampered extensive operations. The V Corps was regrouping and maintaining a defensive position during this period.

Expenditures corresponding to the above calendar periods are presented below for the 105-mm howitzer, 155-mm howitzer, and 155-mm gun M1:

Period	Average guns in action	Average rds per gun per day	Total rds for period	Average percent U/F
WEAPON—105-MM HOWITZER				
6 Aug.–17 Aug.	423	41	208,533	33
18 Aug.– 3 Sep.	498	13	107,906	10
4 Sep.–16 Sep.	434	15	86,472	12
17 Sep.– 1 Oct.	456	34	233,698	27
2 Oct. –14 Oct.	510	42	276,771	34
15 Oct. –28 Oct.	522	23	171,200	18
29 Oct. –11 Nov.	554	24	189,247	19
12 Nov.–25 Nov.	576	44	354,989	35
26 Nov.– 9 Dec.	558	41	322,868	33
10 Dec.–15 Dec.	600	44	159,049	35
16 Dec.–31 Dec.	504	69	552,752	55
1 Jan. –20 Jan.	536	43	466,209	34
21 Jan. –11 Feb.	354	35	271,171	28
12 Feb.–22 Feb.	511	15	83,392	12
WEAPON—155-MM HOWITZER				
6 Aug.–17 Aug.	229	20	55,752	27
18 Aug.– 3 Sep.	140	11	26,571	15
4 Sep.–16 Sep.	159	8	16,687	11
17 Sep.– 1 Oct.	203	19	58,958	25
2 Oct. –14 Oct.	222	24	69,456	32
15 Oct. –28 Oct.	228	10	31,908	13
29 Oct. –11 Nov.	213	13	37,563	17
12 Nov.–25 Nov.	258	21	74,300	28
26 Nov.– 9 Dec.	260	24	86,936	32
10 Dec.–15 Dec.	282	29	57,577	39
16 Dec.–31 Dec.	231	44	164,130	59
1 Jan. –20 Jan.	254	33	167,288	44
21 Jan. –11 Feb.	200	26	114,975	35
12 Feb.–22 Feb.	259	11	32,195	15
WEAPON—155-MM GUN M1				
6 Aug.–17 Aug.	71	24	20,380	48
18 Aug.– 3 Sep.	50	12	9,948	24
4 Sep.–16 Sep.	49	7	4,270	14
17 Sep.– 1 Oct.	82	17	21,400	34
2 Oct. –14 Oct.	78	20	19,913	40
15 Oct. –28 Oct.	84	8	9,054	16
29 Oct. –11 Nov.	82	8	8,900	16
12 Nov.–25 Nov.	84	24	27,707	48
26 Nov.– 9 Dec.	84	24	28,293	48
10 Dec.–15 Dec.	77	27	14,491	54
16 Dec.–31 Dec.	67	34	36,752	68
1 Jan. –20 Jan.	59	30	35,352	60
21 Jan. –11 Feb.	47	34	34,955	68
12 Feb.–22 Feb.	65	13	8,938	25

Note. In view of the restricted amount of 105-mm howitzer ammunition and to take advantage of the ample supply of 75-mm howitzer ammunition, a 105-mm howitzer battalion on 12 November was reequipped temporarily with 18 75-mm howitzers. From 13 November to 2 December, this battalion expended 22,350 rounds.

B. ISSUE OF FIELD ARTILLERY AMMUNITION BY LOT NUMBERS

The issue of field artillery ammunition by lot number continued as a troublesome problem throughout the period covered by this report. During the period 3–10 November, all field artillery ammunition under control of First Army was segregated and recorded by lot number. This was a tremendous task for the ordnance officer involving some 25,000 man hours of labor and resulted in so many lots of each type of ammunition that it was deemed impossible to issue all field artillery items by lot number. For example, 105-mm howitzer stocks contained 50 lots and a total of 1,235 lot numbers. An attempt was made to improve this unsatisfactory situation through the issue of ammunition by lot in accordance with the following priorities:

a. 8-inch gun ammunition (both propelling charges and projectiles) to be completely sorted, stored, and issued by lot number.

b. 240-mm howitzer ammunition to be completely sorted, stored, and issued—propelling charges by lot number and projectiles by weight zone.

c. It was recognized that 105-mm howitzer battalions must accept a certain proportion of unsegregated ammunition (w/fuze M48A2, M48A1, and M48) with each issue of segregated ammunition due to the large number of lots.

In establishing the above priorities it was recognized that (a) the relatively limited quantities of heavy caliber ammunition permitted thorough segregation, (b) every effort must be made to insure that each round of heavy artillery ammunition "paid off," and (c) the tactical employment of 105-mm ammunition in close support of the infantry impelled the utilization of dependable ammunition.

In order to implement this project for 105-mm howitzer ammunition—the most stubborn of the several calibers—it was segregated so far as possible in multiples of 150 rounds and field artillery units were instructed to draw in like amounts.

The success of being able to continue the issue of ammunition by lot number in the ASPs supporting the corps obviously is dependent in the first instance upon the delivery by the Communication Zone of segregated ammunition to the First Army depots. Reasonably satisfactory results were being obtained at the close of the period covered by this report.

IX. Field Artillery Matériel

A. CALIBRATION OF WEAPONS

Although it has long been standard practice for field artillery commanders to calibrate their pieces by firing CI adjustments with each weapon so as to permit grouping them into short, mean, and long—shooting batteries, calibration, as First Army artillery units knew it, consisted of the determination of muzzle velocities by the 6821st Velocity Calibration Team. In addition to providing the battalion commander with the relative characteristics of his pieces, for grouping purposes, the data obtained by the Calibration Team was used by the ordnance officer to determine the serviceability of weapons. The availability of the Calibration Team permitted a sound gun tube replacement policy based on accurate data rather than haphazard estimation, thereby insuring against the premature replacement of serviceable gun tubes.

B. USE OF CAPTURED AMMUNITION AND WEAPONS

The continuing shortage of ammunition led the First Army Artillery Officer to become interested in employing captured weapons. As a result, forty-eight German 105-mm gun-howitzers (10.5-cm L.F.H. 18m/40 with muzzle brake) were obtained from the Communication Zone between 15 November and 1 December. Approximately 20,000 rounds of ammunition were available. All weapons were put in serviceable condition and equipped with panoramic sights. Two provisional battalions were formed from personnel from within the 32d FA Brigade, and a total of 36 of these weapons were in action by 7 December. Up to 26 December, approximately 11,350 rounds were expended, primarily for harassing and interdiction fires. The results obtained through the use of these captured weapons were satisfactory but not outstanding, due to the serious maintenance problem presented.

Captured ammunition was employed successfully by 155-mm Gun M12 battalions. The complete round used was projectile 15.5-cm Stg. Gr. 423 (f) with windshield, fuze R.Y.G. 24/31, and propelling charge 155-mm Gun Charge, B&I, GPF. Some 7,500 rounds were expended.

C. EMPLOYMENT OF SELF-PROPELLED 155-MM GUNS

Prior to and during the early stages of operations on the continent, doctrine for employment of these weapons was not thoroughly clarified. During the pursuit operations across France they proved themselves an ideal heavy weapon to support an armored division; frequently, they were the only long-range weapons within a day's march of the armored column. Later, these weapons became an essential part of the task forces charged with re-

ducing the concrete fortifications of the Siegfried Line. Both direct and indirect fire were employed with superior results. All types of concrete pillboxes and bunkers were taken under fire and were either destroyed or neutralized in short order. The most successful method of attack involved short-range indirect fire with sight defilade. Although this required an expenditure of two or three extra adjusting rounds, it was greatly preferred to placing the piece in a direct fire position under enemy observation. The self-propelled 155-mm guns again proved themselves in the street fighting of Aachen against unfortified buildings whose defenders refused to capitulate to the direct fire of tank destroyers.

As a result of experiences in the several roles the recommendation was made that one battalion of 155-mm guns (SP) be made an organic part of the armored division artillery. (The recommendation was also made at the same time that one battalion of 155-mm howitzers (SP) be made available to the First Army on the basis of one per armored division.)

D. POZIT FUZES

Pozit fuzes were first employed by the artillery with the First Army on the 18th of December 1944, at which time the seriousness of the German break-through rendered it highly desirable to release these fuzes for combat. This was accomplished one week earlier than had been anticipated. A series of demonstrations designed to familiarize infantry, armored, and field artillery commanders with the capabilities and limitations of the fuze had been started but had not been completed. As a result the initial results were not all that might have been obtained since many units were overly cautious and their employment was largely experimental. Notwithstanding this, Pozit concentrations were of inestimable aid in halting and throwing back the German penetration. Many enemy attacks, detected in their initial stages, never reached our lines. Within 23,000 yards range of the front, primary arteries of advance (and later withdrawal) and principal communication centers were largely denied to the enemy both day and night. The fuze proved itself equally valuable for both the defense and the offense.

E. 4.5-INCH ROCKETS

Faced with an ever-dwindling resupply of light artillery ammunition and increased requirements for large-scale neutralization fires it was decided that 4.5-inch rockets, employed in mass, might well supplement artillery fires and air bombardment in deliberately prepared attacks. The 18th Field Artillery Battalion was temporarily equipped with 75 4.5-inch Rocket Launchers T–27, trained in their use, and successfully employed them on three occasions in accordance with this concept. Although much remains to be learned of the organization and employment of rockets, it is felt that there is, and will be in the future, a definite requirement for an inexpensive, easily manufactured, next-to-expendable weapon capable of placing a mass of fire on an area target. The future development and employment of such rocket weapons is considered the logical responsibility of the field artillery.

ANNEX 4

APPENDIX 1

CHART OF AIR OP OPERATIONS

	August	*September*	*October*	*November*	*December*	*January*
Aircraft operational	191	216	203	240	237	213
Aircraft lost*	10	9	24	14	30	9
Percent aircraft lost	5.3	4.2	11.9	5.8	12.67	4.23
Total flying hours	7,982	9,169	4,677	4,610	6,303	3,598
Average hours/aircraft	41.7	42.4	23.1	19.2	26.6	16.9
Pilots operational	214	247	246	276	281	264
Pilots lost†	8	6	5	2	4	2
Percent pilots lost	3.7	2.4	2.0	.7	1.43	.76
Average hours/pilot	37.1	37.1	19.0	16.7	22.4	13.25
Average hours/inf div arty pilot	42.8	39.2	19.2	17.9	20.3	13.6
Average hours/armd div arty pilot	59.8	49.0	19.8	19.7	33.9	19.6
Average hours/corps arty pilot	29.8	24.7	19.0	15.8	21.8	14.5
Average hours/army arty pilot	34.6	32.6	18.0	12.4	18.1	8.9
Hours/lost pilot	999	1,526	935	2,305	1,579	1,798
Missions						
Adj of fire	1,372	1,924	1,254	1,406	1,941	1,046
Reconnaissance	3,290	3,114	2,010	1,721	2,101	1,451
Other	551	750	517	444	267	74
Training	71	202	155	130	233	69
Administrative	1,727	2,024	758	667	777	578
Total	7,011	8,074	4,694	4,368	5,319	3,218
Average hours per mission	1:07	1:07	1:01	1:02	1:19	1:12

*Aircraft missing or actually salvaged.
†Pilots missing in action, killed, or seriously injured.

ANNEX NO. 5

ARMORED

SECTION REPORT

Annex 5
Table of Contents

ANNEX 5

I. Activities of the Armored Section

The Armored Section was responsible for technical and tactical advice and recommendations to the army commander and his general staff on the use, capabilities, and employment of armored and mechanized cavalry units of the command. The performance of these duties included periodic inspection of these units, compilation and evaluation of information secured, and the preparation of detailed records on the combat efficiency of armored units. Allocation of equipment and vehicles to support requirements demanded exercise of rigid control because of the critical supply problems during most of the period. Likewise, recommendations on personnel matters, reflecting technical evaluation, prior training and efficiency of armored officers, and allocation of enlisted personnel, constituted an important part of the section activities. Continued study of enemy armored equipment, tactical dispositions, and methods of employment assisted materially in the development and revision of tactical doctrine.

II. Personnel and Administration

A. TRAINING

Reinforcements were spot-checked by officers of this section at reinforcement battalions and depots and assistance rendered to the general staff on the allocation and assignment of personnel. In cases where it was found that reinforcements lacked adequate training, had spent excessive time in the reinforcement system, or were not suitable for assignment under the SSN required, report was made to the Assistant Chief of Staff, G–1. While reinforcement training was generally adequate, experience indicated that additional time is required for instruction in gunnery and tank driving.

B. AVAILABILITY AND UTILIZATION OF ARMORED AND CAVALRY PERSONNEL

The supply of reinforcements for armored and cavalry units available to the army was not sufficient to meet the combat loss requirements. Infantrymen were used in sizable numbers to make up this deficiency. Their use reduced the combat efficiency of armored and cavalry units during the period of assimilation training in the units.

Tank gunners, tank drivers, and radio operators were required in greater numbers than the package shipments provided and it was necessary to augment the supply of this type reinforcement for armored, cavalry, and tank destroyer units by withdrawing personnel from armored group headquarters and headquarters companies, the 738th Tank Battalion and by retraining of personnel whose SSNs caused them to be excess.

C. AUGMENTATION OF THE NEW ARMORED DIVISION

The reserve command of the new armored division lacked sufficient personnel and equipment to permit utilization as a combat command. Although the Table of Organization did not contemplate its use as a combat command, such use, however, was required. Detachments from armored group headquarters and headquarters companies were, therefore, attached to these divisions to augment the headquarters of the reserve command. This effected a triangular organization within the new armored division.

D. CORPS ARMORED SECTIONS

Combat operations early demonstrated the need for an armored officer at corps level with technical and tactical training in the utilization of armor and who was conversant with the requirements and problems peculiar to separate tank and cavalry units. Personnel from armored group headquarters and headquarters were used to establish Corps Armored Sections on a temporary basis. Recommendation was prepared, approved, and forwarded to higher headquarters for incorporation of a Corps Armored Section in Tables of Organization and Equipment for Corps Headquarters.

E. TABLES OF ORGANIZATION AND EQUIPMENT

Existing deficiencies in Tables of Organization and Equipment were apparent early in our operations. Comprehensive study and analysis was undertaken and amended Tables of Organization and Equipment prepared after detailed consideration of the recommendations of all commanders based on their experiences in combat. Recommended Tables of Organization and Equipment for the Heavy Tank Battalion, Separate, and the Cavalry Regiment, Mechanized, were completed and submitted during this period.

III. Armored Combat Intelligence

A. ARMORED DIRECTIVES AND ESSENTIAL ELEMENTS OF INFORMATION OF ENEMY ARMORED EQUIPMENT

Assistance in the procurement of information on the technical and tactical employment of enemy armored forces was furnished the general staff periodically in the form of specific directives to intelligence interrogators. Questionnaires were forwarded, through G–2 channels, to all armies in the theater so that wide distribution and coverage was obtained. Detailed information on the methods used by the enemy in the employment of his armored forces was obtained. Knowledge of his tactical teachings obtained from prisoners of war aided the development of tactical formations to better defeat him.

Figure 1. Jadgtiger.

B. ARMORED INTERROGATORS

In cooperation with the Assistant Chief of Staff, G–2, and PWI personnel, interrogators were selected at the Prisoner of War Cage who had previous duty and experience with armored units; and these interrogators were used to obtain accurate information from enemy prisoners of war from panzer formations.

C. CAPTURED ARMORED EQUIPMENT

In cooperation with Ordnance Intelligence Service, enemy armored equipment captured in serviceable condition was studied and information on capabilities and characteristics disseminated to armored units. Sighting equipment obtained was returned direct to the United States for further study. Enemy tanks were shipped to the United States through army ordnance to aid in future development of armored fighting vehicles.

D. ENEMY ARMORED ORGANIZATION AND TACTICAL EMPLOYMENT AND DOCTRINE

Enemy documents, training directives, and combat orders, together with information obtained from prisoners of war, were carefully evaluated and screened. Detailed information on the enemy's organization of specific armored units, their equipment and combat experience was continually studied and proved of definite value.

IV. Noncombat Operations

A. TRAINING

1. Reinforcements

Basic training in gunnery and tank driving for reinforcements whose SSN showed them to be clerks, cooks, stenographers, and administrative noncommissioned officers and for whom there was little demand, was conducted by the 12th Armored Group and the 738th Tank Battalion. Upon completion they were reclassified and assigned as tank crewmen.

2. Screening

Armored units were screened for personnel in the class IV and class V category, who were not and had not been since their induction into the service, capable of absorbing the required training and technical knowledge essential for a soldier in an armored unit.

3. Recognition

Appearance of new items of German and American equipment on the battlefield rendered recognition instruction for all units necessary.

4. Rehabilitation and Reorganization of Combat Units

a. The 14th Cavalry Group, consisting of the 18th and 32d Cavalry Squadrons, occupied a defensive sector between the 99th and 106th Infantry Divisions at the beginning of the German counteroffensive. These units were heavily engaged and suffered severe losses in personnel and vehicles in the initial attack, and were thereafter attached to the 7th Armored Division on 18 December 1944. Composite units were organized and operated with the 7th Armored Division and Combat Command "R," 9th Armored Division until 30 December 1944, when they reverted to army control and were moved into billets three miles south of Tongres, Belgium for rehabilitation and reorganization. This unit had lost 20 percent of the commissioned personnel, 33 percent of the enlisted personnel, and 53 percent of vehicular equipment.

b. Cavalry reinforcements were not available, and infantry personnel was used to reconstitute the units. An intensive program of retraining and combat indoctrination of reinforcements as reconnaissance personnel was carried out under the supervision of the Armored Section.

c. Reequipment was difficult because vehicles were critically short, especially trucks, 1/4-ton, of which the group had lost 132. Many substitutions were required in completing the reequipment. The group was attached to the XVIII Airborne Corps on 25 January 1945 with each squadron organized with two reconnaissance troops. Later, on 4 February 1945, equipment to fill all existing shortages was made available; and both squadrons became operational on their normal T/O and E basis. It was again necessary to assign infantry to fill squadrons to T/O strength as cavalry reinforcements received were insufficient to replace combat losses.

5. Training Aids and Films

a. Firing ranges for tank weapons were improvised in the vicinity of Spa, Belgium, and new tank units test-fired their weapons in this area before they were attached to combat units.

b. Training films available were insufficient. There was definite need for training films on infantry-tank combat involving tank units larger than a platoon.

6. Tactical Demonstrations

No tractical demonstrations were held in the army area.

Figure 2. Reinforcement training in tank gunnery by 738th Medium Tank Battalion, Special (ME).

Figure 3. Training detachment camp of 738th Medium Tank Battalion, Special (ME) for reinforcements.

B. CAMOUFLAGE

In cooperation with the 602d Engineer Camouflage Battalion, Sommerfield Airplane Landing Mat was welded to the sides of the tank and turret, and taped to the gun barrel. The tank was then given a coat of disruptive painting. The colors used were lusterless black and green. The Sommerfield Matting permitted the extensive use of natural camouflage and aided materially in the concealment of tanks from the enemy. Recommendations were submitted through channels to have disruptive painting applied prior to oversea shipment.

Snow camouflage, obtained by mixing 6 gallons of lime, 2 quarts of salt, and 4 gallons of water, was recommended for use by armored units. Snow camouflage was applied only to combat vehicles actually used at the front. The use of salt in the mixture required that all electrical contacts and unpainted surfaces be thoroughly lubricated with suitable grease to protect against corrosion. No damaging effects on vehicles were noted where snow camouflage had been applied. However, the tactical results were reported as extremely effective.

C. TACTICAL INSPECTIONS

Constant tactical and administrative inspections of armored units were conducted in order to maintain accurate information on the morale and combat worthiness of units. Maxi-

Figure 4. Mechanized cavalry on reconnaissance.

Figure 5. Medium Tank M4 equipped with Sommerfeld airplane landing mat using natural camouflage.

mum combat efficiency required that battalions be relieved periodically for maintenance and rehabilitation. Recommendations were made by the section for relief of battalions for refitting and inspection of their equipment.

D. PUBLICATIONS

1. Armored Notes

Combat experiences of general value submitted by armored units were screened by this section and published in the form of "Armored Notes" to the end that all personnel might benefit by the experiences of those units engaged in combat.

2. Artillery Observers

Because the tactical doctrine and the equipment of the enemy is designed to permit the effective engagement of our tanks at long range, the neutralization of the antitank gun became of increasing importance. Methods of adjustment of artillery fire by GHQ tank units

were coordinated with the Artillery Section. A forward observer's card was prepared, printed, and issued to all tank commanders. The use of artillery by tank commanders, and its adjustment by tank personnel, greatly facilitated tank operation. In one engagement, a tank sergeant requested, received, and adjusted the entire corps artillery.

3. *Friend or Foe*

Changes in silhouette and design of armored fighting vehicles required thorough instruction of infantry, aircraft, tank destroyer, engineer, and field artillery personnel in recognition of American tanks. Principal types of American and German tanks and tank destroyers were illustrated in a pamphlet entitled, "Friend or Foe," and distributed to all First Army units.

4. *Armored Bulletins*

Technical data on armored equipment reported by the Armored Board was included in bulletins prepared by this section and distributed to tank units.

E. LOGISTICS FOR ARMORED UNITS

Logistical data for all type armored units, including fuels and lubricants, ammunition, road space, time length of columns, and casualty rates, were studied by the section. Recommendations were made to interested staff sections, when requested, for their use in the efficient handling of armored units.

Figure 6. Medium Tank M4 with snow camouflage applied.

V. Supply and Equipment

A. EQUIPMENT

1. Availability

Due to a critical shortage of medium tanks during the entire period covered by this report, it was mandatory to issue a directive reducing the authorized strength of medium tanks in armored divisions and tank battalions to 50 medium tanks per battalion irrespective of the Table of Equipment. (See app. 1 for operational strengths.) Although no reductions in other elements were directed, light tanks and other vehicular equipment had to be issued on a proportional scale because of the same critical status on these items.

2. Maintenance

Maintenance tools, tank accessories, and equipment were critically short. It became necessary to issue rehabilitated tanks with only the necessary "on vehicle items" for use by crews while in contact with the enemy. There were practically no tools with tanks to be used for crew maintenance. Also, second-echelon tools were short to the extent that maintenance personnel of battalion and regimental sections were rendered about 50 percent effective.

3. Ammunition

The first distribution of 76-mm HVAP ammunition was made to tank units on 11 September 1944, as follows: (1) 3d Armored Division, 643 rounds; (2) 746th Tank Battalion, 160 rounds. The receipt of this ammunition was the first realization of the continuing efforts of the Armored Section to increase the effectiveness of our tank weapons against enemy armor. Although units were very enthusiastic about this ammunition, very limited quantities were received at infrequent intervals, and the battle requirements of units actually engaged could not be met. Upon recommendation from the Armored Section, the ordnance officer issued this ammunition to all units on the basis of an equal number of rounds for each medium tank 76-mm gun in the army. By 22 February 1945, each 76-mm gun had been supplied approximately five rounds.

4. Radios

During the period, AN/VRC–3 radios were installed in medium tanks in GHQ tank battalions in order to provide adequate communication between elements of the tank-infantry team. The first of these installations was made about 11 September 1944, and the last was completed about 15 December 1944. The long delay was occasioned by a scarcity of equipment; installation was completed by the army signal officer in accordance with operational priorities set up by this section.

5. Tank Casualty Intelligence

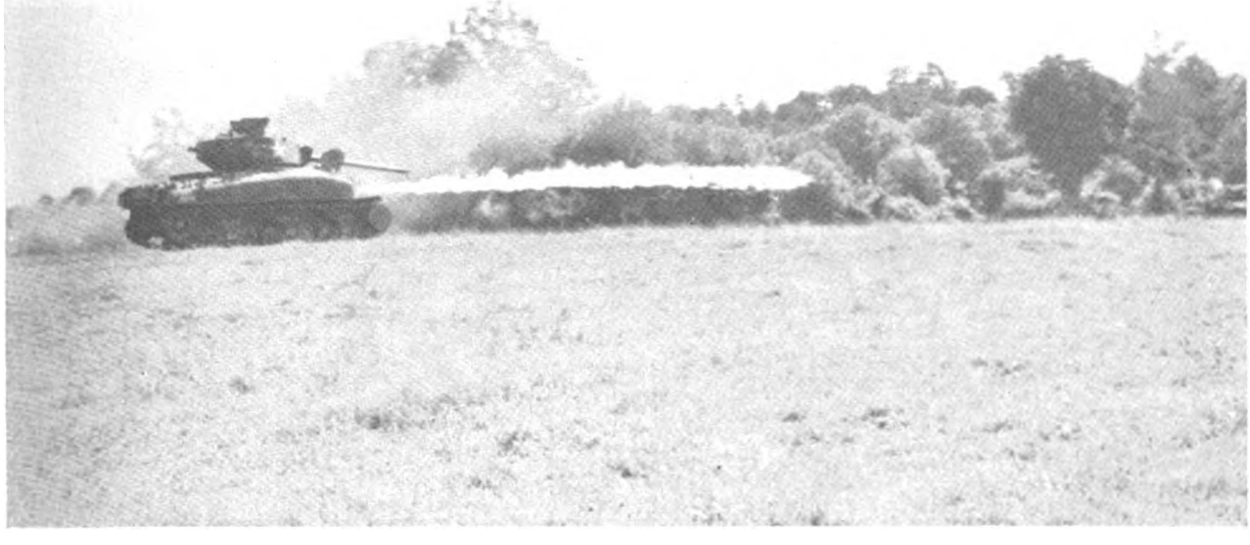
To afford accurate data to development agencies and furnish adequate information on the effectiveness of our equipment, reports on tanks rendered inoperative due to enemy action were instituted. These reports were completed by unit maintenance officers when inspecting on the battlefield. They gave specific information as to how and where tanks were damaged, what damaged them, personnel casualties suffered, and whether or not the tank was destroyed by fire. This data was of material value to the agencies concerned in the development and improvement of armored equipment.

Figure 7. Medium Tank M4 equipped with outside telephone.

Figure 8. Medium Tank M4 equipped with ice caulks.

Figure 9. Corduroy matting used to extricate vehicles stuck in the mud.

Figure 10. E4–5 Flame Thrower.



B. SPECIAL EQUIPMENT

1. Extended End Connectors

Tanks were unable to negotiate terrain in the First Army sector during the winter months without extended end connectors. Originally the army's requirement was fixed at 100,000. Extended end connectors for both light and medium tanks were produced by local manufacture and received in small shipments during November, December, January, and February. When installed on medium tanks, they provided additional flotation and were used very successfully. On light tanks, they did not prove satisfactory and resulted in many thrown tracks and caused undue damage to bogie wheels. All requirement for extended end connectors for light tanks was canceled on 16 February 1945.

2. Ice Caulks

Armored combat during the German counteroffensive was over ice-covered roads and required the use of all available traction devices. Grousers were used when available, but many units developed ice caulks which were welded to the tracks. The development of a dependable ice caulk, easily attached and removed, should receive high priority in future development.

3. Corduroy Matting

For use in muddy terrain, armored units improvised log corduroy matting which was hung on the sides of tanks and used to extricate vehicles stuck in the mud.

C. SUBSTITUTE EQUIPMENT

1. M5A1 Light Tank

Experiments were conducted by reconnaissance units in substituting the M5A1 Light Tank for the M8 Armored Car with varying results. At the close of the period, the reports were incomplete on the suitability of this substitution.

2. 81-mm and 4.2-inch Mortars

81-mm Mortars were substituted for 60-mm Mortars in mechanized cavalry units because of the critical shortage of 60-mm Mortars in infantry units in the army. 4.2 Mortars were substituted in the 83d Cavalry Squadron on an experimental basis. Unit commanders did not agree on the desirability of such substitutions, and study thereon was continued.

3. Machine Gun, Model 1919A6

One machine gun, Model 1919A6 was issued to the 4th Cavalry Group to determine the suitability of this weapon for mechanized cavalry units.

4. Rifle, M1

Substitution of the Rifle, M1 for the carbine for reconnaissance personnel was recommended.

D. NEW EQUIPMENT

1. E4–5 Flame Thrower

The E4–5 Flame Thrower, mounted on the M4 Tank, was given major consideration and installation of one gun per platoon in GHQ tank battalions was completed. A school of 4 days duration for crews of all tank battalions on the operation, maintenance, care, and functioning of this weapon was conducted under the supervision of this section. Mechanical failures, lack of uniformity of the fuel, and short range were the principal criticisms encountered. Ignition difficulties and variations in fuel created doubt in the minds of tank crews that the gun would operate positively in combat. The gun proved unsuitable for the missions encountered.

Mechanized flame throwers of both the Crocodile and E4–5 type proved of limited application in the fighting in Belgium and Germany. Operational requirements exist for a dependable flame thrower capable of 250 to 300 yards range with a fuel capacity of 500 gallons, an output of 5 gallons per shot and a positive ignition system.

2. M24 Light Tank

The M24 Light Tank was recommended for procurement and issue as a replacement for the M5A1 Light Tank in all armored and cavalry units. At the close of the period, M24 Light Tanks had been issued to all mechanized cavalry units in the army.

Figure 11. Light Tank M24.

Figure 12. T1E3 Mine Exploder.

3. T34 Rocket Launcher

On 17 August 1944, tests supervised by this section were conducted by the 2d Armored Division of 4.5-inch T34 Rocket Launcher. At a range of 4,000 yards, a dispersion in range of 300 yards and deflection of 650 yards was obtained using ripple salvo fire. This performance was considered satisfactory but no operational requirement for the equipment existed for its use by tank units, due to the disadvantages inherent in mounting the launcher on the tank.

4. M2 Demolition Snake

In cooperation with the army engineer, a demonstration by the 1111th Engineer Combat Group and 746th Tank Battalion of the M2 Demolition Snake was held 8 November 1944, near Camp Elsenborn. The demonstration covered the construction of the snake, and the equipment and methods used in pushing and towing, and finally the detonation of a prepared mine field. Thorough examination of the mine field after demolition of the snake revealed only one unexploded mine which was partially destroyed and located approximately 20 feet from the center line of the snake. The demonstration confirmed the effectiveness of this method of destruction of mine fields.

5. T1E1 and T1E3 Mine Exploders

The 738th Tank Battalion, Special (Mine Exploder) was assigned to the army effective 24 November 1944. This unit was equipped with T1E1 and T1E3 Mine Rollers. It was

committed by attachment of companies to corps, armored divisions, infantry divisions, and separate engineer units. A recommendation for a Table of Organization and Equipment for this battalion was forwarded to higher headquarters on 28 January 1945. Due to unfavorable weather and terrain, limited use was made of this equipment.

6. Armor Penetration Firing Tests

A board of officers consisting of officers from armored, artillery, and ordnance sections of this headquarters conducted firing tests from 12 July 1944 to 30 July 1944 to determine the effectiveness of tank and antitank weapons in First U. S. Army, against the German Mark V "Panther" and Mark VI "Tiger" Tanks. (See appendix 2 for copy of report of these proceedings.)

7. M26E3 Heavy Tanks

Twenty Heavy Tanks M26E3 were allotted to First U. S. Army early in February and issued equally to 3d and 9th Armored Divisions. Ordnance department representatives conducted a preliminary demonstration, driving and operation school for crews assigned to these tanks on 17 February 1945. By the end of the period, satisfactory combat experience had not been obtained on the effectiveness of this tank in fighting German heavy equipment.

8. T26E4 Heavy Tank

One Heavy Tank T26E4 was delivered and issued to the 3d Armored Division for experimental purposes. Muzzle velocity of 3,850-foot seconds with a 16.70 pound projectile was more nearly comparable with German tank

Figure 13. The Flail.

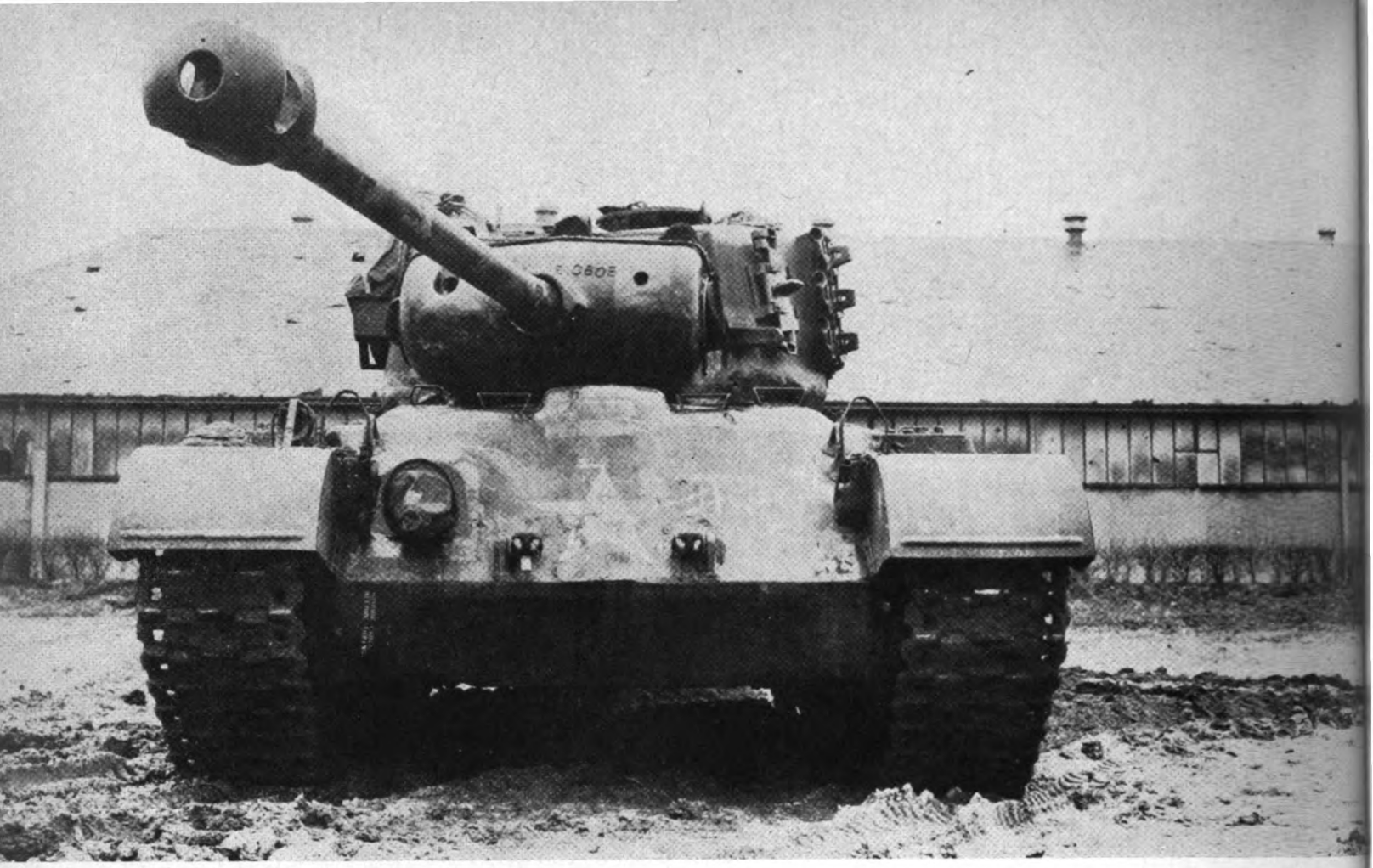


Figure 14. Heavy Tank M26E3.

weapons, but use of separate loading ammunition was not acceptable.

9. Conversion to British 17-pounder

Requirements for conversion of M4 Medium Tanks armed with 75 millimeter gun to the British 17-pounder were reviewed. This weapon was desired because it had a muzzle velocity of 3,100-foot seconds with APCBC ammunition, would penetrate 5.1 inches of homogeneous armor at 1,000 yards at a 20° angle of impact and 4.55 inches at 2,000 yards. Conversion involved procurement of British ammunition, and at the close of the period no tanks so converted had been received.

10. DD Tanks

Requirements for DD Tanks for crossing the Rhine were studied. Demonstrations proved vulnerability to small-arms fire and difficulty of control in swift currents, and the necessity for special training and maintenance of equipment.

11. CDL Tanks

CDL Tanks were issued to the 738th Tank Battalion and this unit employed to reinforce antiaircraft units in the protection of Rhine bridges against water-borne attack. Use of CDL Tanks in their normal combat role was not considered.

12. Gun, Motor Carriage M7

One Gun, Motor Carriage M7, with 9.75 incendiary Mortar was issued to the 8th Infantry Division. A demonstration was held 18 March 1945 under the joint supervision of the Armored and Artillery Sections. This weapon was considered of value for special missions only in its present stage of development.

E. EQUIPMENT SURVEYS

A questionnaire on the use of present tank equipment was prepared; and specially selected field officers from armored groups conducted a survey on opinions and practice of tank personnel on the use of present equipment, its suitability under combat conditions, and difficulties which had been demonstrated by combat experience. These surveys were analyzed by the Armored Section and used to prepare recommendations on future development and to answer queries from various development agencies.

F. INDIVIDUAL CLOTHING

At the request of the quartermaster, various combinations of the latest types of clothing developed were tested.

1. Combat

The combat suit previously designed for the Armored Force proved the most satisfactory outer cold weather garment for armored and mechanized troops. Outside pockets, gussetted wrists, skirt below the waist, and lapel collar as found on the jacket, field M–1943 were extremely undesirable features catching on the vehicle, hampering the soldier in the proper performance of his duties in the vehicle, and constituted a menace to his safety when required to evacuate a burning vehicle.

Crash helmets were essential for protection of tank personnel and efficient use of radio earphones.

Combat boots were required for armored and mechanized troops. Laces were undesirable. Soles which provided footing on greasy metal free from steel caulks or studs were necessary in armored vehicles.

2. Winter

Winter clothing of heavy bulky type was not suitable for armored or mechanized cavalry for combat.

3. Camouflage

Camouflage clothing of special type was not required.

VI. Armored Units Assigned to First U. S. Army

TROOP LIST

Unit	*Date attached*	*Date detached*
2d French Armd Div	19 Aug. 44	5 Sep. 44
2d Armd Div	.....	21 Oct. 44
	22 Dec. 44	3 Feb. 45
3d Armd Div	.....	.....
4th Armd Div	.....	1 Aug. 44
5th Armd Div	24 Aug. 44	21 Jan. 45
7th Armd Div	.....	5 Aug. 44
	25 Sep. 44	21 Oct. 44
	20 Dec. 44	.....
9th Armd Div	22 Oct. 44	21 Dec. 44
	22 Feb. 45	.....
10th Armd Div	17 Dec. 44	21 Dec. 44
3d Armd Gp	.....	2 Feb. 45
6th Armd Gp	.....	.....
7th Armd Gp	.....	22 Oct. 44
9th Armd Gp	10 Dec. 44	.....
12th Armd Gp	22 Oct. 44	24 Dec. 44
	24 Jan. 45	.....
70th Tank Bn	.....	21 Dec. 44
707th Tank Bn	22 Aug. 44	21 Dec. 44
709th Tank Bn	.....	22 Dec. 44
738th Med Tnk Bn, Sp (ME)	24 Nov. 44	.....
740th Tank Bn	4 Nov. 44	.....
741st Tank Bn	.....	2 Oct. 44
	22 Oct. 44	.....
743d Tank Bn	.....	21 Oct. 44
	22 Dec. 44	3 Feb. 44
744th Tank Bn	.....	21 Oct. 44
745th Tank Bn	.....	.....
746th Tank Bn	.....	.....
747th Tank Bn	.....	21 Oct. 44
750th Tank Bn	5 Nov. 44	.....
759th Tank Bn (L)	.....	.....
771st Tank Bn	22 Dec. 44	3 Feb. 45
774th Tank Bn	22 Oct. 44	.....
777th Tank Bn	12 Feb. 45	.....
786th Tank Bn	30 Jan. 45	.....
4th Cav Gp, Mecz	.....	.....
14th Cav Gp, Mecz	22 Oct. 44	.....
102d Cav Gp, Mecz	.....	22 Dec. 44
	24 Jan. 45	.....
113th Cav Gp, Mecz	.....	21 Oct. 44
4th Cav Sqdn	.....	.....
18th Cav Sqdn	22 Oct. 44	.....
24th Cav Sqdn	.....	.....
32d Cav Sqdn	22 Oct. 44	.....
38th Cav Sqdn	.....	.....
102d Cav Sqdn	19 Aug. 44	22 Dec. 44
	26 Jan. 45	.....
113th Cav Sqdn	.....	21 Oct. 44
125th Cav Sqdn	.....	21 Oct. 44

VII. Armored Operations

A. MECHANIZED CAVALRY OPERATIONS

Campaigns in Western Europe proved the doctrine of "sneaking and peeping" by reconnaissance units to be unsound. Cavalry units had to fight to obtain information. Organization and equipment of mechanized cavalry based solely on requirements for reconnaissance missions was proved to be equally unsound. Both cavalry groups and squadrons were handicapped in the performance of their assigned missions because of lack of organic strength and firepower.

Mechanized cavalry accomplished the following assigned missions over the period covered by this report:

1. Dismounted attack of an important terrain feature.
2. Dismounted attack in a zone.
3. Seizing and holding a town or communications center.
4. Counter-reconnaissance, screening and blocking.
5. Filling a gap and maintaining contact between divisions, corps, and armies.
6. Pursuit.
7. Covering force and rear guard.
8. Defense of wide sectors of the Siegfried Line.
9. Reconnaissance in force.
10. Patroling and mopping-up of an area.
11. Reconnaissance of routes and bridges including seizure and holding them.
12. Offensive operation in the enemy rear area.

Reinforcement of cavalry units with motorized infantry, tank destroyers, artillery, engineers and tanks was required for accomplishment of most combat missions. Such attachment permitted units to brush aside enemy resistance and push rapidly forward into enemy rear areas. Cavalry squadrons were the basic tactical unit. Vigorous patroling of enemy positions convinced the enemy that our positions were held in force.

Assault gun troops were generally used in battery for indirect fire support and when artillery was available this unit was placed under the artillery commander for coordination of harassing and interdictory fires.

Mobility and speed made possible quick reduction of towns and villages by attack from the rear and by surprise.

Communication often was the key to success in moving rapidly, concentrating where resistance was weakest, bypassing heavy resistance, penetrating into rear area installations, cutting off routes of enemy withdrawal, preventing demolition of bridges, and close coordination and cooperation with fighter bomber cover in reduction of strong points, neutralization of enemy armor, and scattering enemy units forming for counterattack. On 31 August 1944 when the VII Corps changed direction to the north, the 4th Cavalry Group filled the gap between First U. S. Army and Third U. S. Army, advanced on a wide front, captured Mezieres, established a bridgehead over the Meuse River, and saved a full infantry division to the corps for the decisive battle in the vicinity of Mons.

During the German counteroffensive, the 14th Cavalry Group fought a successful rearguard action covering the enemy salient until the 7th Armored Division could be moved to that sector.

A definite need was demonstrated for the rifle trooper in cavalry organization and combat although there was no requirement for horses for mounting him. Cavalry retained its tactical importance and use, and the fact

that horses were not required as a means of obtaining mobility and speed did not eliminate the necessity for troops to perform the cavalry mission. Lack of strength and firepower for combat necessitated battlefield improvisation.

The flexibility visualized in the group organization was not required; and the elimination of the regiment removed those elements of unity, espirit de corps, history and morale which concern the preponderant part of the soldier's life, the importance of which cannot be minimized and which makes for the close association and cooperation required of cavalry on the battlefield.

B. EXPLOITATION OF ST. LO BREAK-THROUGH

Early in the expansion of the beachhead in Normandy, a policy was established of permanent attachment of the same tank battalion to each infantry division. In long association, intimate acquaintances with personnel aided materially in establishing the close cooperation required for successful infantry-tank combat.

Following the St. Lo break-through, infantry divisions were reinforced by an attached medium tank battalion, so far as they were available. All armored divisions were committed as spearheads and generally moved with combat commands echeloned to the flank. Reserve commands were small and usually followed the combat command making the main effort. Armored combat during this phase was generally sharp and violent, yielding large numbers of prisoners and large quantities of matériel.

Headquarters, service and supply personnel captured and rounded up prisoners, engaging

Figure 15. Medium Tank M4 destroyed by Pz Kw IV.

in close combat on numerous occasions, relieving their tank units of "mopping-up" responsibilities so that the pursuit might continue unabated. Objectives were overrun and missions accomplished in some cases prior to receipt of orders directing the operations. Distances involved and rapidity of movement prohibited complete wire installations and placed unaccustomed demands on signal radio personnel, necessitating chain relay stations (equipped with CW sets), often in enemy territory, to maintain contact with adjacent and higher headquarters. Armor enjoyed the greatest freedom of maneuver, the air cover and communication therewith was most effective, and tank unit attachments permitted all infantry divisions to launch an armored attack. Dismounted elements were kept within supporting distance by shuttling, although at one time an infantry division was transported 125 miles by truck only to find itself upon arrival still 40 miles from an appropriate assembly area. The 9th Panzer Division was destroyed south of Orchies, France on 2 September 1944 by the 2d Armored Division when columns of both divisions attempted to use the same road at the same time. GAF divisions were easily mauled because of their lack of supporting weapons.

The logistical requirements for an army of this size pursuing with all available armor employed, reached staggering proportions. After 2 September 1944, essential battle resupply in the necessary quantity to continue aggressive pursuit became impossible. Existent stocks of gasoline had been exhausted. Track was not available for replacement, and vehicular equipment had become unreliable without considerable maintenance and extensive repair. Movement of armored units was controlled in September 1944 by the strictest hoarding and rationing. The advance continued at the speed dictated by the dismounted elements with armor limited in an increasing degree to an infantry-support role.

Figure 16. Medium Tank M4 with dozer.

C. BATTLE OF GERMANY

Advance of our lines through the Siegfried defenses at the German border required armored action over terrain not particularly suited to tanks. The Provinces of Eupen and Malmedy, Belgium, and the Duchy of Luxembourg are territories where grades and slopes are often too steep for tanks and many densely-wooded, well-covered areas aid the defender who possesses antitank means.

Our operations required armored units to fight through and completely reduce numerous small towns and villages. Several techniques were developed using armor in village fighting. Within the armored divisions these attacks were usually conducted as combined operations without rigid limitation upon types of missions assigned subordinate units. Usually the town was first encircled by the tank elements and isolated on the battlefield, denying the enemy exits and routes of approach. Infantry and tanks then entered the town and proceeded down the streets with the tanks blasting buildings, antitank guns, and tanks and the infantry digging the enemy out of the cellars and steeples. Tank losses within the armored units were heavy but utilization of air and artillery kept them within operational limits. Necessity for speed to avoid a formidable build-up was paramount.

Infantry division commanders usually attached one company of medium tanks to each regimental combat team. Medium tank companies were further broken down by attaching a platoon to each infantry battalion. Assault guns were usually detached from their units and employed as a six-gun 105-mm howitzer battery under the artillery commander, although this gun was the only weapon within armored units which could penetrate the front slope plate of the German Panther and Tiger "II" Tanks. Light tank companies were attached to divisional reconnaissance troops. Battalion commanders and staffs functioned in an administrative capacity, performing liaison missions and supervising maintenance within the battalion, which operated under many commanders over the entire divisional front.

Attacks were local, for limited objectives, over thickly wooded and difficult terrain and were usually canalized. The enemy had now had time to organize for defense in depth, to emplace his antitank means—returning to his tactical teaching of fighting at ranges from 2,000 to 3,000 yards. The entire front experienced an increase in artillery and mortar fire. Mines were encountered in quantity. Extended end connectors were installed to give additional flotation to tanks in marshy and muddy ground which had become a serious obstacle. Tanks remained on the infantry defense perimeter at night and proved a beneficial morale factor to the infantry.

The losses in personnel and equipment were substantial. Tactical gains were controlled by the infantry's rate of advance. The close of the period was marked by increased call upon tank units to reinforce the fires of our artillery.

D. THE GERMAN COUNTEROFFENSIVE AND THE DRIVE TO THE RHINE

When the enemy launched his counteroffensive, his main effort was directed against a sector held by inexperienced troops without armored support. All armor assigned to the First U. S. Army, except the 740th Tank Battalion, was committed in an offensive operation designed to clear the Hurtgen Forest and advance to the Roer River. The 740th Tank Battalion had no equipment except a small number of administrative vehicles.

The enemy employed his armor in mass and in greater numbers than had previously been

Figure 17. Pz Kw VI Model II (Tiger Royal) and Medium Tank M4 at Spa, Belgium

Figure 18. Pz Kw V "Panther."

Figure 19. Pz Kw VI Model II (Tiger Royal).

experienced. The spearhead force included the German Fifth Panzer and Sixth SS Panzer Armies. During the initial phase of the counteroffensive, our armor was used on a wide front usually in company strength on roadblocks fighting a delaying action covering withdrawal of other units.

Failure of the German to resupply his tank units with gasoline permitted rapid concentration of the 2d, 3d, 5th, and 7th Armored Divisions in critical sectors undisturbed. Much German equipment was destroyed by the enemy because they were unable to move due to lack of fuel. Reconnaissance elements of the 1st Panzer SS Division "Adolph Hitler" were able to advance on two occasions to a point about 1,000 yards from the army dump at Spa, Belgium containing in excess of 3 million gallons of gasoline.

After containing the penetration, the initial phase of restoration of the line was completed by the 2d and 3d Armored Divisions. The weather was bitterly cold, and the majority of casualties were from freezing and frostbite. Some units poured gasoline on the turet rings and set them on fire to keep their tanks in operation. Operation over icy ground required additional traction devices especially when tanks were equipped with steel tracks. Snow camouflage for armored vehicles was used extensively.

The enemy was never able to recover from his losses in equipment and men in the "bulge." The Sixth SS Panzer Army was withdrawn for the Eastern front. The drive to the Rhine was conducted with additional infantry attached to armored divisions due to the nature of the terrain traversed. German armor

did not appear in strength and captured documents revealed that it was necessary for the German high command to husband their armor to the point of prohibiting its commitment in less than company strength.

The absence of German tanks in large numbers and the rolling plains of the Rhineland permitted all armored units again to make substantial advances. The long unequal fight of the Sherman with the Tiger Royal "II," which had operated in force in the First U. S. Army sector, had ended.

E. COMBAT LESSONS

1. Mechanized cavalry must be organized and equipped for combat and must fight to gain information.

2. Flexibility visualized in the group organization for cavalry units was not required.

3. Mechanized cavalry must be capable of accomplishing all cavalry missions in addition to performing reconnaissance.

4. Carefully planned infantry-tank operations employing tanks in mass and depth will succeed.

5. Using the assault gun radio net forward to the lead tanks and by wire laterally to division and corps artillery, any well-trained tank officer or NCO is able to direct all available artillery.

6. Tanks cannot remain stationary in the face of enemy antitank fire but must keep under cover until suitable targets appear which they can engage and neutralize.

7. Tanks attract artillery fire and when placed in position on the infantry perimeter make the infantry positions untenable resulting in casualties to both tanks and infantry.

Figure 20. Jadgpanther.

8. Areas selected for tank employment must be suitable for maneuver. Narrow valleys with restricted canalized routes, objectives which do not include commanding terrain, or small infantry unit sectors with inadequate tank maneuver space result in destruction of tanks by enemy antitank guns emplaced in depth, fighting at maximum ranges.

9. The doctrine of mass employment is sound and the most decisive method of tank employment. Armor must be employed in mass, in depth, on a narrow front, through soft spots, by surprise, against decisive objectives.

10. Successful utilization of supporting tank formations by infantry units is dependent upon a well-rounded, thorough knowledge of tanks and their capabilities by those infantry commanders responsible for the method and manner of commitment. Infantry who fight with tanks should train with tanks.

11. The infantry division must have adequate organic antitank means for the protection of the infantry position. Towed artillery does not possess the flexibility of self-propelled artillery. The use of tanks and assault gun tanks within the infantry division in these roles is not utilization as originally intended and tank equipment is not particularly fitted therefor.

12. Armor must be prepared to meet armor and to destroy it in battle. Armored combat cannot be limited to those missions which can be performed by one type of tank. Tanks for close support of infantry must be capable of destroying hostile armor and have sufficient armor protection to permit them to stay on the battlefield without having to resort to extensive maneuver. Tanks for armored divisions must have gun power to destroy hostile armor and mobility to permit swift decisive action through maneuver.

ANNEX 5
APPENDIX 1

Operational Strength

AUGUST 1944

Unit	Medium tank T/O strength	Medium tank operative daily average	Medium tanks lost
2 A D	232	224	40
2 A D (French)	174	176	19
3 A D	232	226	74
5 A D	168	160	21
70th Tk Bn	54	50	13
712th Tk Bn	54	47	0
735th Tk Bn	54	53	0
737th Tk Bn	54	51	15
741st Tk Bn	54	46	2
743d Tk Bn	54	46	11
745th Tk Bn	54	50	3
746th Tk Bn	54	50	7
747th Tk Bn	54	49	18
749th Tk Bn	54	54	0
Total	1,346	Total 1,282	Total lost 223

SEPTEMBER 1944

Unit	Medium tank T/O strength	Medium tank operative daily average	Medium tanks lost
2 A D	232	221	7
2 A D (French)	174	164	..
3 A D	232	193	74
5 A D	168	137	20
70th Tk Bn	54	48	3
707th Tk Bn	54	54	0
741st Tk Bn	54	40	5
743d Tk Bn	54	43	1
745th Tk Bn	54	44	7
746th Tk Bn	54	42	17
747th Tk Bn	54	40	5
Total	1,184	Total 1,026	Total lost 139

OCTOBER 1944

Unit	Medium tank T/O strength	Medium tank operative daily average	Medium tanks lost
2 A D	232	197	17
3 A D	232	193	12
5 A D	168	143	10
7 A D	168	117	37
9 A D	168	167	0
70th Tk Bn	54	52	0
707th Tk Bn	54	52	0
709th Tk Bn	54	38	0
741st Tk Bn	54	41	0
743d Tk Bn	54	34	22
745th Tk Bn	54	35	17
746th Tk Bn	54	34	16
747th Tk Bn	54	45	1
774th Tk Bn	54	53	0
Total	1,454	Total 1,201	Total lost 132

NOVEMBER 1944

Unit	Medium tank T/O strength	Medium tank operative daily average	Medium tanks lost
3 A D	232	196	51
5 A D	168	142	3
9 A D	168	167	0
70th Tk Bn	54	41	23
707th Tk Bn	54	43	26
709th Tk Bn	54	36	5
740th Tk Bn	54	9	0
741st Tk Bn	54	49	0
745th Tk Bn	54	31	5
746th Tk Bn	54	33	4
750th Tk Bn	54	47	16
774th Tk Bn	54	52	0
Total	1,054	Total 846	Total lost 133

Unit	Medium tank T/O strength	Medium tank operative daily average	Medium tanks lost
DECEMBER 1944			
2 A D (23-31)	232	187	26
3 A D	232	176	44
5 A D	168	131	48
7 A D	168	102	103
9 A D	168	158	45
10 A D	168	156	7
70th Tk Bn	54	31	9
707th Tk Bn	54	40	26
709th Tk Bn	54	33	12
740th Tk Bn	54	17	5
741st Tk Bn	54	47	18
743d Tk Bn	54	40	9
745th Tk Bn	54	27	5
746th Tk Bn	54	37	8
750th Tk Bn	54	47	7
771st Tk Bn	54	42	9
774th Tk Bn	54	49	17
Total 1,730	Total 1,320	Total lost	398
JANUARY 1945			
2 A D	232	195	30
3 A D	232	176	102
5 A D	168	160	0
7 A D	168	141	29
9 A D	168	61	0
740th Tk Bn	54	47	14
741st Tk Bn	54	47	0
743d Tk Bn	54	45	0
745th Tk Bn	54	47	9
746th Tk Bn	54	47	0
750th Tk Bn	54	50	0
771st Tk Bn	54	50	0
774th Tk Bn	54	44	0
Total 1,400	Total 1,110	Total lost	184

Unit	Medium tank T/O strength	Medium tank operative daily average	Medium tanks lost
1–22 FEBRUARY 1945			
2 A D	232	207	0
3 A D	232	207	8
7 A D	168	156	0
740th Tk Bn	54	45	14
741st Tk Bn	54	42	2
743d Tk Bn	54	46	0
745th Tk Bn	54	50	3
746th Tk Bn	54	44	1
750th Tk Bn	54	53	6
771st Tk Bn	54	50	0
774th Tk Bn	54	42	8
Total 1,064	Total 942	Total lost	42

Total loss for period: 1,251

Report of Proceedings of Board of Officers

Organization: Headquarters, First U. S. Army.
Place: APO 230, U. S. Army.

Proceedings of a board of officers which convened at Headquarters, First U. S. Army, pursuant to Special Order No. 196, Headquarters, First U. S. Army, 19 July 1944.

The board met pursuant to the foregoing order at Headquarters, First U. S. Army, APO 230, at 1400 on 12 July 1944 and on subsequent dates to conduct the firing tests. The final meeting was held on 30 July 1944. *Present:* All members. PURPOSE: To conduct tests to determine the effectiveness of tank and antitank weapons in First U. S. Army, against the German Mk V "Panther" and Mk VI "Tiger" Tanks.

1. *a.* Firing was conducted on terrain permitting 1,500 yards maximum range with a zero angle of site. All guns and types of ammunition, suitable for antitank purposes, available to First U. S. Army were defeated on targets whose armor plate was slightly burned. Upon determination of critical ranges, all penetrations were proven against the armor plate of a German Mk V "Panther" Tank with armor undamaged and in excellent condition. All firing was conducted normal to the target. No firing was conducted against the German Mk VI "Tiger" Tank as there were none available.

b. The following normal types of tank and antitank weapons and ammunition were tested:

Weapon	*Ammunition*
Launcher, Rocket, AT, 2.36-inch	Rocket, AT, 2.36-inch, M6A1
Launcher, Grenade, M8	Grenade, AT, M9A1
37-mm Gun, M6, Mounted on Light Tank, M5A1	APC, M51
40-mm Gun, M1, (AA)	AP, M58
57-mm Gun, M1	APC, M86
	Sabot
75-mm Gun, M3, Mounted on Medium Tank, M4	APC, M61
	Heat, M66 (Special)
3-inch Gun, M5, Mounted on Motor Carriage, M10	APC, M62, w/BDF, M66A1
	AP, M79
90-mm Gun, M1A1, (AA)	AP, M77
105-mm Howitzer, M4, Mounted on Medium Tank, M4	HEAT, M67

c. The board assumed that the effect of hollow charge ammunition is not dependent on terminal velocity but the effect does vary with the angle at which the projectile strikes. Hits approaching a 90° angle of impact give better penetration.

2. FINDINGS: The board having carefully considered the evidence before it finds that:

(1) *Launcher, Rocket, AT, 2.36-inch.* Rocket, AT, 2.36-inch, M6A1 will penetrate the side of the turret and the side and rear armor plate of the "Panther" Tank at 100 yards. On the basis of the assumption in paragraph 1*c*, it follows that as the range increases, thereby reducing the angle of impact against the side of the turret and side armor plate, the possibility of penetration will materially decrease.

(2) *Launcher, Grenade, M8.* Grenade, AT, M9A1, will penetrate the side of the turret and the side and rear armor plate of the "Panther" Tank at 60 yards. On the basis of the assumption in paragraph 1*c*, it follows that as the range increases, thereby reducing the

angle of impact against the side of the turret and side armor plate, the possibility of penetration will materially decrease.

(3) *37-mm Gun, M6, Mounted on Light Tank, M5A1.* APC, M51 will penetrate the sides and rear of the "Panther" Tank at 600 yards.

(4) *40-mm Gun, M1, (AA).* AP, M58 will penetrate the sides and rear of the "Panther" Tank at 600 yards.

(5) *57-mm Gun, M1.* (*a*) APC, M86 will penetrate the sides and rear of the "Panther" Tank at 1,500 yards.

(*b*) Sabot fails to penetrate front glacis slope plate and gun shield at 200 yards. Due to difficulty experienced in obtaining hits no conclusion as to the effectiveness of this ammunition was reached.

(6) *75-mm Gun, M3, Mounted on Medium Tank, M4,* (*a*) APC, M61 will penetrate the sides and rear of the "Panther" Tank at 1,500 yards. APC, M61 at 200 yards will not penetrate the front armor of the "Panther" Tank.

(*b*) HEAT, M66 (Special) will not penetrate the front glacis slope plate at 500 yards. (See assumption made in par. 1c.)

(7) *3-inch Gun M5, Mounted on Motor Carriage, M10.* (*a*) APC, M62 w/BDF, M66A1 will not penetrate front glacis slope plate at 200 yards. Will penetrate gun mantlet at 200 yards and penetrate sides and rear of the "Panther" Tank up to 1,500 yards.

(*b*) AP, M79 will not penetrate the front slope plate or the mantlet at 200 yards. It holds no advantage over APC, M62 ammunition w/BDF, M66A1.

(8) *90-mm Gun, M1A1, (AA).* AP, M77 will penetrate front glacis slope plate up to 600 yards, the gun mantlet up to 1,000 yards, and turret up to 1,500 yards.

(9) *105-mm Howitzer, M4, Mounted on Medium Tank, M4.* HEAT, M67 will penetrate front glacis slope plate and gun mantlet at 500 yards. (See assumption made in par. 1c.)

In addition to testing the normal types of tank and antitank weapons and ammunition, additional types were tested with the following results:

(*a*) *75-mm Gun, M3, Mounted on Medium Tank, M4.* WP, M64—Three rounds were fired at 500 yards for the purpose of obtaining an incendiary or blinding effect. The results were unsatisfactory.

(*b*) *75-mm Gun, M3, Mounted on Medium Tank, M4.* HE, M48 w/fz T105—Three rounds were fired at the front glacis slope plate at 500 yards to determine its armor penetrative characteristics. The rounds failed to penetrate, ricocheting from the plate and bursting in the air.

(*c*) *90-mm Gun, M1A1, (AA).* HE, M71, w/fz M48—One round was fired at 1,500 yards as a ranging shot. No perceptible effect was obtained beyond cracking the welds between the glacis and nose plate and the glacis and side plate for a distance of approximately 12 inches. The corner of the glacis slope plate appeared to have a slight depression as a result of this round.

RECOMMENDATIONS: In view of the above findings the board recommends: (1) That steps be taken by the Ordnance Department to develop armor-piercing ammunition of materially higher muzzle velocity and armor penetrative characteristics for the 3-inch, 76-mm, and 90-mm Guns, accepting, if necessary, a gun tube life as low as 200 rounds.

(2) That upon availability of 90-mm, APC, M82 ammunition in this theater, tests be conducted to determine the effectiveness of this ammunition against the "Panther" Tank.

(3) That consideration be given by the Ordnance Department to the development of a liquid-filled incendiary shell capable of igniting the target adjacent to the point of impact, for the 75-mm Gun and the 105-mm and 155-mm Howitzers.

The board adjourned at 1630 on 30 July 1944.

[*s*] *Charles E. Hart*
CHARLES E. HART
Colonel, FA
Member

[*s*] *Peter C. Hains, 3d*
PETER C. HAINS, 3d
Colonel, Cav (Armd)
President

[*s*] *Mason D. Salisbury*
MASON D. SALISBURY
Captain, FA (Armd)
Recorder

ANNEX NO. 6

ANTIAIRCRAFT SECTION REPORT

Annex 6
Table of Contents

ANNEX 6

I. Introduction

A. GENERAL

Operations during the period 1 August–15 December 1944 were characterized by the continued absence of the Luftwaffe in strength. Except for sporadic attempts to interfere with our operations at defiles and river crossings, air activity was limited to reconnaissance, hit-and-run strafing attacks on spearheads, and some night harassing employing flares, strafing, and antipersonnel bombs. No determined or continued air effort was directed at the First U. S. Army, nor was any damage done to vital objectives.

The overwhelming Allied air superiority during daylight hours, plus the continued Allied bomber activity in advance of the thrust towards Germany, necessitated utilizing the Luftwaffe fighter strength in a purely defensive rqle. Losses in aircraft up to 1 August and the swift advance of the First and Third U. S. Armies, forced evacuation of the central and Paris group of airfields and a move to the northern group of airfields. Just as regrouping of the Luftwaffe on the Mons–Laon–St. Trond group of airfields was being completed, the push to the Seine developed into a pursuit across northern France, forcing a further evacuation of the Luftwaffe to bases inside Germany.

Several factors unquestionably influenced the Luftwaffe in its failure to oppose our advance in strength:

(1) Continued Allied air action against air bases reduced the aircraft serviceability factor to a new low.

(2) Losses in aircraft to both Allied aircraft and antiaircraft considerably reduced the reserve of trained pilots.

(3) The German bomber force, which had been neglected in favor of the controlled missile offensive (V–1 and V–2), and an increased single-engine fighter force, could not muster an adequate bomber striking force.

(4) Losses in oil reserves and manufacturing facilities necessitated strict conservation of fuel, in order to permit withdrawal of armored forces, as well as to rebuild fuel reserves in anticipation of the coming battle of Germany.

Following the break-through at St. Lo and commitment of the Third U. S. Army, the amount of antiaircraft available to the First U. S. Army was considerably less than had been available during the establishment and consolidation of the beachhead. Therefore it was impossible to maintain the same density of coverage over troops and troop concentrations as had been the case prior to the break-through. In general, each infantry division continued to have one automatic weapons battalion (mobile) attached and each armored division, one antiaircraft automatic weapons battalion (self-propelled) attached. Corps normally had two automatic weapons battalions (mobile) attached. However, as vital defiles were secured, additional automatic weapons and gun battalions were attached to corps and then left in position to be taken over by the 49th AAA Brigade as the corps pushed forward. This policy of pushing army units forward when needed by corps was a continuation of the doctrine which proved to be successful in the assault. Except for defiles, corps and division objectives, antiaircraft was employed primarily in the defense of airfields and supply dumps. (See app. 1 for attachment and missions of AA units.)

When the pursuit across France and Belgium developed into the battle for the Siegfried Line and the army rear boundary was closed up tight, the concentration of antiaircraft weapons in the army area was increased. Through a coordinated deployment of all units, it was possible to provide an area coverage. For the first time during this operation,

gun battalions were employed in forward areas to cover troop concentrations in the attack on the Siegfried Line. Prior to stabilization of the front along the German border, the limited number of gun battalions available and the number of important defiles requiring protection in rear of corps, precluded employment of guns in forward areas.

Coincidental with the launching of the German Ardennes counteroffensive on 16 December, the Luftwaffe appeared in some strength in an obvious attempt to regain the prestige which had been lost in the Battle of Britain and never regained. A total of 1,178 sorties were flown over the First U. S. Army zone of action from 16 December to 1 January, involving attempted dropping of parachutists, attacks on troop concentrations, MSRs, bridges and on 1 January, an all out effort to destroy our fighter and fighter bomber bases and aircraft on the ground. Despite 5 days of bad flying weather during the 17-day period, an average of 70 sorties per day were flown. On 1 January, 288 sorties were flown, representing the largest 24-hour enemy effort during the entire operation on the continent. The air effort during the counteroffensive represented 27 percent of the total effort against the First U. S. Army from 6 June 1944 to 22 February 1945. No extensive damage resulted from these operations, except the GAF lost 22.71 percent of their aircraft destroyed by antiaircraft with another 8.57 percent confirmed as probably destroyed by antiaircraft.

When the Allied counterattack began, the Luftwaffe again became conspicuous by its continued absence. Except for 22 February, the day preceding the attack across the Roer River when 33 enemy aircraft attacked forward areas of the VII Corps, no appreciable air effort was employed. Including these 33 sorties, a total of only 123 sorties were flown over the First U. S. Army zone of action between 3 January and 22 February 1945, an average of less than 3 sorties per day.

B. AA IN OTHER THAN THE AA ROLE

In addition to performing the normal role of antiaircraft defense of vital targets, antiaircraft units contributed to the success of the operation by their employment in other than the AA role.

1. Provisional Truck Companies

When the distance between forward units and supply bases made it impossible to maintain the flow of supplies with available service unit transportation, provisional truck companies were organized in all AAA units. The truck companies organized out of army AA units alone covered over 2,500,000 truck miles while hauling army supplies (class I, II, III, and V) during the period 17 August 1944 to 22 February 1945. In addition, truck companies were formed from the units attached to corps and divisions and utilized to assist in the further distribution of supplies from truck and railheads. This utilization of AAA trucks did not interfere with the accomplishment of the assigned AA mission.

2. Automatic Weapons in Close Support Role

Antiaircraft automatic weapons, particularly those of the self-propelled battalions and the M–16–Bs of the 40-mm battalions (M–51s converted into M–16s by the First U. S. Army) were utilized to the maximum in a ground support role. Frequently during the pursuit across France, M–16s proved quite versatile in attacking enemy strong points and eliminating pockets of resistance, and on one occasion were used to destroy an enemy locomotive and several cars. These missions were accomplished without reducing the effectiveness of the antiaircraft defense, since self-propelled weapons were always utilized to provide

column cover during an advance. On several occasions automatic weapons were utilized in prearranged fire missions to neutralize resistance ahead of infantry attacks.

3. 90-mm Employment

When not required in the AA role, 90-mm gun battalions in forward areas were used to support the fire of field artillery, particularly for long-range harassing and interdiction missions. No gun battalions were assigned a primary field artillery role.

During the initial phases of the German counteroffensive, nine 90-mm gun battalions were employed wholly or in part in a primary TD role. The three gun battalions in the Liege PAC defense belt were swung around to hold the shoulder against the German armored thrust towards Eupen. As rapidly as 90-mm units could be moved, they were emplaced ahead of the thrust towards Liege and the Meuse, rendering valuable support to TD units in many cases, while in other cases they were employed alone, supported only by the M51 quad mount machine guns assigned to each 90-mm battery in the First U. S. Army. Three 90-mm guns were lost due to enemy action in return for 19 Mark V and Mark VI German tanks destroyed by AA gun battalions.

AA guns were effectively employed in the AA marker plan for the Eighth U. S. Air Force in the attack to the Roer River on 16 November. The 413 AAA Gun Bn. (M), emplaced in line west of Aachen marked a safe line for the 1,200 heavy bombers in close support of the ground attack. Firing a line of eight 90-mm bursts every 15 seconds, spaced 500 yards apart, 2,000 feet below the bombers, the 413 AAA Gun Bn. expended 3,270 rounds of 90-mm ammunition during the 1 hour and 50 minutes the air bombardment was in progress.

C. CONTROLLED MISSILES (V–1 and V–2)

On 17 September the first V–2 launched against a continental target landed in First U. S. Army Headquarters in the vicinity of Huy, causing a few casualties. This was the first of many trial rounds fired in the Maastricht–Liege–Charleroi area between this date and opening of the Port of Antwerp. The largest number fired in this area in any one day was 32, the daily effort averaging between 1 and 15 rockets. It was immediately obvious that existing aircraft detection equipment was of little value in detecting this high-speed rocket. However, from the fall of shots, interrogation of prisoners of war, the sighting of rocket contrails, and on some occasions, actual sighting of the rocket on the ascending branch of its trajectory, it was possible to determine the general location from which rockets were being launched. None of these launching areas were within range of artillery. Since the launching sites proved to be unprofitable targets for air attack, no heavy air effort was used to neutralize individual launching sites. Continued fighter-bomber and bomber action against supply lines proved the most effective counter measure.

The last V–2 trial round was fired at the Liege–Maastricht area 20 October. At 210730B October, the first V–1 aimed at Antwerp passed over the First U. S. Army area. Beginning with an average of 8 to 10 per day, the scale of effort against Brussels and Antwerp increased until the daily average was over 100. On 21 November the V–1 target area was shifted to Liege, where for several days, 25 to 75 crashes per day were reported. While the success of this operation was not such as to seriously interfere with military operations, a considerable amount of damage was done to the city of Liege. In a few cases serious damage resulted to military installations such as hospitals and POL dumps.

The number of V–1s landing in Liege prior to 21 November had been such as to indicate

that at a later date Liege would become a target area. An area in the vicinity of Camp Elsenborn was selected to be used as a defense belt for the destruction of V–1s launched against Liege and Antwerp. This area was selected in order to assure that those PAC winged by antiaircraft would not land in the target area and thus accomplish the mission. On 24 November, a pilotless aircraft AA defense belt, referred to as the Liege Diver Belt, was set up consisting initially of one gun and one AW battalion, later increased to three gun and three AW battalions. During the period 6 June 1944–22 February 1945, *5,003* PAC were reported over the First U. S. Army, of which 392 were engaged by antiaircraft, 24 of which were hit and exploded in the air, and another 65 were brought down by antiaircraft fire and exploded on ground impact. (See app. 4 for résumé of AA action against PAC.)

D. ENEMY AIR EFFORT

The Luftwaffe flew a total of 3,070 sorties over the First U. S. Army area during the period, bringing the total to 4,319 sorties for the entire operation 6 June 1944 to 22 February 1945, an average of 16 plus per day. Activity was divided almost equally between day and night. With few exceptions, pilots appeared to be reluctant to press home an attack once antiaircraft fire was encountered. Only during the German counteroffensive, when E/A penetrated into rear areas attacking bridges and targets of opportunity was there any semblance of aggressive action against ground targets. On numerous occasions E/A operated over the area by day and night, carefully avoiding areas defended by antiaircraft artillery. (For scale of effort, effectiveness of defenses, confirmed claims, and ammunition expenditure, see par. B, V and app. 2A and 2B.)

II. Exploitation of The St. Lo Break-through

1 Aug.–12 Sep.

A. THE DRIVE SOUTH (1–12 Aug.)

Effective 1 August, responsibility for the antiaircraft defense of Omaha Beach was turned over to the Commanding General, 55 AAA Brigade under the Commanding General, Advance Section, Communication Zone. All army units had been replaced by other units prior to this time and moved forward to cover defiles in the vicinity of Canisy and Mortain. Three hundred and fifty-seven enemy aircraft operated over the First U. S. Army, a large number of which were enroute to the traffic defile and bottleneck at Avranches. A considerable amount of flare activity, night strafing, and bombing with fragmentation bombs was directed against forward elements during the hours of darkness. Thirty enemy aircraft were destroyed by antiaircraft fire, and a further seven probably destroyed. The scale of effort directed against the First U. S. Army was considerably smaller than had been anticipated in the exploitation of the break-through at St. Lo.

The 116 AAA Gun Bn. was attached to VII Corps and deployed with the 1st Division to protect the crossings of the Mayenne River. The M–51 quad mount machine guns of the battalion were utilized to provide the automatic weapons defense of the bridges. During the hours of darkness, the 84 Smoke Generator Company was utilized to provide a smoke screen over the bridges. This was the first use of smoke in the antiaircraft role in this operation. In addition, 90-mm guns were used to support the 1st Division in their attack across the Mayenne River and were credited by the 1st Division with breaking up an armored counterattack before it could be launched.

B. FALAISE-ARGENTAN GAP (13–19 Aug.)

After the failure of the Mortain counterattack, the Luftwaffe effort showed a further decline. It must have been obvious that their airfields would soon be overrun. The arrival of transport planes indicated that as many flying personnel and ground crews as possible were being evacuated to the group of airfields northeast of the Seine. The total scale of enemy air effort during the period amounted to 16 raids of 31 planes, of which 4 were destroyed by antiaircraft fire.

C. DRIVE TO THE SEINE (19–26 Aug.)

Again there was little enemy air activity, as the enemy husbanded his resources of serviceable aircraft to oppose the impending crossing of the Seine. One Heinkel 111 attempting to resupply German troops trapped in the Falaise-Argentan Gap was destroyed by AA fire

on the morning of 21 August. Except for a few strafing attacks on forward elements, there was no further enemy air reaction during the period. A total of 33 enemy aircraft operated over the First U. S. Army area, including the bridges at Mantes Gassicourt, of which 5 aircraft were destroyed.

D. BATTLE OF NORTHERN FRANCE (27 Aug.–3 Sep.)

The Luftwaffe reacted on the night of 28 August to our crossing of the Seine, in a concentrated effort to destroy the bridges at Melun. Approximately 35 enemy aircraft came in at altitudes between 1,000 and 1,500 feet. The aircraft were clearly silhouetted by their own flares, and during 15 minutes of action, 15 enemy aircraft were destroyed and 6 more probably destroyed.

Out of a total of 129 aircraft which operated over the area during the period, including one night attack on Paris, 19 were destroyed and another 6 probably destroyed.

E. THE PUSH TO THE SIEGFRIED LINE (4–12 Sep.)

The push to the Siegfried Line brought the Luftwaffe out on reconnaissance in strength; but in general they avoided attacks and stayed out of range of antiaircraft weapons. The only exception was the air attack on the crossings of the Meuse River, which was conducted on a limited scale and with no success. One hundred and sixty-one enemy aircraft operated over the area during this period, of which 11 were destroyed and 14 more probably destroyed.

III. The Battle of Germany

13 Sep.–15 Dec.

A. CONSOLIDATION (13 Sep.–1 Oct.)

The Luftwaffe continued reconnaissance in force during daylight hours, frequently staying beyond range of automatic weapons. During the hours of darkness, single enemy aircraft operated over the crossings of the Meuse River in an attempt to interfere with the traffic across the bridges.

During this period the V–2 rocket made its first appearance on the Continent, in what apparently was a combat test of its operational efficiency. While no appreciable damage was done to vital installations, it was apparent that this weapon had great potentialities. The destructive effect of the warhead was not great, but the fact that the V–2 could be neither seen, heard, nor detected by electrical or mechanical means in time to warn personnel in the target area, meant that casualties would be high in case of a concerted attack on a densely populated objective.

In order to provide closer coordination between IX TAC Combat Operations and the FC–AAOC, the Commanding General of the IX TAC moved the FC–AA operations board and its operating personnel (327 Fighter Control Squadron) from 70th Fighter Wing Headquarters to Headquarters IX TAC. This necessitated a similar move of the 149 AA Operations Detachment; and to simplify administration and control of this detachment, it was relieved from attached to the 49th AAA Brigade and placed under the direct supervision of the Army Antiaircraft Officer. This change in procedure for the coordination of air and AAA effort resulted in a higher percentage of identifications, closer integration of the AAAIS with the Air Warning Service, and a decided increase in over-all efficiency of air defense operations. During this period direct telephone communications were established from the Antiaircraft Operations position at the Fighter Control-Antiaircraft Operations Center to each Inner Artillery Zone, and to each AAA Gun Battalion operating in an unrestricted area. Direct land line communications were necessary in order to safeguard friendly aircraft over forward areas.

B. THE AACHEN OFFENSIVE (2–21 Oct.)

In this period the first evidence of a German "air front" since D-Day appeared. By this time the enemy, with characteristic resilience, had largely recovered from the disorganization of his air force and bases resulting from our rapid advance across France and Belgium; and some 400 single and twin-engined E/A were estimated to be based in the Rhine-Ruhr area.

First tangible evidence of the recrudescence of his tactical ground support air force was a concentrated attack on the First Army front launched on 5 October, apparently in a frantic effort to bolster the defenses of Aachen. This was the biggest daylight effort since D-Day, some 50 to 70 FW–190's and Me–109's striking the VII and XIX Corps fronts in four waves. In a period of one hour the main fury

of the attack—strafing, bombing and rocket-firing on targets of opportunity—was spent. Once again there was evidence of either poor planning and briefing, or faint-hearted execution, as the aircraft took violent evasive action and caused no serious damage to any installation. A total of 93 E/A were over the area this day. Antiaircraft destroyed 18 aircraft and probably destroying 22.

Several missions to resupply the Aachen defenders were flown during the period. The total sorties were 316, of which 29 enemy aircraft were destroyed and 30 were probably destroyed by antiaircraft fire.

C. PREPARATION FOR A NEW OFFENSIVE (22 Oct.–15 Nov.)

There was an almost complete lack of enemy aircraft over the First Army area during this period. Automatic weapons were utilized to a considerable degree in a ground support role, while some 90-mm fire was employed to support the field artillery. A total of 104 sorties were flown over the army area during this period, the majority of which were reconnaissance flights. Eighteen aircraft were destroyed and another four probably destroyed by antiaircraft fire.

In preparation for the "carpet bombing" to support the ground offensive to the Roer River, plans were prepared in conjunction with the Eighth Air Force and IX TAC to utilize the AA marker plan proposed by First U. S. Army, as a safeguard to friendly troops. Plans called for the use of 90-mm bursts, a row of barrage balloons, navigational marker panels, and frontline markers coordinated with Air Force radio beacon markers. The 413 AAA Gun Bn was deployed along a line west of Aachen with the mission of firing a line of eight 90-mm bursts every 15 seconds, 2,000 feet below the approaching bombers, to mark a line beyond which the Eighth Air Force bombers could safely release their bombs. The entire plan was closely coordinated and timed with the Air Force. Communications were established direct to the IX TAC MEW and to the Fighter Control-Antiaircraft Operations Center. Panel details were kept on the alert ready to accomplish their mission on one hour's notice. 104 P Flight, RAF Balloon Command placed 15 VLA balloons along a line immediately east of Aachen and directly beneath the proposed line of 90-mm AA bursts. No balloons were inflated, but all equipment was held in readiness so that balloons could be inflated and raised to operational height beginning at H-60 minutes. The plan called for the entire Eighth Air Force effort to cross the marker line in a period of 55 minutes. The 413 AAA Gun Battalion was provided with 1,800 rounds of specially modified 90-mm ammunition, containing a red smoke pellet.

D. THE DRIVE TO THE ROER RIVER (16 Nov.–15 Dec.)

On the night of 15 November all units were advised that the offensive would jump off the following morning. Marker panels were placed early on the morning of 16 November and the pilots of incoming Eighth Air Force bombers were transmitted direct from the Mew to the 109 AAA Group in VII Corps. Due to time lag between divisions and dispersal in column, the actual time length of the air column was 1 hour and 50 minutes. After the initial 1,800 rounds of red smoke ammunition had been expended, fire was continued with regular HE

ammunition until the last formation had passed over the marker line. A total of 3,270 rounds of 90-mm ammunition was expended. The careful planning, coordination, and execution of this operation contributed greatly to the successful employment of a heavy bomber force in close support of ground operations.

In the early afternoon of 3 December, IX TAC Air Warning Service advised the First Army AA units that they could expect a large-scale attack by the Luftwaffe within about an hour. Four minutes prior to the attack, a track of approximately 74 aircraft was broadcast to all antiaircraft units. The Luftwaffe, taking advantage of the absence of our own fighter aircraft which had returned to base due to weather conditions, made a concentrated attack on forward troops and installations in the V and VII Corps. The aircraft came down to very low levels to strafe roads, artillery, and other targets of opportunity. As a result of this action 45 enemy aircraft were destroyed and 13 more probably destroyed by antiaircraft.

During the period there were a total of 152 raids of 391 aircraft, of which 69 were destroyed and another 26 probably destroyed by antiaircraft units.

On 24 November an antiaircraft defense belt was established in the vicinity of Butgenbach to combat pilotless aircraft, and placed under the command of the V Corps. It consisted initially of one gun battalion (later increased to three gun battalions), and one automatic weapons battalion (later increased to three automatic weapons battalions). On 9 December, when it became obvious that this defense belt could be operated more satisfactorily under army than corps control, since AAA units were deployed in two corps sectors, responsibility was transferred to the 49 AAA Brigade.

Many difficulties were encountered in this new AAA role. Poor visibility prevailed, precluding firing by automatic weapons during a great part of the time. AAAIS warning was inadequate, as the defenses were located within 2,000 to 4,000 yards of the front line. The extremely low altitude of the targets, averaging about 1,000 feet over the defense belt, made radar tracking extremely difficult, particularly since the terrain was most unsuitable to radar siting. Nevertheless, of the PAC engaged by AA fire, 21.13 percent were destroyed.

On 3 December pilotless aircraft activity over the First U. S. Army area showed a sharp decline, falling to zero on 6 December. The indication was that difficulty was being experienced in transportation or that launching sites were soon to be abandoned. It was during this period that Von Rundstedt utilized all means of transportation to concentrate his forces for the Ardennes counteroffensive. Activity again increased on 13 December.

E. ROER DAMS OFFENSIVE (13–15 Dec.)

A total of 34 enemy aircraft operated over the First Army sector. Practically all activity was reconnaissance in preparation for the German counteroffensive. No attacks were made on ground targets. One aircraft was destroyed by antiaircraft fire.

IV. The German Counteroffensive and the Drive to the Roer River

16 Dec. 1944 to 22 Feb. 1945

A. THE GERMAN COUNTEROFFENSIVE (16 Dec. 44 to 2 Jan. 45)

1. Army AAA

a. LIEGE DIVER BELT. When, in the early hours of 16 December, the German counteroffensive was heralded with the commencement of a heavy artillery barrage in all corps sectors, the bulk of the army antiaircraft was disposed in the vicinity of Kalter–Herberg–Bullingen–Krinkelt, where they were being employed in the Liege Diver Belt to counter the V–1 offensive against the Liege communications center. This belt consisted of the 49 AAA Brigade, two AAA Groups, three AAA Gun Bns, and three AAA AW Bns. These units were employed within 2,000 to 4,000 yards of the front line, for the following reasons:

(*a*) An area was selected containing a minimum of supply installations, to mitigate the effect of "winged" V–1's which would detonate on ground impact.

(*b*) The employment of the VT fuze, the release of which for AAA was expected daily (and was in fact released 15 December), was considered vital to the efficient combatting of the V–1. The extremely low altitudes at which V–1's were flying imposed a quadrant elevation safety limitation in the use of this fuze, which however would be a less restrictive one if the guns could be sited close enough to the front to permit firing over enemy rather than friendly troops.

The consequence was that these units found themselves in the forefront of the counteroffensive. One battalion, deployed in the vicinity of Krinkelt, was forced to evacuate its positions the morning of 16 December, and the remaining battalions were soon receiving heavy enemy pressure.

As the counteroffensive gained momentum, it became apparent that the units of the Diver Belt would have to be reattached, and in some cases redeployed, to facilitate control and to aid in stemming the enemy drive. The 49 AAA Brigade had done its utmost to maintain liaison with adjacent divisions, but was not located close enough to a higher echelon to keep abreast of the obscure developments. The night of 16 December two AAA gun battalions were ordered to withdraw to the vicinity of Steinbach, while one AAA AW Bn was attached to the 99th Infantry Division and one to the 106th Infantry Division. The morning of 17 December, as armored elements approached the brigade CP at Ligneuville, the following reattachments were effected:

At 1000A—413 and 134, AAA Gun Bns to V Corps in position, for employment in an antitank role—(11 AAA Group was ordered to Spa, to assume control of AAA units covering the approaches to the north and northwest of Stavelot).

At 1300A—18 AAA Group, 602 AAA Gun Bn and 863 AAA AW Bn to V Corps.

At 1700A—Battery "C," 197 AAA AW Bn (SP) from 71 Ordnance Group to V Corps.

The 49 AAA Brigade was forced to evacuate Ligneuville by advance elements of the 12 SS Pz. Div. at approximately 171430A. This resulted in a break in communications between the brigade and its subordinate units. At this time, the First Army Antiaircraft Officer assumed temporary command of all Army AAA units, retaining it until the brigade had reestablished communications from its new CP.

b. 16 AAA Group. 16 AAA Group, with two AAA gun and one AAA AW battalions attached, was being employed at this time in defense of Twelfth Army Group Headquarters, Radio Luxembourg, and the Differdange steel mill. Heavy enemy pressure was being exerted on the 4th Infantry Division front in this area, and the morning of 17 December the Group Commander was authorized to employ his units in a ground role. At 171000A December, communications from 49 AAA Brigade to this group failed. From then until 19 December the group operated independently, at which time the group and attached battalions were relieved from First Army and attached to Third Army.

c. 103 AAA Group. This group, comprising one gun and two automatic weapons battalions, was charged with the AA defense of Army Headquarters, the ammunition depot at Herve, and the defiles in the vicinity of Verviers. At approximately 171430A, it was placed under the control of the AA Officer, First Army, because of the break in communications to 49 AAA Brigade.

d. 11 AAA Group. At approximately 171000A December, this group was relieved from its mission in the Liege Diver Belt and moved to Spa for a new mission. Its subsequent employment in the ground battle is covered in paragraph 2 below. On 20 December this group was attached to the XVIII Airborne Corps and the group commander served as the Corps AA Officer until the relief of this corps from First Army on 13 February.

2. *AAA in the Ground Role*

The German armored penetration along the axis Butgenbach–Malmedy–Stavelot offered a serious threat, both to Liege and to Huy. The interval until the 30th Infantry Division, enroute from Ninth Army, could close in the Stavelot–La Gleize area and block the routes to these towns was most critical. On 17 December, the deployment of the smaller attached units had been delegated by G–3 to the Chiefs of Special Staff Sections in the interest of speed. From this time until 21 December AAA battalions were speedily deployed piecemeal along these axes of advance, resulting in the fighting of a very effective and timely delaying action.

Initially, the 110th AAA Gun Bn, defending the Army Headquarters, was deployed in an antitank role along the roads from Malmedy and Stavelot to Spa, supplemented by a battery of 40-mm guns. Meanwhile, two gun and two AW battalions were obtained from the Antwerp Diver Defense Belt of 21 Army Group and rapidly set in motion. One gun battalion was obtained from the 52d AAA Brigade (Ninth Air Defense Command), and one from Ninth Army. Battalions were successively deployed as follows: 143d AAA Gun Bn—vicinity Stoumont Station–Aywaille; 125th AAA Gun Bn vicinity Ouffet–Anthisnes; 141st AAA Gun Bn, along the southern and southeastern approaches to Huy. The remaining army units were committed in an AA role, to cover the vital road net in the vicinity of Verviers which was supporting the bulk of traffic moving from Ninth Army and VII Corps to the critical battle area.

These gun battalions had never before been employed in an antitank role, and those arriving from the Ninth Air Defense Command and 21 Army Group had not previously been in close contact with the enemy. Despite this, and acting on fragmentary and oral orders, they were deployed with maximum speed and efficiency. Two of these, the 110th and 143d AAA Gun Battalions, met the reconnaissance elements and armor of 12 SS Pz. Div. thrusting north and northwest from Stavelot and effectively aided in diverting them to the south. Nineteen Mark V and Mark VI tanks were destroyed by 90-mm fire, for the loss of three guns. In addition, effective artillery concentrations were fired on enemy armor and motor transportation in Stavelot and La Gleize. While the situation at this time was too fluid to permit a complete reconstruction of all

simultaneously occurring actions, it appears that the defensive fire of these battalions, plus the 563d AAA AW Bn and minor attachments, all operating under the command of the 11th AAA Group, was largely instrumental in filling the gap until the redeployment of friendly infantry could be effected.

3. *AAA in the Primary Role*

The task of antiaircraft during the counter-offensive was rendered doubly difficult by the fact that the period of large-scale employment of AAA in the ground role was also a period in which the enemy launched his most serious air effort of the campaign. The most difficult of problems was the commitment of a proper balance of antiaircraft units against armor and against aircraft. The subsequent actions proved the soundness of maintaining adequate antiaircraft defenses at this time.

The enemy air effort began on 16 December, when the largest number of sorties in one 24-hour period since D-Day were flown—122. The bulk of the effort was concentrated in VII Corps. While bombing and strafing were intense, the effort was highlighted by a paratroop attack designed to cut the main supply roads in the area Waimes–Eupen–Verviers. This attack was totally disorganized, largely by fire of one AAA Gun Battalion, which in a period of 8 hours engaged 87 E/A, destroying 14 and probably destroying an additional 5. On this first day practically the entire air effort was by night, apparently designed to divert the fire of 90-mm guns from the simultaneously occurring paratroop operation. The effort of the Luftwaffe continued unabated on the following two days, when the enemy came out in great numbers during daylight also. Strafing and bombing in division areas was practically continuous, and again the enemy paid in terrific losses of aircraft, both to automatic weapons and to 90-mm fire. On 19 December the air effort showed signs of weakening, as only 46 E/A were over the area. A five-day lull followed during which the Luftwaffe licked its wounds. A tabulation of enemy aircraft over the area and confirmed claims for this period follows:

	No. of Raids	*No. E/A*	*Confirmed Cat. I*	*Cat. II*
160601 to 170600 Dec.	53	122	17	7
170601 to 180600 Dec.	65	134	38	16
180601 to 190600 Dec.	34	129	28	12
190601 to 200600 Dec.	6	46	23	2

Notable was the unparalleled record of 116 AAA Gun Battalion, attached to VII Corps, which in this four-day period destroyed 29 and probably destroyed an addition 11 E/A. It is estimated that this battalion destroyed one-half of the 40 plus Ju–52 paratroop-carrying aircraft utilized. Me 262's were employed in the First Army sector for the first time.

On 21 December, the 52d AAA Brigade comprising 4 AAA Groups, 9 AAA Gun Battalions, and 9 plus AAA AW Battalions, was relieved from attached to Ninth Air Defense Command, and attached to First Army. In general, the units of the 52d AAA Brigade continued their previously assigned missions—defense of the communications centers of Liege, Huy, Namur, Dinant, and Charleroi, and IX TAC airfields. Inner Artillery Zones were established at Namur, Huy, Dinant, and Charleroi, while one still existed at Liege. The resumption of the enemy air effort on 24 December was marked by a shift in objectives from the forward areas to the communications centers and traffic in the vicinity of Liege, Huy and Namur, by far the largest effort being on the former city. This effort continued on a scale of 60–70 sorties daily for 4 days. Many rarely seen types of E/A were employed, probably because the enemy was husbanding his reserves of SEF's for the impending New Year's Day spree.

On 31 December 68 E/A attacked. This day was noteworthy in that specific point targets which might hinder the impending New Year's Day raid were assaulted, including the MEW radar, the most vital source of early warning available to First Army, and AAA gun positions in the Liege area.

January 1, 1945 marks the high-water mark in German efforts to provide air support for their ground forces, and at the same time their most disastrous day in the air. On that day some 790 to 870 sorties were flown, of which approximately 280 crossed the First Army area, more than twice the number ever before

encountered by First Army in any one day since its arrival in Normandy. It was unique also as the only such activity which gave evidence of careful planning and deliberately and well-selected targets. Evidence later acquired indicated that this operation had been planned and assigned a code name several months before. The primary targets assigned were airfields, mainly concentrated in the area between the Meuse and the Channel. An effort was made to avoid radar detection by flying low. Ju 88 night fighter aircraft were specially assigned to guide each formation to its target. Radio silence was in effect and security was excellent. Execution of the operation was to be ordered by announcement of the code word "VARUS."

Like operation GREIF, the execution of this operation was by no means equal to its conception. No doubt a number of Staffeln were assigned diversionary missions, to attack forward defiles, convoys, and installations. However, only one attack against airfields was executed in the First Army area.

The aircraft, flying low to avoid radar detection, began crossing the front lines at 0855. They were immediately met with a fusillade of automatic weapons fire, which completely disorganized most formations. As a consequence (as confirmed by PW interrogation), many pilots abandoned their primary mission to execute a secondary one, while others untrained in navigation and leaderless, flew aimlessly about, strafing hastily chosen targets of opportunity. In a period of 2 hours and 45 minutes, approximately 280 E/A had entered the army area. Destruction of aircraft was so great that complete verification of claims required approximately 30 days. The confirmed score proved to be 67 Cat. Is and 23 Cat. IIs.

In the one attack on a primary target, 50 plus E/A attacked airfield Y–29 in the vicinity of St. Trond. XXIX TAC, supporting Ninth Army, provided 5 minutes early warning, and the local ring of AA OP's 2 minutes. Two squadrons from this field were airborne at the time, and the others "scrambled" as the attacking formations arrived. The E/A made one strafing pass, damaging one C–47 and one P–47. From that time on the bulk of the activity was air-to-air combat out of sight of the field. The E/A occasionally broke away from our fighters and attacked the field, in all of which cases they were driven off or destroyed. As the friendly fighters landed to rearm and refuel, they were usually tailed by E/A. It was at this time that the AAA contributed most, in several instances destroying the E/A as they closed on our landing A/C. IX TAC claims were 35–2–7, while Batteries "B" and "D," 784 AAA AW Bn claimed 7 destroyed and an additional 4 probably destroyed.

During the period 16 December to 2 January, 1,198 sorties were flown over the First Army zone of action. Of these, 267½ were destroyed and an additional 101 were probably destroyed.

4. PAC Activity (Pilotless Aircraft)

The PAC activity, which had temporarily ceased on 6 December, was resumed on a small scale 13 December. On 16 December, timed with the counteroffensive, it took on serious proportions, 128 V–1s being reported over the army area that day. From then on a scale of 40–70 was maintained daily, until early in January, when wide daily variations in the scale of effort began to appear. While the V–1 effort never very seriously hampered military operations, the effectiveness of the weapon is evidenced by citing two examples among a large number of such incidents. On 18 December, a V–1 scored a direct hit on a convoy vehicle at Pepinster containing personnel of First Army Headquarters killing one officer and 15 enlisted men. On 19 December, in the vicinity of Liege, a V–1 scored a direct hit on an M–4 tractor towing a 90-mm gun, part of a convoy of the 125th AAA Gun Bn. Fourteen enlisted men, all occupants of the tractor, were killed, the gun and tractor were demolished, and the road was blocked to traffic for an hour. It is believed that had the center of impact of all shots been on Verviers rather than Liege, serious interruption to the movement of units from Ninth Army and VII Corps to the battle area might have resulted. More important than the casualty effect of V–1 was its morale effect, which was appreciable on personnel within earshot of the area in which the motor cut out. There is no doubt that much traffic,

particularly single vehicles, followed circuitous routes to avoid the target area (Liege).

5. *Employment of VT Fuzes*

Preparations for the employment of the VT fuze had been made early in the Normandy Campaign, but security restrictions had delayed its operational commitment in this theater. Late in November, ordnance specialists arrived from Headquarters ETOUSA to discuss the employment of the fuze PD–T74E6. Special graphs were computed and drawn to enable its use at very low quadrant elevations, by accepting a small calculated safety risk. By 10 December, an AA Bulletin on the subject had been distributed, ammunition had been issued to all AAA Gun Battalions, the using personnel had been instructed in handling it, and the date of release for use in an AA role was eagerly awaited. 15 December was announced as the date of release.

On 16 December, as a result of the German counteroffensive, those gun battalions in the Liege Diver Belt not only found themselves deployed in the wrong role to take advantage of this fuze, but they were faced with the urgent necessity of evacuating all Pozit lest it fall into enemy hands. All Pozit fuzes (and all fire-control equipment) were safely evacuated. Some cavitized shells had to be abandoned, however.

The first battle test of the POZIT fuze fell to the lot of 116 AAA Gun Battalion (VII Corps) when the all-out enemy air effort started the night of 16–17 December. Safety restrictions for firing over friendly troops prevented using it in most engagements. Several significant engagements occurred, however. In one night this battalion engaged and destroyed 4 E/A at an expenditure of 40 rounds of POZIT. Although additional battalions soon employed POZIT, an insufficient amount was fired during the period to draw definite conclusions. However, as indicated in appendix 2A, the rounds expended per aircraft destroyed are definitely lower than for time fuzed ammunition.

B. THE ALLIED COUNTERATTACK (3 Jan.–22 Feb. 45)

1. *AAA in the Primary Role*

Following the great New Year's Day attack, the Luftwaffe went into hiding to husband and replenish its badly depleted reserves of aircraft, pilots, and fuel. During this period, the Luftwaffe engaged only in minor nuisance raids, with one exception. On 22 February, the eve of the impending offensive to the Rhine, the enemy sent 33 E/A over the army area on daylight reconnaissance. Noteworthy was the predominant use of Me 262's.

For the entire period of the Allied counterattack, 123 E/A were over the army area, of which 13 were destroyed and an additional 13 probably destroyed.

2. *Missions and Attachments*

Most noteworthy during this period was the gradual withdrawal from First Army of those units which had been attached immediately after the launching of the German counteroffensive, and the redeployment of AAA to defend the army supply installations as they were shifted once more to the east and south of the Meuse. On 26 December, one gun battalion borrowed from Ninth Army and deployed south of Huy was returned to Ninth Army when the armored threat to Huy was contained. On 30 December the first of the Antwerp battalions was returned, and by 30 January the others had followed. On 4 Febru-

ary, the 52d AAA Brigade and all its subordinate units reverted to Ninth Air Defense Command. When the army supply installations were redisposed east of the Meuse, the 49th AAA Brigade, which had been responsible during the German counteroffensive for defense of the Pepinster–Verviers–Liege defile, readjusted its defenses to protect the ammunition depot and class I and III installations in the vicinity of Herve and Eupen.

Other significant changes during the period were:

(1) On 1 February 18 AAA Group was relieved from assigned to First Army and assigned to Ninth Army. Simultaneously, the 16th AAA Group which had been attached to Third Army in the early days of the German counteroffensive reverted to First Army and was attached to the 49th AAA Brigade.

(2) On 13 February, with the relief of the XVIII Airborne Corps by III Corps, 16 AAA Group was attached to III Corps and the 11th AAA Group was attached to the 49th AAA Brigade.

3. *PAC Activity*

PAC activity during the period was on a much reduced scale. 1134 PAC were reported over the army area, an average of 22 daily. From 5 February on the daily effort never exceeded 5 a day.

V. Conclusions

A. TACTICAL LESSONS LEARNED

1. General

Operations subsequent to 1 August fully justified the procedure established by IX TAC and First U. S. Army for the coordination of fighter aircraft and antiaircraft artillery in air defense of a field army. While certain difficulties arose during the rapid pursuit across France and Belgium, these were solved. The results attained are reflected in the large percent of enemy aircraft destroyed and probably destroyed and the small number of friendly aircraft engaged by antiaircraft units. During the period, a total of 24 friendly aircraft were engaged erroneously, of which 8 were destroyed.

The equipment issued to First U. S. Army units in excess of T/E proved the necessity for inclusion of these items in standard T/E for units with a field army. Certain items of equipment, such as the M–5 director with the 40-mm units and the height finder with 90-mm units, proved to be surplus equipment and are not required in a field army.

Flexibility of employment gained through attachment of separate antiaircraft battalions to major commands permitted maximum concentration of fire power at the most critical points.

2. Specific Lessons

a. The Air Warning Service of the Tactical Air Command and the AAAIS of army antiaircraft units, when integrated into a single warning service, assures more efficient coverage and coordination than could be attained by operating independent warning services.

b. The speed and degree of coordination between fighters and antiaircraft in air defense attained through operation of a combined Fighter Control-Antiaircraft Operations Center is far superior to that which might be attained by utilizing a separate AAOR depending entirely on liaison officers for coordination.

c. Antiaircraft guns can be employed efficiently and coordinated with fighter aircraft in forward areas without establishing restricted areas to flying (Inner Artillery Zones) when an efficient warning and control system is in operation over the army area. Direct telephone communications from the AA Operations Officer at the FC–AAOC to each AA gun battalion are required to supplement radio nets in order to advise AA units of large flights of friendly aircraft crossing the area at night.

d. Regardless of how much early warning radar equipment is available to antiaircraft units, the responsibility for identification of aircraft remains with the Air Forces.

e. 90-MM GUNS. (1) 90-mm gun batteries equipped with the SCR 584 and M–9 director are effective against aircraft at all altitudes from 1,000 to 25,000 feet.

(2) Height finders are no longer required, since all engagements will be by radar control, even when targets are visible.

(3) Emergency methods of fire control are unnecessary when a rigid policy of preventive maintenance of equipment is followed.

(4) A bulldozer is required in order to dig in equipment. Dependence on borrowing frequently results in units not being ready for action in the minimum time.

(5) 90-mm units can move long distances and be ready for action in less time than previously prescribed. One battalion moved 275 miles, went into action, and destroyed an aircraft by unseen methods in 36 hours.

(6) 90-mm guns are effective in the field artillery role, but due to their relatively short accuracy life and small effective burst radius should not be employed to fire missions for which field artillery weapons are available.

f. AUTOMATIC WEAPONS. (1) M–5 direc-

tors are not required by automatic weapons units with a field army. The normal low-level target precludes getting on target with other than an "on carriage" sight.

(2) The Stiffkey Stick proved to be an effective means of automatic weapons fire control.

(3) The M–7 (Weiss) Sight presented a number of difficulties in operation. It is a fragile instrument requiring an excessive amount of maintenance. In action given the same opportunity to engage hostile aircraft and with approximately the same ammunition expenditure, it has proven to be less effective than the Stiffkey Stick or Peca Sight.

(4) The cal. .50 AAMG M–51 is entirely unsuited for operations with a mobile force. Its low-road clearance limits its movement to hard-surfaced roads with no crown.

(5) Automatic weapons, specifically the M–16 or similar self-propelled mount, must be interspersed in columns to provide convoy protection. The doctrine prescribing that AW units move ahead, defend defiles, then jump ahead on parallel roads to the next defile is unsound. Any column, regardless of the presence of a terrain defile, presents a target to an aircraft on a strafing mission.

(6) The automatic weapons battalion should consist of forty-eight rather than thirty-two fire units. The First U. S. Army organization of four batteries, each consisting of eight 40-mm guns and four M–16s has proven an effective organization both as to firepower and mobility.

(7) A heavier automatic weapon on a self-propelled mount is urgently needed. A 3-inch gun with "Pozit" fuzed ammunition would be desirable.

(8) The 40-mm, the M15A1, and the M16 are effective weapons when employed in either the AA or ground role. When employed in the ground role, AWs must not be used as armored vehicles. They should be employed in at least platoon strength under platoon officers, and not parcelled out one mount per infantry company.

g. AA MARKER PLAN. (1) 90-mm guns can be effectively employed to mark a safe bomb line for aircraft in close support of ground forces.

(2) Colored smoke shells (red) are required to make bursts distinctive.

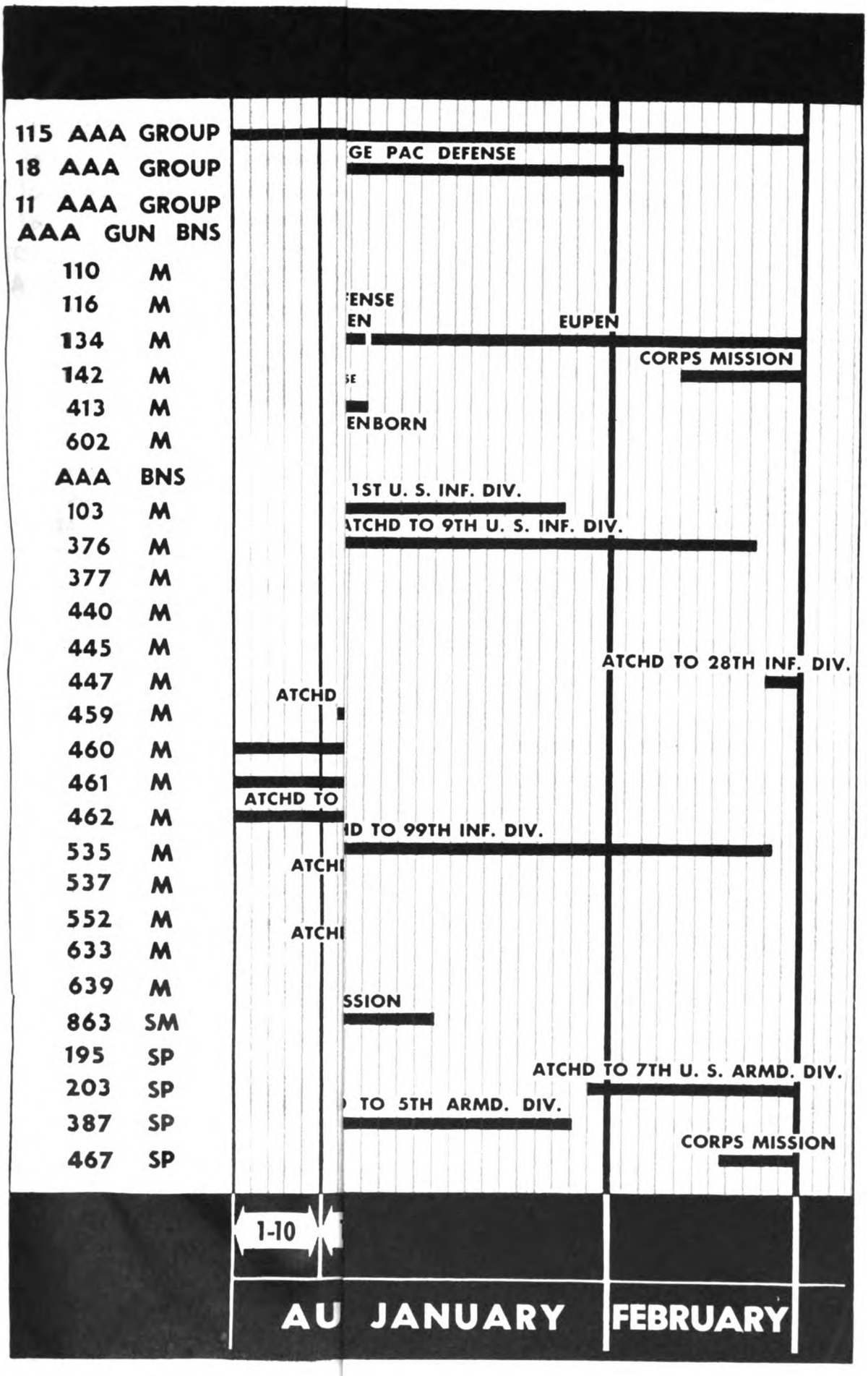
(3) 90-mm bursts can be effectively employed to mark targets for aircraft flying above the overcast.

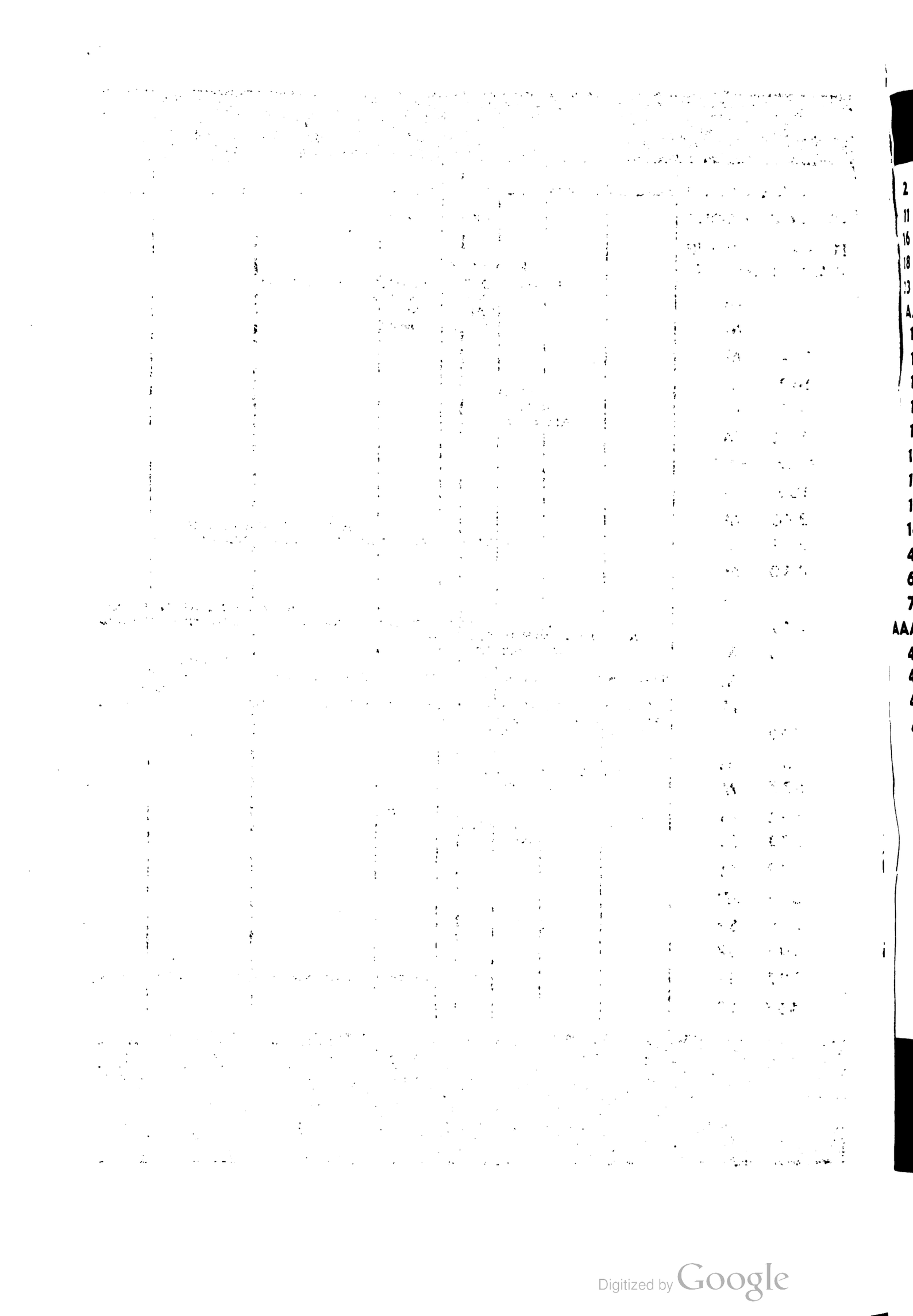
B. RESULTS OF OPERATIONS

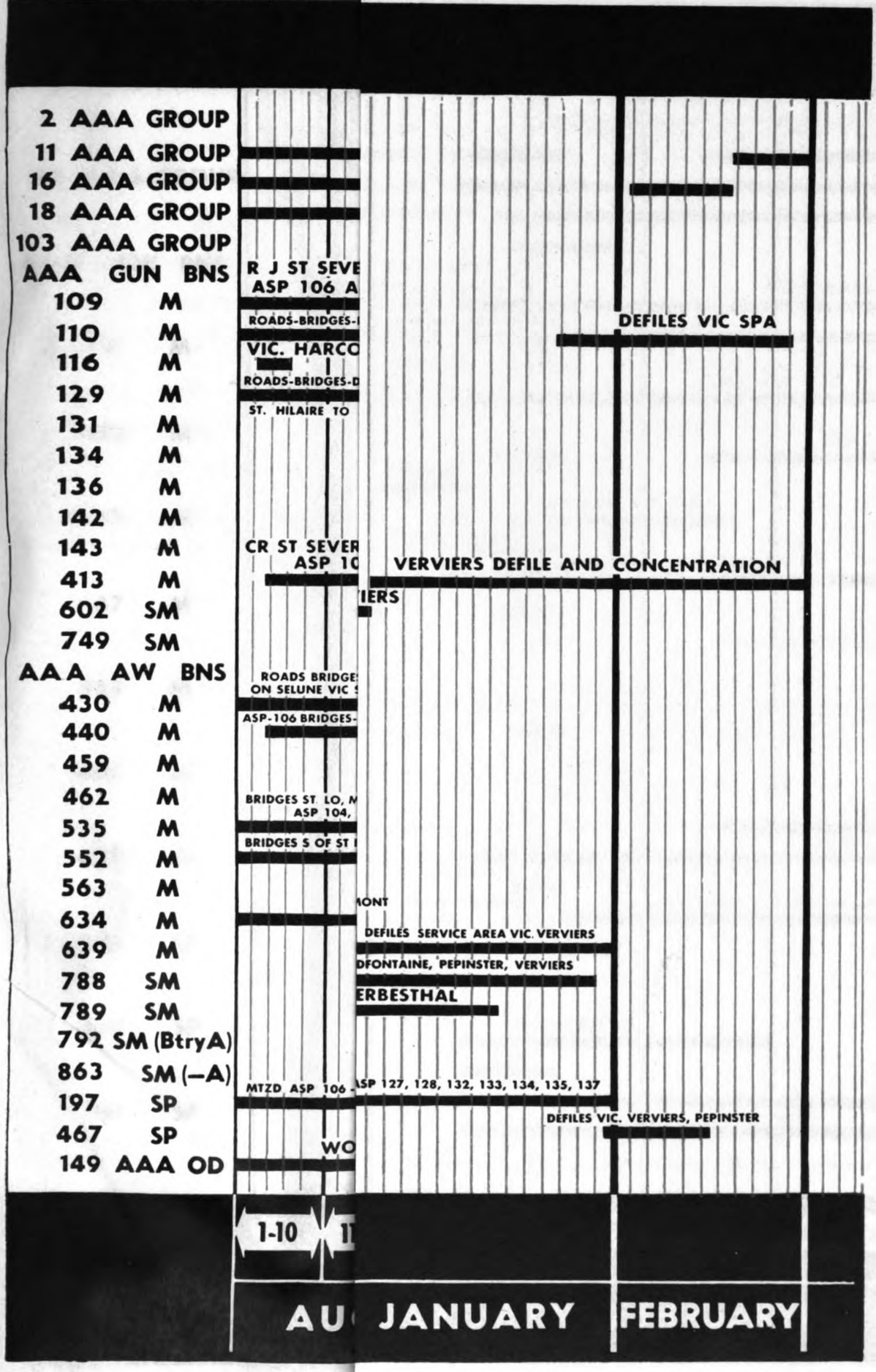
The results attained by antiaircraft artillery in this operation indicate that the effectiveness of modern antiaircraft in sufficient densities can make air attack too costly to be continued. The destruction of 15.85 percent and probable destruction of an additional 7.16 percent of all the German aircraft which operated over the First U. S. Army area is more than any air force can sustain in a protracted operation.

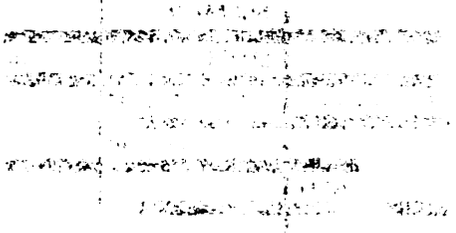
ANNEX 6
APPENDIX 1

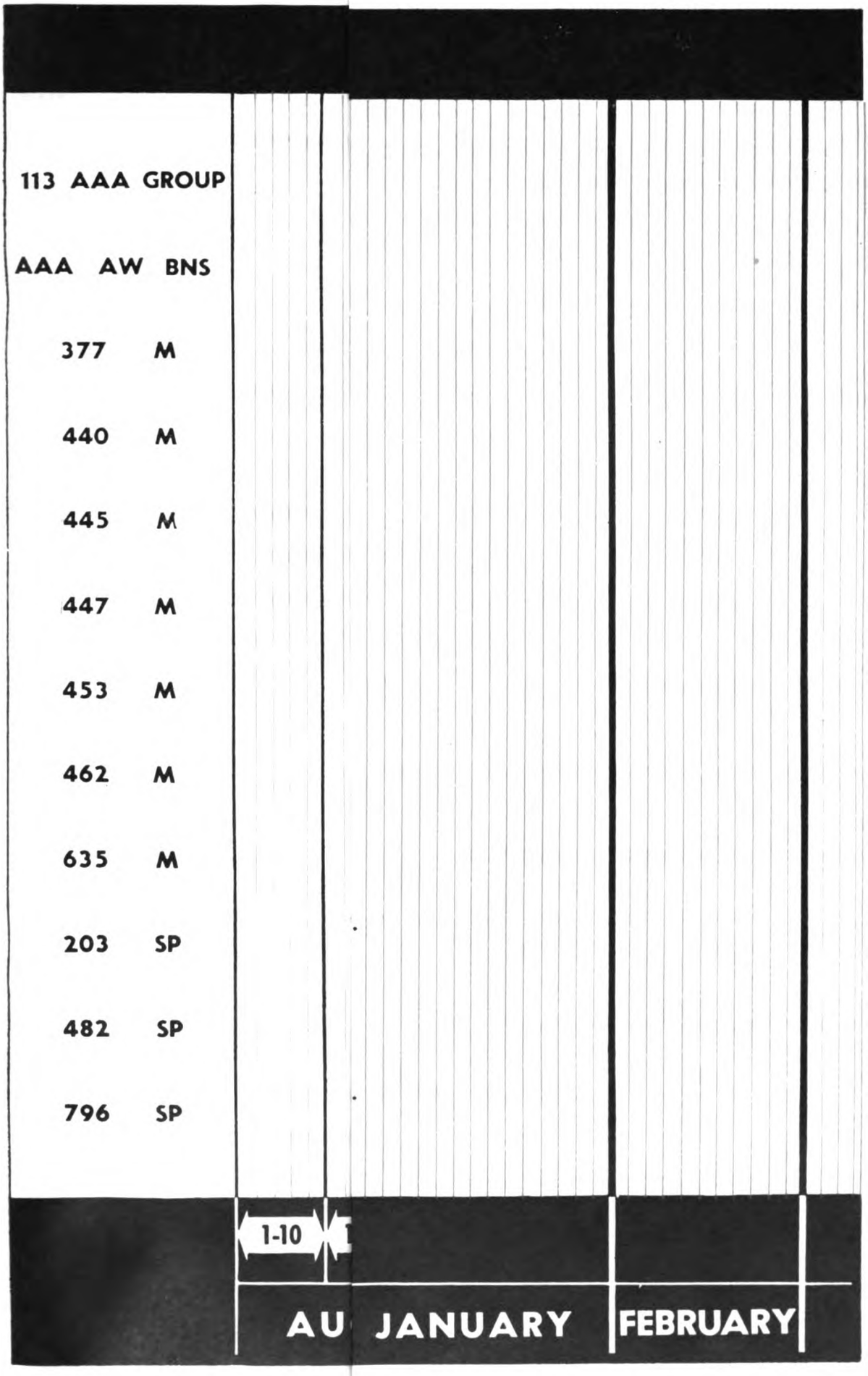
Attachments of AA Units, Missions

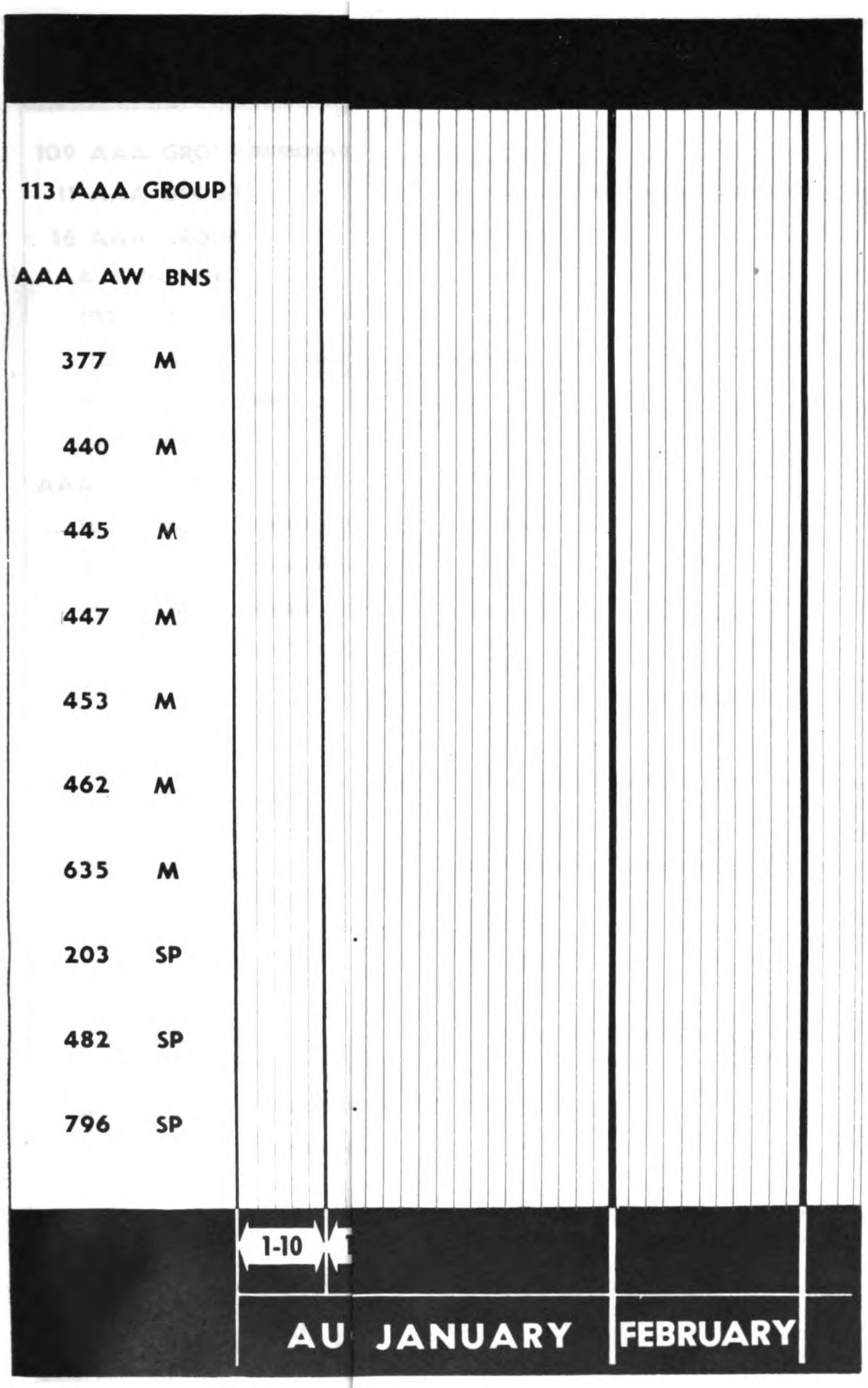


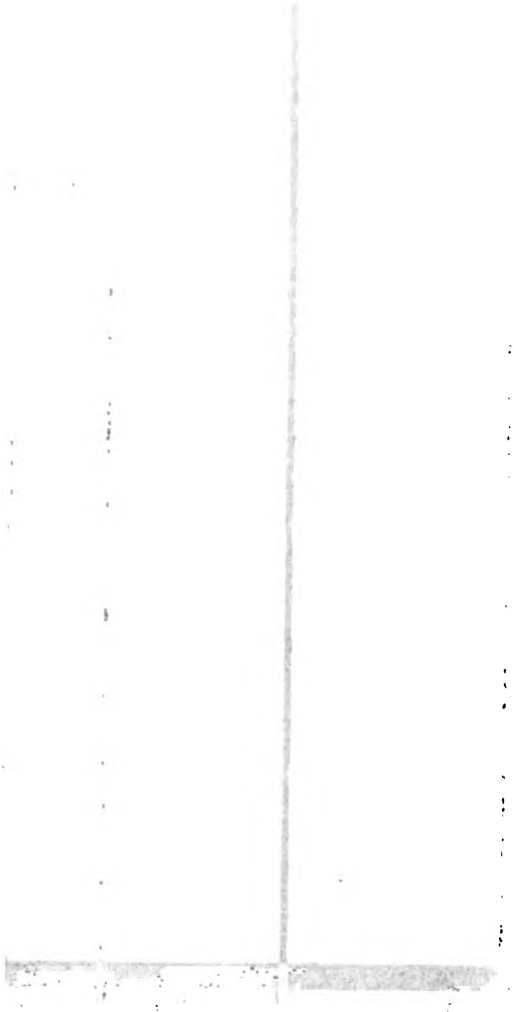


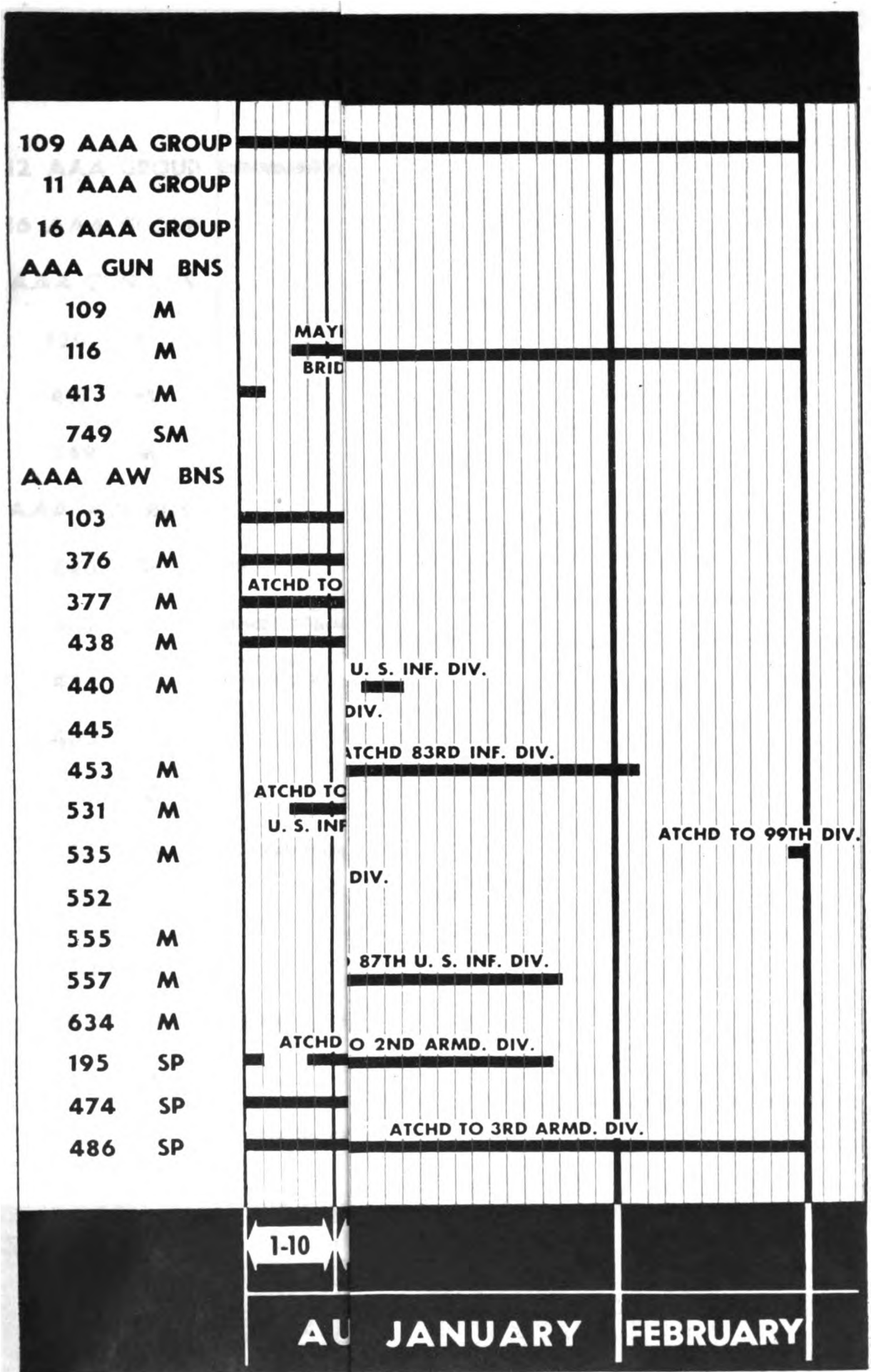


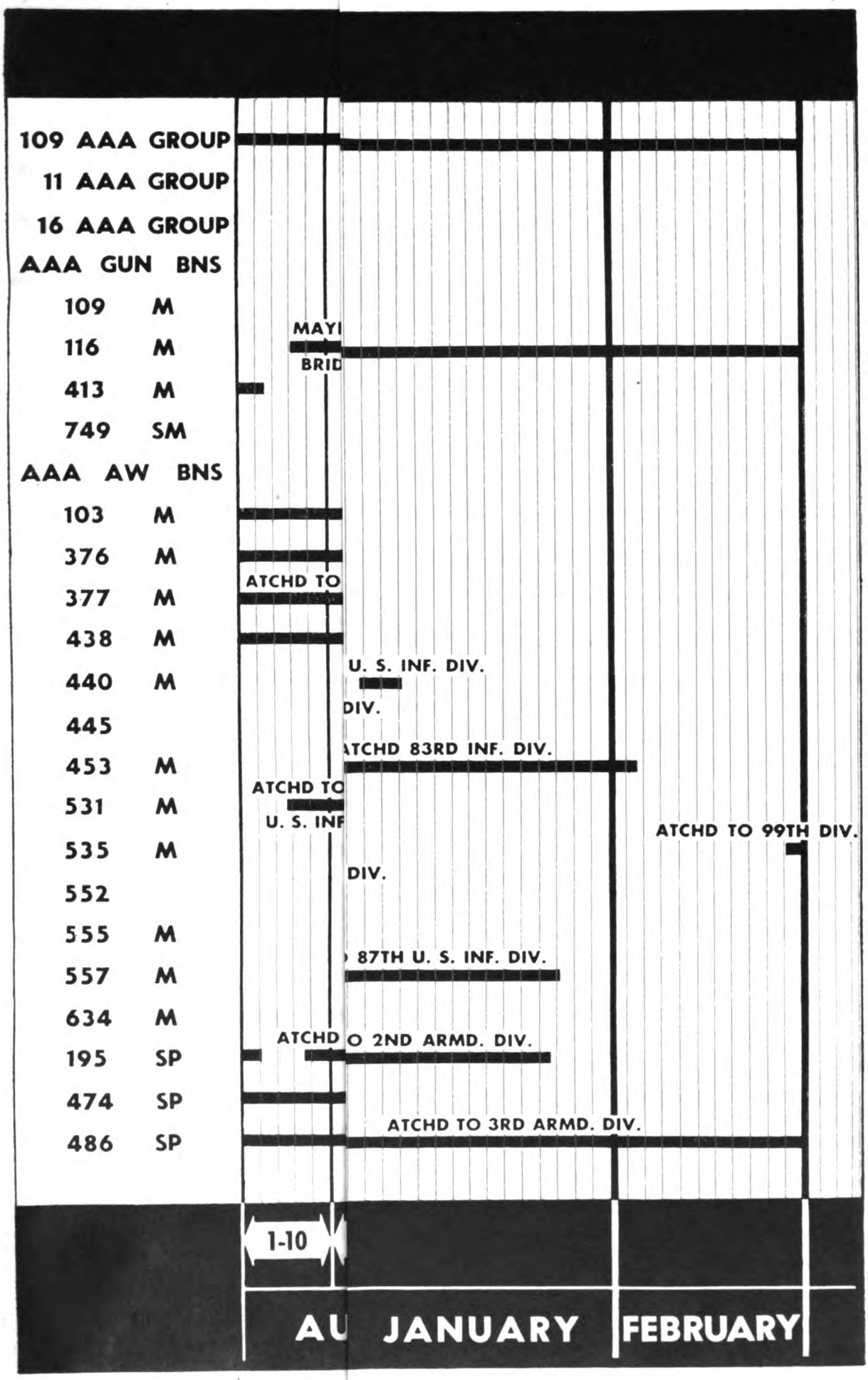


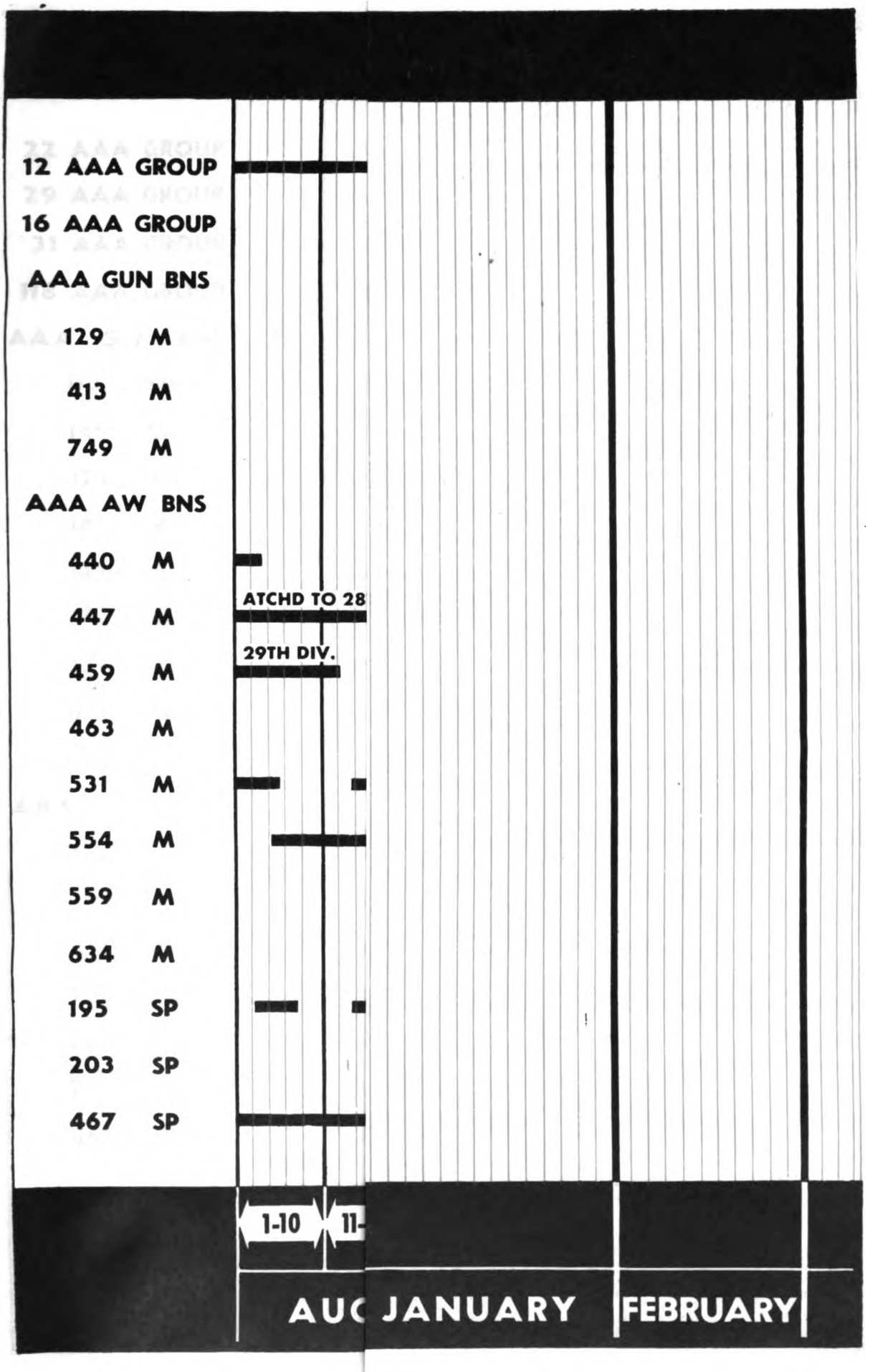


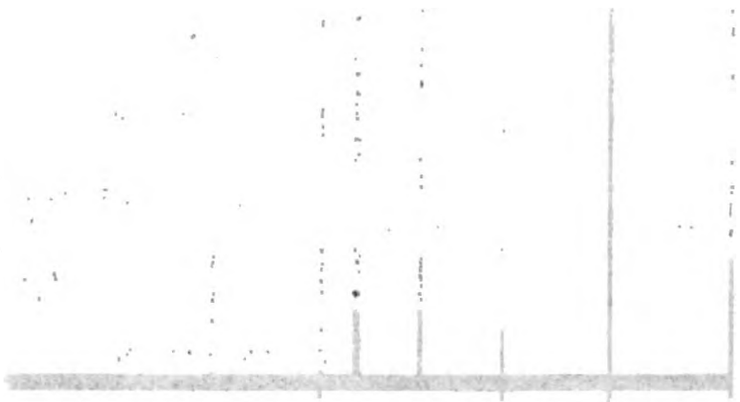


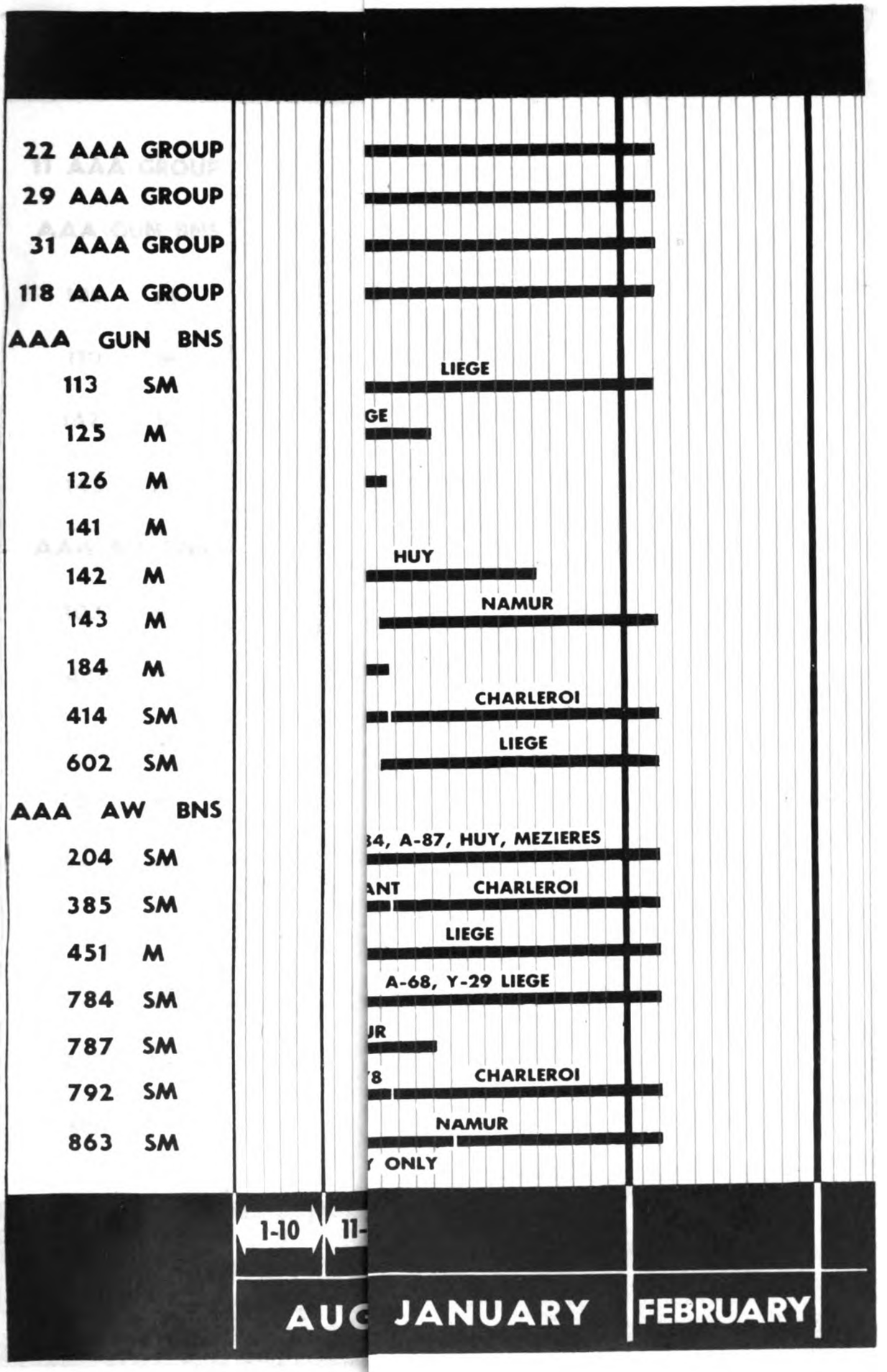


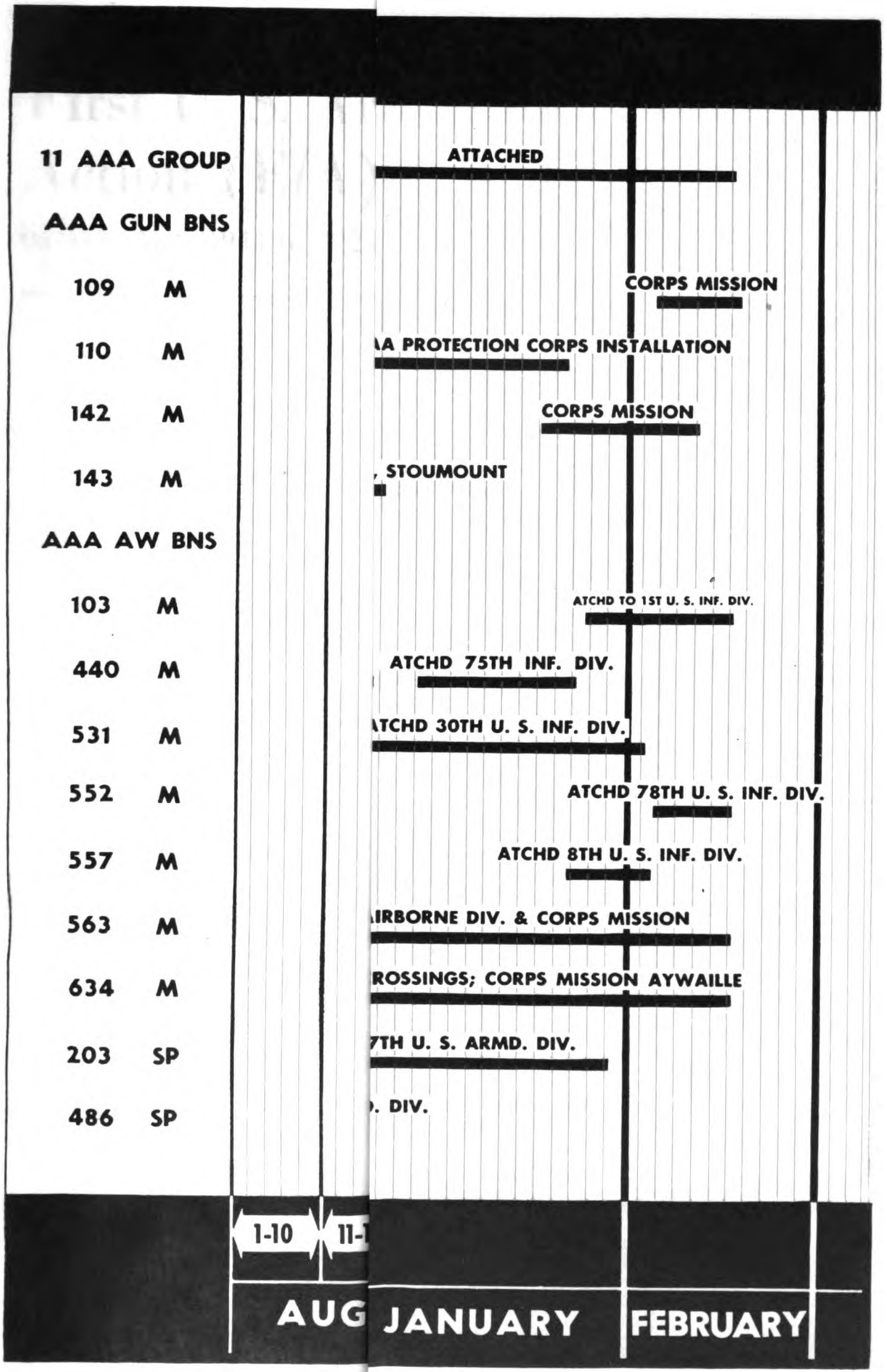












ANNEX 6
APPENDIX 2A

First U. S. Army Résumé of AAA Action (E/A)

010601 Aug. 1944 to 222400 Feb. 1945

1. Raids—Daylight Hours	441
Number E/A	1,842
Raids—Night	621
Number E/A	1,228
Total Raids, Day and Night	1,062
Total E/A	3,070

2. *E/A Destroyed or Probably Destroyed*

a. Category I by:	
90-mm	89½
90-mm (Pozit)	20
40-mm	244
37-mm	60
.50 cal	73
Total	486½
b. Category II by:	
90-mm	30
90-mm (Pozit)	5
40-mm	96
37-mm	45
.50 cal	44
Total	220
c. Cat. I and Cat. II by:	
90-mm	119½
90-mm (Pozit)	25
40-mm	340
37-mm	105
.50 cal	117
Total	706½

3. *E/A Destroyed or Probably Destroyed by Types*

a. Category I	
Me 109	209
Fw 190	138½
Ju 88	44
Do 217	1
Me 110	3
He 111	4
Ju 188	2
Me 410	1
Ju 87	2
Ju 52	4
Me 262	1
Unknown	77
Total	486½
b. Category II	
Me 109	94
Fw 190	55
Ju 88	19
Fw 200K	1
Me 262	12
Me 410	2
Ju 52	1
Ju 188	1
Unknown	35
Total	220
c. Total Cat. I and Cat. II	706½

4. *Ammunition Expenditure (AAA Role)*

90-mm	21,032
90-mm (Pozit)	3,558
40-mm	81,353
37-mm	35,398
.50 cal	2,362,272

5. *Effectiveness of Weapons*

a. *Rounds per E/A Destroyed (Cat. I)*

90-mm	235
90-mm (Pozit)	178
40-mm	333
37-mm	590
.50 cal	32,360

b. *Rounds per E/A Destroyed (Cat. I) or Probably Destroyed (Cat. II)*

90-mm	176
90-mm (Pozit)	142
40-mm	239
37-mm	337
.50 cal	20,190

c. *Percent of Total Number E/A by Weapons*

(1) *Destroyed by:*

90-mm	2.91
90-mm (Pozit)	0.65
40-mm	7.95
37-mm	1.96
.50 cal	2.38
Total percent destroyed	15.85

(2) *Destroyed and Probably Destroyed by:*

90-mm	3.89
90-mm (Pozit)	0.81
40-mm	11.07
37-mm	3.42
.50 cal	3.81
Total Percent Destroyed and Probably Destroyed	23.01

d. *Percent of Total Number E/A*

Destroyed (Cat. I)	15.85
Probably Destroyed (Cat. II)	7.16
Destroyed and Probably Destroyed (Cat. I and Cat. II)	23.01

6. *AAA Ammunition Expenditure in Other than AAA Role*

*90-mm	10,981
90-mm (Pozit)	324
40-mm	21,143
37-mm	2,519
.50 cal	951,903

*Includes 3,270 rounds fired 16 Nov. 44—AA Marker Plan.

First U. S. Army Résumé of AAA Action (E/A)
6 Jun. 1944 to 222400 Feb. 1945

ANNEX 6
APPENDIX 2B

	6 Jun. to 010600 Aug.	010601 Aug. to 010600 Sep.	010601 Sep. to 010600 Oct.	010601 Oct. to 010600 Nov.	010601 Nov. to 010600 Dec.	010601 Dec. to 010600 Jan.	010601 Jan. to 010600 Feb.	010601 Feb. to 222400 Feb.	Total 6 Jun. to 222400 Feb.
1. Raids—Daylight Hours	125	19	128	50	25	184	11	24	566
Number E/A	408	180	347	203	46	673	327	66	2,250
Raids—Night	579	106	94	90	51	250	20	10	1,200
Number E/A	841	303	108	168	77	534	20	18	2,069
Total Raids, Day and Night	704	125	222	140	76	434	31	34	1,766
Total E/A	1,249	483	455	371	123	1,207	347	84	4,319
2. *E/A Destroyed or Probably Destroyed*									
a. Category I by:									
90-mm	65	18	6	12½	3	47	3	0	154½
90-mm (Pozit)	0	0	0	0	0	18	1	1	20
40-mm	69	22	21	12	5	138	44	2	313
37-mm	23	9	9	10	3	25	4	0	83
.50 cal.	21	8	6	2½	3	35½	17	1	94
Barrage Balloon (VLA)	1	0	0	0	0	0	0	0	1
Total	179	57	42	37	14	263½	69	4	665½
b. Category II by:									
90-mm	58	0	7	0	0	23	0	0	88
90-mm (Pozit)	0	0	0	0	0	5	0	0	5
40-mm	40	3	11	12	5	41	16	8	136
37-mm	14	4	11	10	2	13	3	2	59
.50 cal.	18	6	2	8	1	18	8	1	62
Total	130	13	31	30	8	100	27	11	350
c. Cat. I and Cat. II by:									
90-mm	123	18	13	12½	3	70	3	0	242½
90-mm (Pozit)	0	0	0	0	0	23	1	1	25

40-mm	109	25	32	24	10	179	60	10	449
37-mm	37	13	20	20	5	38	7	2	142
.50 cal.	39	14	8	10½	4	53½	25	2	156
Barrage Balloon (VLA)	1	0	0	0	0	0	0	0	1
Total	309	70	73	67	22	363½	96	15	1,015½
3. *E/A Destroyed or Probably Destroyed by Types:*									
a. Category I:									
Me 109	31	12	12	7	6	126	44	2	240
Fw 190	47	14	25	16	3	60½	20	0	185½
Ju 88	30	15	0	1	2	23	3	0	74
Do 217	2	1	0	0	0	0	0	0	3
Me 110	2	0	0	1	0	2	0	0	5
He 111	0	1	1	1	0	1	0	0	4
Ju 188	1	0	0	1	0	1	0	0	3
Me 410	1	1	0	0	0	0	0	0	2
Ju 87	0	0	0	1	1	0	0	0	2
Ju 52	0	0	0	1	0	3	0	0	4
Me 262	0	0	0	0	0	0	0	1	1
Unknown	65	13	4	8	2	47	2	1	142
Total	179	57	42	37	14	263½	69	4	665½
b. Category II:									
Me 109	29	4	15	13	6	35	18	3	123
Fw 190	23	3	9	16	1	19	7	0	78
Ju 88	13	5	0	0	0	13	1	0	32
He 111	3	0	0	0	0	0	0	0	3
Fw 200K	0	1	0	0	0	0	0	0	1
Me 262	0	0	0	0	1	2	1	8	12
Me 410	0	0	0	1	0	1	0	0	2
Ju 52	0	0	0	0	0	1	0	0	1
Ju 188	0	0	0	0	0	1	0	0	1
Unknown	62	0	7	0	0	28	0	0	97
Total	130	13	31	30	8	100	27	11	350
c. Total Cat. I and Cat. II:	309	70	73	67	22	363½	96	15	1,015½

First U. S. Army Résumé of AAA Action (E/A) (Cont'd)

	6 Jun. to 010600 Aug.	010601 Aug. to 010600 Sep.	010601 Sep. to 010600 Oct.	010601 Oct. to 010600 Nov.	010601 Nov. to 010600 Dec.	010601 Dec. to 010600 Jan.	010601 Jan. to 010600 Feb.	010601 Feb. to 222400 Feb.	Total 6 Jun. to 222400 Feb.
4. *Ammunition Expenditure (AAA Role):*									
90-mm	35,493	3,529	2,351	2,376	739	11,573	316	148	56,525
90-mm (Pozit)	0	0	0	0	0	2,972	502	84	3,558
40-mm	27,815	3,992	6,375	10,655	4,512	37,229	7,262	11,328	109,168
37-mm	7,598	1,503	4,385	6,357	4,408	13,788	1,144	3,813	42,996
.50 cal.	937,801	126,041	274,479	363,484	167,004	968,743	165,330	297,191	3,300,073
5. *Effectiveness of Weapons:*									
a. Rounds per E/A destroyed (Cat. I):									
90-mm	546	196	392	190	246	246	105	0	366
90-mm (Pozit)	0	0	0	0	0	165	502	84	178
40-mm	403	181	304	888	902	270	165	5,664	349
37-mm	330	167	487	636	1,469	552	286	0	518
.50 cal.	44,657	15,755	45,747	145,394	55,394	27,289	9,725	297,191	35,107
b. Rounds per E/A Destroyed (Cat. I) or Probably Destroyed (Cat. II):									
90-mm	288	196	181	190	246	165	105	0	233
90-mm (Pozit)	0	0	0	0	0	129	502	84	142
40-mm	255	160	199	444	451	208	121	1,133	243
37-mm	205	116	219	318	881	363	163	1,907	302
.50 cal.	24,046	9,003	34,310	34,618	41,751	18,107	6,613	148,596	21,154
c. Percent of Total Number E/A by Weapons:									
(1) *Destroyed by:*									
90-mm	5.20	3.73	1.32	3.37	2.44	3.89	0.87	0.00	3.58
90-mm (Pozit)	0.00	0.00	0.00	0.00	0.00	1.49	0.29	1.19	0.46
40-mm	5.53	4.55	4.62	3.23	4.06	11.44	12.68	2.38	7.25
37-mm	1.84	1.86	1.98	2.70	2.44	2.07	1.15	0.00	1.92
.50 cal.	1.68	1.66	1.32	0.67	2.44	2.94	4.90	1.19	2.18
Barrage Balloon (VLA)	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Total percent Destroyed	14.33	11.80	9.24	9.97	11.38	21.83	19.89	4.76	15.41

(2) *Destroyed and Probably Destroyed by:*									
90-mm	9.84	3.73	2.86	3.37	2.44	5.80	0.86	0.00	5.61
90-mm (Pozit)	0.00	0.00	0.00	0.00	0.00	1.91	0.29	1.19	0.58
40-mm	8.73	5.18	7.03	6.47	8.13	14.83	17.29	11.91	10.40
37-mm	2.96	2.69	4.40	5.39	4.06	3.15	2.02	2.38	3.29
.50 cal.	3.12	2.90	1.76	2.83	3.25	4.43	7.21	2.38	3.61
Barrage Balloon (VLA)	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Total percent Destroyed and Probably Destroyed	24.73	14.50	16.05	18.06	17.88	30.12	27.67	17.86	23.51
d. Percent of Total Number E/A:									
Destroyed (Cat. I)	14.33	11.80	9.24	9.97	11.38	21.83	19.89	4.76	15.41
Probably Destroyed (Cat. II)	10.40	2.70	6.81	8.09	6.50	8.29	7.78	13.10	8.10
Destroyed and Probably Destroyed (Cat. I and Cat. II)	24.73	14.50	16.05	18.06	17.88	30.12	27.67	17.86	23.51
6. *AA Ammunition Expended in Other than AAA Role:*									
*90-mm	8,715	20	0	361	4,807	3,866	503	1,424	19,696
90-mm (Pozit)	0	0	0	0	0	288	36	0	324
40-mm	793	77	709	10,107	7,261	2,989	0	0	21,936
37-mm	0	866	436	438	607	172	0	0	2,519
.50 cal.	90,266	1,300	30,126	212,840	253,292	295,985	125,760	32,600	1,042,169

*Includes 3,270 rounds fired 16 Nov. 44—AA Marker Plan.

First U.S. Army Confirmed AAA Claims By Brigades and Corps
6 Jun. 1944 to 222400 Feb. 1945

ANNEX 6
APPENDIX 3A

	June		July		August		September		October		November		December		January		222400 February		Total	
	Cat. I	Cat. II	Cat. I	Cat. II	Cat. I	Cat. II	Cat. I	Cat. II	Cat. I	Cat. II	Cat. I	Cat. II	Cat. I	Cat. II	Cat. I	Cat. II	Cat. I	Cat. II	Cat. I	Cat. II
47 AAA Brigade	0	0	3	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	1
49 AAA Brigade	76½	49	28	36	9	0	2	1	6	4	1	1	19	15	11½	11	0	0	153	117
52 AAA Brigade	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29½	19	10	6	.....	.....	39½	25
III Corps	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0	3	0	3
V Corps	15	6	14½	6	5	0	0	0	0	0	4½	4	98½	29	35½	6	0	1	173	52
VII Corps	4	0	16	17	41	13	24	20	27	20	5½	1	109½	33	0	0	4	6	231	110
VIII Corps	0	0	12½	5	1	0	.....	.....	0	0	3	2	0	0	.....	.....	.....	.....	16½	7
XV Corps	0	0	0	0	1	0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0
XVIII Corps (AB)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	2	12	4	0	1	17	7
XIX Corps	½	0	9	10	0	0	15	10	2	4	.....	.....	.....	.....	.....	.....	.....	.....	26½	24
*197 AAA AW Bn (SP)	.....	.....	.....	.....	.....	.....	.....	.....	2	2	0	0	1½	2	.....	.....	.....	.....	3½	4
35 Sig Constr Bn	.....	.....	.....	.....	.....	.....	1	0	0	0	0	0	½	0	0	0	0	0	1½	0
Totals	96	55	83	75	57	13	42	31	37	30	14	8	263½	100	69	27	4	11	665½	350

*While operating directly under Army control.

ANNEX 6
APPENDIX 3B

Confirmed Claims by AAA Battalions
6 Jun. 1944 to 222400 Feb. 1945

Unit	Cat. I	Cat. II	Total
116 AAA Gun Bn	68	13	81
474 AAA AW Bn (SP)	39	32	71
110 AAA Gun Bn	23	29	52
103 AAA AW Bn	35	8	43
486 AAA AW Bn (SP)	26	14	40
376 AAA AW Bn	25	15	40
453 AAA AW Bn	31½	5	36½
535 AAA AW Bn	30	6	36
460 AAA AW Bn	30	6	36
531 AAA AW Bn	18½	15	33½
413 AAA Gun Bn	20½	11	31½
109 AAA Gun Bn	16½	15	31½
461 AAA AW Bn	21½	9	30½
634 AAA AW Bn	19	10	29
445 AAA AW Bn	14½	13	27½
462 AAA AW Bn	20½	4	24½
197 AAA AW Bn (SP)	13½	9	22½
788 AAA AW Bn	8½	12	20½
387 AAA AW Bn (SP)	9	11	20
184 AAA Gun Bn	10	8	18
438 AAA AW Bn	9½	6	15½
602 AAA Gun Bn	11	4	15
457 AAA AW Bn	11	3	14
377 AAA AW Bn	9½	4	13½
440 AAA AW Bn	8	5	13
784 AAA AW Bn	7½	4	11½
552 AAA AW Bn	6½	5	11½
863 AAA AW Bn	6	5	11
555 AAA AW Bn	6	3	9
495 AAA Gun Bn	4	5	9
113 AAA Gun Bn	3	6	9
789 AAA AW Bn	6½	2	8½
557 AAA AW Bn	4½	4	8½
129 AAA Gun Bn	6	2	8
195 AAA AW Bn (SP)	6	2	8
414 AAA Gun Bn	7	0	7
126 AAA Gun Bn	5	2	7
115 AAA Gun Bn	2	5	7
467 AAA AW Bn (SP)	3½	3	6½
740 AAA Gun Bn	3	3	6
430 AAA AW Bn	2	4	6
118 AAA Gun Bn	2	3	5
537 AAA AW Bn	2	3	5
451 AAA AW Bn	1	4	5
449 AAA AW Bn	4½	0	4½
554 AAA AW Bn	2½	2	4½
411 AAA Gun Bn	4	0	4
142 AAA Gun Bn	4	0	4
463 AAA AW Bn	4	0	4
489 AAA AW Bn (SP)	3	1	4
563 AAA AW Bn	2	2	4
787 AAA AW Bn	2½	1	3½
601 AAA Gun Bn	3	0	3
459 AAA AW Bn	2	1	3
120 AAA Gun Bn	1	2	3
217 AAA Gun Bn	2½	0	2½
639 AAA AW Bn	1½	1	2½
448 AAA AW Bn	2	0	2
81 AA/AT Bn (AB)	2	0	2
792 AAA AW Bn	1	1	2
143 AAA Gun Bn	1	1	2
456 AAA AW Bn	0	2	2
203 AAA AW Bn (SP)	0	2	2
749 AAA Gun Bn	1½	0	1½
35 Sig Constr Bn	1½	0	1½
134 AAA Gun Bn	1	0	1
125 AAA Gun Bn	1	0	1
204 AAA AW Bn	1	0	1
391 AAA AW Bn	1	0	1
473 AAA AW Bn (SP)	1	0	1
482 AAA AW Bn (SP)	1	0	1
447 AAA AW Bn	1	0	1
320 AAA Bln Bn (VLA)	1	0	1
776 AAA AW Bn	0	1	1
385 AAA AW Bn	0	1	1
Total	665½	350	1,015½

Résumé of Action PAC

	6 June to 010600A Dec	010601A Dec to 010600A Jan	010601A Jan to 222400A Feb	Total to Date
1. PAC—Over area	2,278	1,428	1,297	5,003
PAC—Engaged	232	160	0	392
2. *PAC DESTROYED*				
a. Category "A" by:				
90-mm	6	5		11
90-mm and .50 cal	1	0		1
40-mm	0	2		2
40-mm and .50 cal	6	4		10
37-mm	0	0		0
.50 cal	0	0		0
Total	13	11		24
b. Category "B" by:				
90-mm	17½	7		24½
90-mm and .50 cal	2	3		5
40-mm	2½	2		4½
40-mm and .50 cal	15	7		22
37-mm	1	0		1
.50 cal	3	5		8
Total	41	24		65
c. Cat. "A" and Cat. "B" by:				
90-mm	23½	12		35½
90-mm and .50 cal	3	3		6
40-mm	2½	4		6½
40-mm and .50 cal	21	11		32
37-mm	1	0		1
.50 cal	3	5		8
Total	54	35		89
3. *Ammunition Expenditure:*				
90-mm	2,880	1,730		4,610
40-mm	6,337	6.243		12,580
37-mm	20	0		20
.50 cal	105,897	59,363		165,260

No Engagements

	6 June to 010600A Dec	010601A Dec to 010600A Jan	010601A Jan to 222400A Feb.	Total to Date
4. *Effectiveness of Weapons; Percent of Total Number PAC Engaged:*				
a. Cat. "A" (In Air) Destroyed by:				
90-mm	2.59	3.13		2.81
90-mm and .50 cal	0.43	0.00		0.25
40-mm	0.00	1.25		0.51
40-mm and .50 cal	2.59	2.50		2.55
37-mm	0.00	0.00		0.00
.50 cal	0.00	0.00		0.00
Total	5.61	6.88		6.12
b. Cat. "B" (By Crashing) Destroyed by:			No Engagements	
90-mm	7.54	4.37		6.25
90-mm and .50 cal	0.86	1.88		1.28
40-mm	1.08	1.25		1.15
40-mm and .50 cal	6.47	4.37		5.61
37-mm	0.43	0.00		0.25
.50 cal	1.29	3.13		2.04
Total	17.67	15.00		16.58
c. Percent of Total Number PAC Engaged:				
Destroyed—Category "A"	5.61	6.88		6.12
Destroyed—Category "B"	17.67	15.00		16.58
Total	23.28	21.88		22.70

ANNEX NO. 7

ENGINEER

SECTION REPORT

Annex 7
Table of Contents

I. Introduction

A. GENERAL

This report describes the nature and scope of Engineer Activities of First United States Army during the period 1 August 1944 to 22 February 1945. It has been prepared as a basic text setting forth the salient facts with appendices which describe the various activities in detail.

B. BRIEF OF ACTIVITIES

Engineer activities during the period varied greatly as a result of the changing tactical situation. Rapid advances produced the usual road maintenance problems incidental to long lines of communications. The Seine and Meuse River Crossings provided major water obstacles and presented the problem of displacing bulky bridging equipment great distances to support the crossings. Demands for new maps taxed the reproduction and distribution facilities to their fullest. Requirements for engineer supplies were great and the provision of transportation for its forward movement was difficult, dictating a stimulated program of local procurement of materials and the establishment of an Army Engineer Transport Service utilizing all available transportation for the movement of supplies. Local production of lumber for winterization absorbed the attention of many troops.

During November and December, all engineer activities were being affected materially by adverse weather conditions. Snow and ice created new road problems and an obvious variation in camouflage techniques. Snow suits were manufactured locally and issued to combat troops, and interest in white paint for vehicles and tanks was stimulated. The status of engineer supply had materially improved and emphasis was being placed on the accumulation of supplies for proposed Roer and Rhine River Crossings.

The German counteroffensive in the Ardennes presented the engineers with new and different problems. Army engineer troops were committed to the preparation and defense of successive barriers before the advancing enemy. The installation of road blocks, defensive mine fields, and bridge demolitions occupied a major portion of the engineer troops during this critical period.

Road maintenance became of prime importance following the early February thaws, and subsequent failure of many roads in the army area resulted in the employment of non-engineer troops in order to insure adequate communications.

The close of the period found all engineer activities centered around preparations for the Roer and Rhine River operations.

II. Engineer Activities

A. ADMINISTRATION AND PERSONNEL

1. General

Administrative and personnel functions were routine throughout the period. Numerous moves of the headquarters required almost continuous attention. Reinforcements were never available in sufficient quantities to satisfy the demand.

2. Administration

The volume of material passing through the engineer message center steadily increased and by the end of the period approximately 300 pieces of incoming and outgoing correspondence were processed daily. A total of 30,648 documents, 9,000 Engineer Field Notebooks (Second Edition), and 4,500 blank mine field forms were distributed to engineer units. An engineer library of 1,350 documents was maintained for reference. Communication problems were acute with the army engineer radio net lending material assistance.

3. Personnel

The effective strength of the army engineer units varied from a high of 615 officers, 52 warrant officers, and 12,191 enlisted men in September to a low of 483 officers, 38 warrant officers, and 9,131 enlisted men in January 1945. This variation in strength was due primarily to the shifting of units to meet the overall tactical situation.

B. INTELLIGENCE

1. General

Engineer Intelligence was distributed during the period through the medium of the Engineer Intelligence Notes, the Engineer Intelligence Memoranda, ETIT Charts, and Special Engineer (Photo Interpretation) Reports.

2. Operational

Operational intelligence, including road and bridge data, railroad information, location of enemy engineer dumps, quarries, road blocks, antitank defenses, and other items of interest was secured by correlation of daily reports of subordinate units, reports of higher and equal headquarters, interpretation of aerial photographs, captured documents and prisoner of war interrogation. The resulting intelligence was disseminated principally in Engineer Intelligence Notes, a continuing numbered series previously initiated.

3. Technical

Source data of engineer technical intelligence included reports of subordinate units, reports of equal and higher headquarters, and investigations and studies conducted by engineer technical intelligence teams. Information derived from these sources was disseminated in the Engineer Technical Intelligence Memoranda and ETIT Charts. This information included field modifications and adaptions to Allied equipment, data on enemy engineer matériel, and descriptions of enemy technical methods.

C. OPERATIONS AND TRAINING

1. General

The period, as a whole, may be characterized as being a test of the versatility of engineer units to cope with an ever-changing situation. Experience proved that organization and long-range planning played the major role in the successful and efficient completion of all assigned missions. The rapid advance during the months of August and September resulted in continual adjustment of the primary mission of all units. Predominant among these were the opening of road communication, which involved approximately 30 percent of the engineer effort. The transition from a fast-moving to a static campaign during October was accomplished without difficulty, and created an increase in such tasks as training, defensive mine warfare, and preparation for winterization. During the latter part of the period an increase in road maintenance and repair on an unprecedented scale absorbed the major effort of all engineer troops.

2. Organization

No serious deficiencies arose in the organization of engineer units in the army. The loss of engineer units to other armies caused an acute shortage of dump trucks, especially in the army engineer groups in support of corps. The lack of quartermaster transportation for the hauling of supplies necessitated the employment of one army engineer group, with attached light and heavy ponton battalions, on this mission. The loss of the dump trucks from the light ponton companies during the month of September resulted in a reduction of efficiency, and sacrificed the advantages of the dual role formerly played by these units in hauling Bailey bridge, and use in road work. Reorganization, under the latest T/O & E, of engineer combat battalions, topo companies, and dump truck companies proved advantageous.

3. Training

There was no large-scale training accomplished during the first portion of the period. Individual units conducted training in mine warfare and floating bridges. As early as September, training was initiated for the proposed crossing of the Rhine River. This program included such training as floating Bailey bridge, storm-boat operation, heavy ponton bridge, treadway bridge, infantry support bridge, and ferry construction and operation, with emphasis on crossing of streams with swift currents. Experiments were conducted on the installation of booms for the protection of bridges and erection of Bailey bridges on barges.

4. Operations

Engineer operations during the period were high lighted by the following:

a. Extremely high percentage of road maintenance during the early part of the period, including the opening of 1,500 miles of roads during the month of August.

b. Bridging of the Seine River. Crossings involved the construction of six treadway bridges, three heavy ponton bridges, one class 40 fixed Bailey bridge, one Class 70 fixed Bailey bridge, two Class 40 floating Bailey bridges, and one Class 70 fixed Bailey on barge piers.

c. Large scale logging operations and operation of civilian sawmills occurred during October and November. A total of 155 sawmills were operated and produced an average of 353,000 bfm per day.

d. Increased demolitions by the retreating Germans necessitated an extensive effort on bridge construction. Notable were the bridges constructed during September, during which time, a total of 77 semipermanent bridges and 15 culverts were built, and 41 bridges repaired or reinforced.

e. A major break-down of roads during the early portion of February resulting from thaw and heavy traffic, required the maximum effort of all troops to maintain roads.

D. SUPPLY

1. General

On the first of August, the First Army engineer supply system was separated from the beach maintenance area, and the rapid movement of the army across France began. At this time, the engineer supply plan of the army was concentrated on establishing the typical operating set-up which had been envisioned for normal army operations, as opposed to the specialized set-up existing previously, in which army engineer supply had also carried the special mission of supplying other organizations on the continent. The typical set-up was not realized since a well-balanced stock of supplies in support of the army did not exist, and the shortage of transportation hampered both resupply and the intra-army hauling incident to the movement of depots and dumps. It became necessary to utilize tactical engineer transportation for both purposes.

The generally static tactical situation during October, November, and the first half of December and the change in weather shifted the type of supply demand to fortification materials and building supplies, and permitted establishment of more adequate depot stocks.

The German counteroffensive in the Ardennes created immediate heavy demands for fortification materials and antitank mines.

Supply operations during January and February were directed primarily toward replacement of equipment lost in combat and the procurement and issue of supplies to support the eastward advance, snow plows, and snow fencing to reduce snow drifts.

Severe winter weather occurred generally throughout the latter part of the period, and materially increased the difficulties experienced in unloading of transportation and the storage and issue of supplies.

2. Supply Planning

Initially supply planning was based on requirements determined through studies of the probable operational areas. As the operation progressed, initial plans were adjusted on the basis of experience. From time to time, supplementary plans were prepared in order to determine requirements for large specific projects such as Rhine River crossing, winterization program, and defensive materials required in the generally static situation which prevailed after the drive across France and Belgium. Planning was disrupted temporarily by the German counteroffensive in the Ardennes, with increased attention given to needs for fortification materials and antitank mines.

3. Supply Operation

During August and early September the rapid advance of the army created serious problems in connection with movement of supply installations. Truck transportation was used exclusively during the movement across France, and depots and dumps were established in fields, orchards, and woods.

As the tactical situation became more static, rail transportation replaced the bulk of truck transportation; and covered storage, hard standings, and increased accessibility contributed to improved performance of the storage and issue functions.

Local production of lumber for the winterization program became a primary engineer mission.

The procurement of engineer supplies from local sources materially aided engineer support of the operation. During September, almost all of the timber, I-beams, nails, and hardware used in the new and repaired bridges were obtained locally by the troops doing the work.

The German counteroffensive in the Ardennes created problems of evacuation of depots and dumps, emergency supply of vital defensive materials, and transportation on congested routes of communication made more difficult by severe winter weather.

E. REAL ESTATE

Occupancy of real estate during the period of rapid movement was accomplished, in general, without formality. When the situation became less fluid and colder weather resulted in use of buildings for shelter, the issuance of formal documents covering use of real estate became customary.

F. TOPOGRAPHIC SERVICE

1. General

Despite the many problems created by the ever-changing tactical situation, the army topographic elements reacted in a uniformly excellent manner. The quality of maps was, in general, good and the distribution was efficient. Revision of the 1:25,000 scale map series of Germany was accomplished during the period, contributing materially to the quality of this map.

2. Maps

During the period of the rapid advance across France and Belgium, there was very little use for large scale maps or map substitutes such as 1:25,000 scale topographic maps, assault maps, and photomosaics, although large-scale topographic maps always were available. When the army reached the Siegfried Line however, large-scale maps were required immediately and were provided.

3. Reproduction

During the period of rapid advance across France and Belgium, army topographic elements were, except for a short period, able to have the 1:25,000 scale topographic maps printed in time for use. The quantity printed was at the reduced scale of five thousand copies per sheet and in monochrome (black). This quantity was adequate only for issue to artillery units and for planning purposes. When the Siegfried Line was encountered, reprinting was increased to allow full scale issue. Miscellaneous reproduction accomplished by First Army during November reached a level several times greater than at any previous time since the beginning of operations on the continent.

4. Survey

Engineer topographic elements assisted field artillery observation battalions by reestablishing trigonometric control in the army area from the trig data furnished by Supreme Headquarters Allied Expeditionary Forces. Field checks were made in rear areas where photo cover was incomplete to assist in revision of the 1:25,000 topographic map series of Germany.

5. Mapping

Army topographic units were employed on the following projects: Tours Photomap Project, First Army 1:100,000 Scale Roadmap, Revision of 1:25,000 Scale Topographic Map of Germany, Preparation of 1:250,000 Scale Emergency Roadmap of Germany, Rhine River Valley Photomap Project, Road and Bridge Data Sheets, and Rhine River Bank Study.

III. Conclusions and Recommendations

A. ADMINISTRATION AND PERSONNEL

Operation of the army engineer radio net developed the fact that the SCR–193 radio set was of inadequate range for maintenance of contact during rapid advances. The employment of two SCR–399 sets, one located at the army engineer office and one used as a relay station, insured satisfactory operation.

The rate of personnel replacement consistently lagged behind the casualty rate. It is recommended that a minimum stockage of 15 engineer officers and 300 enlisted men be maintained at the replacement depot to provide sufficient personnel.

B. INTELLIGENCE

Excepting the first part of this period when operations were extremely fluid, all units were supplied with detailed information of areas forward of their line of advance. Information of areas far to the front of our troops for long-range planning was procured from higher echelons and was available to all units even during the periods of rapid advance. There was no indication of engineer units being handicapped through lack of available intelligence. Of all intelligence items prepared or disseminated by the army engineer, the Road and Bridge Data Maps received the most favorable comment. Maintenance of these maps on a 1:25,000 scale would be impracticable, however, during a rapid advance.

The capture of large cities creates a problem as to availability of trained teams for exploitation of intelligence targets. It is recommended that additional engineer technical intelligence teams be made available for attachment to army on demand.

C. OPERATIONS AND TRAINING

The engineer depot company does not have sufficient personnel to keep required records of receipt and issue of the large volume of supplies which pass through the engineer depot and forward dumps, nor adequate personnel to handle efficiently the storage and issue of all equipment and supplies handled. Additional personnel should be provided, or two companies assigned to each army. A minimum of eight cranes are needed, instead of the one now authorized, to load and unload heavy items. A small medical detachment should be included in each depot company.

Light ponton companies should be reorganized under a new T/O & E authorizing, as major items of equipment, fixed or floating

Bailey bridge in lieu of the M3 ponton bridge, and dump trucks, sufficient to carry the Bailey bridge, in lieu of cargo trucks. This provision of dump trucks would permit the company to perform a secondary role as a dump truck company.

Two additional cranes, truck mounted, should be added to the T/E of the engineer light equipment company, in order to perform efficiently the manifold tasks assigned, such as assisting in logging operations, bridging operation and unloading of supplies.

The need for additional communications due to enlarged areas and as a standby, necessitated the issue of a high powered radio to engineer combat groups, battalions, depot company, and topo battalion. Each combat group should be authorized two SCR–193 radios, and each engineer combat battalion, depot company, and topo battalion should be provided with one SCR–193 radio.

The following troops are considered essential for adequate engineer support of tactical operations:

Unit	*Corps*	*Army*
Engineer Combat Group	2	4
Engineer Combat Battalion	6	16
Engineer Light Equipment Company	1	4
Engineer Treadway Bridge Company	2	0
Engineer Light Ponton Company	2	0
Engineer Dump Truck Company	2	4
Engineer Topographic Battalion	0	1
Engineer Topographic Company	1	0
Engineer Depot Company	0	2
Engineer Maintenance Company	0	4
Engineer Camouflage Battalion	0	1
Engineer Water Supply Company	0	2
Engineer Fire Fighting Platoon	0	4
Engineer Heavy Ponton Battalion	0	3

D. SUPPLY

Requirements for engineer supplies are governed by tactics and weather as well as by terrain. Battle losses incurred and traffic problems incident to winter conditions had a more profound effect on the expenditure of engineer equipment and materials than was anticipated on the basis of terrain studies.

Army requisitioning procedure must remain in effect for a considerable period of time before its efficacy can be determined. A poorly conceived system, thoroughly understood by all echelons, will produce more consistent results than a frequently changing series of well-conceived systems, the understanding and implementation of which are never achieved.

Transportation becomes the major consideration of supply operations in a moving situation. Rail is superior to truck transportation in economy of effort, but limits the selection of sites and lacks flexibility.

A comprehensive supply control system is essential to adequate supply.

The resupply cycle has been indefinite making maintenance of constant levels difficult.

The amount of personnel, equipment, and transportation required to operate the army depot and dumps varies with tonnage carried, frequency of movement, number of installations operated, and accessibility to rail transportation. A depot company must always be reinforced with labor, transportation, and additional technically trained personnel.

Local procurement serves the dual purposes of reducing tonnage to be shipped through the communications zone and of providing an emergency source of supply, and should be vigorously pursued.

E. TOPOGRAPHIC SERVICE

When the advance of the army becomes very rapid, the need for large-scale maps almost ceases. During these periods, an extremely mobile army map subdepot was found expedient affording maximum service to the troops.

Each topographic unit has a style different from that of other units and utilizes different production methods. Where several units are working on adjacent areas in a map series, precise specifications must be established to assure uniformity throughout the series.

Administration and Personnel

A. ADMINISTRATION

1. Message Center

The message center operated 24 hours per day with an officer and two enlisted men on duty during the period 2200 to 0800 hours to handle any urgent matters which might arise. The procedure was instituted wherein each of the army engineer groups maintained a messenger at the engineer message center to insure a positive means of communication with the groups.

2. Headquarters

During the period 1 August 1944 to 22 February 1945, the headquarters moved a total of thirteen times covering a distance of approximately 726 miles. The office of the engineer was formerly divided into two echelons, command and supply. The command echelon consisted of the engineer, 4 officers, 1 warrant officer, and 6 enlisted men with the remainder of the personnel in the supply echelon. On 24 August 1944, a TAC echelon was formed with 1 officer and 2 enlisted men and the remainder of the personnel was grouped to form the main echelon. With the move to Spa, Belgium, on 25 October 1944, both echelons were reunited.

3. Army Engineer Radio Net

During the month of August, communications with engineer units became increasingly difficult due to the rapidity of the advance. In order to maintain contact with the units, it was found necessary to operate an army engineer radio net, consisting of the 4 army engineer groups, the map depot, and the supply depot. The net was set up to operate thru the signal message center with the engineer transmitter located in the transmitter area of army headquarters. SCR–193 radio sets were procured for each station. Since high-speed radio operators were not available from normal sources, it was necessary to obtain personnel from army engineer units to operate the sets of the army engineer office, map depot, and supply depot. The net began operation on 27 August 1944.

The army engineer radio net as originally conceived, failed to solve the communication problem caused by the rapid advance. The great distances between units exceeded the range of the SCR–193. Two SCR–399 sets were procured and placed in the net as relay stations. In October, the tactical situation stabilized and communications ceased to be a problem. At this time it was decided to speed up the processing of messages and the encoding and decoding was taken over from the signal message center. On 8 November 1944, the army engineer radio net was closed temporarily to permit further schooling of the operators.

The army engineer radio net was reopened on 8 December 1944. During the period of the enemy counteroffensive in the Ardennes while units were shifting rapidly the engineer radio net proved valuable in that the office of the engineer was able to maintain contact with its units at all times. During the counteroffensive, 39 messages were received and 77 messages transmitted.

B. PERSONNEL

1. Procurement

Replacement of army engineer personnel was effected by the ground force reinforcement system. Inclosure No. 1 shows a graphic status of casualties and reinforcements. The stockage of personnel was not always sufficient to meet requirements and it became necessary to draw upon the surplus assigned to units. During the month of February the reinforcement situation became critical and approximately 450 enlisted men were transferred from field artillery and antiaircraft units to make up the shortages.

A total of 105 enlisted men received direct commissions under the regulations of Circular 47, Hq ETOUSA, 26 April 1944 and Circular 59, Hq ETOUSA, 1 June 1944 during the period.

2. Strength Reports

Strength reports of the army engineer units during the period are set forth in Inclosure No. 2.

3. Reclassification

A total of four reclassification cases were acted upon during the period. In each case, the basic reasons for reclassification were lack of engineer background and basic training.

4. Decorations

During the period 1 August 1944 to 22 February 1945, a total of 54 awards were made to members of army engineer units. These awards were as follows:

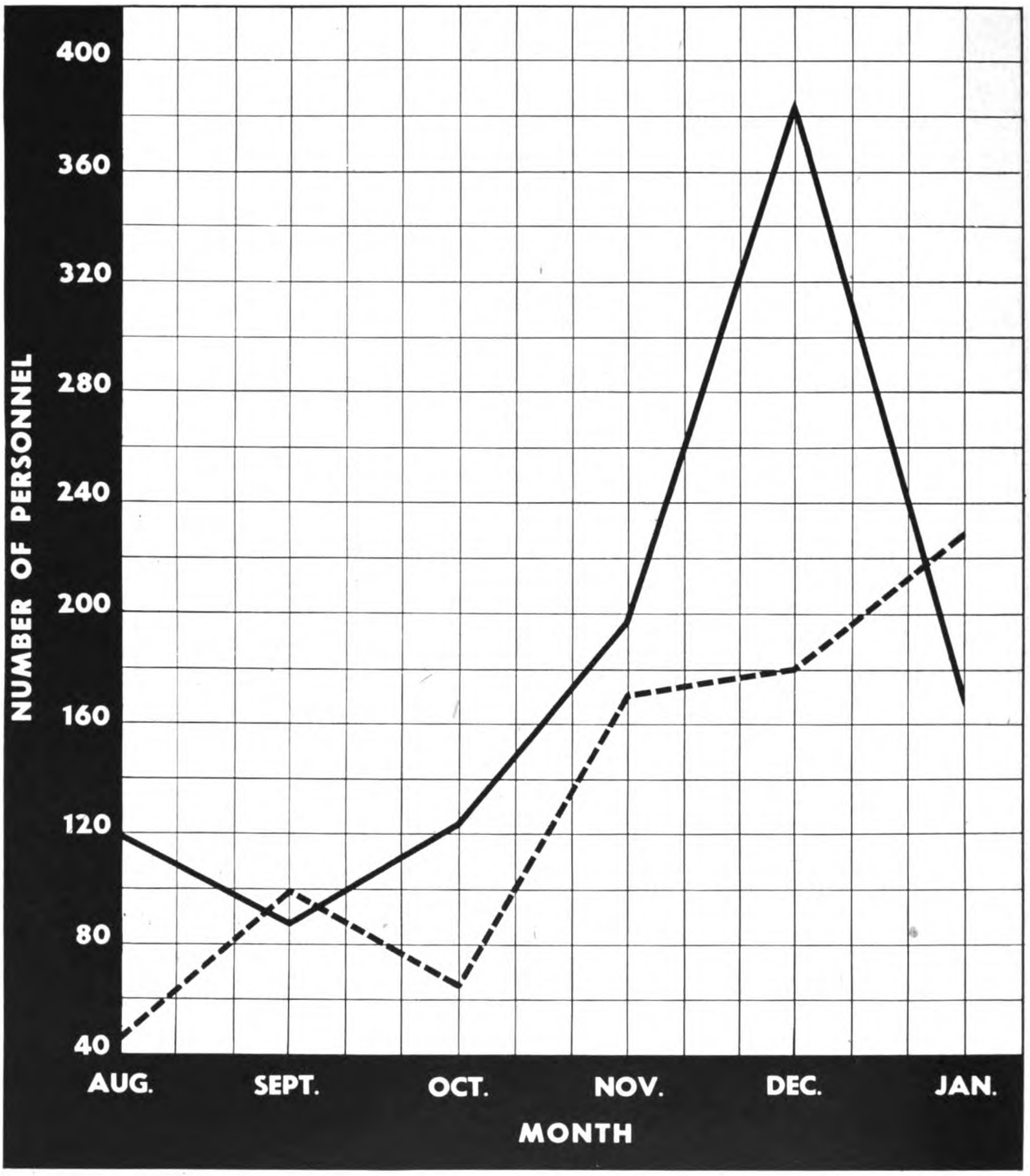
Distinguished Service Cross	1
Legion of Merit	2
Silver Star	11
Soldier's Medal	16
Bronze Star	24

5. Special Service

To provide entertainment for the troops, motion-picture projectors were procured for each army engineer group. In general, the morale of the units was uniformly excellent throughout the period. The placing of certain towns "on limits" and the initiation of passes to Paris during the month of November, insured the maintenance of high morale.

2 Inclosures:

No. 1—Status of Casualties and Reinforcements.
No. 2—Strength Reports of Units (period 1 Aug 44 to 22 Feb 45).



STATUS OF CASUALTIES AND REPLACEMENTS

CASUALTIES

REPLACEMENTS

Inclosure No. 1

STRENGTH OF ARMY ENGINEER UNITS

Unit	Strength 1 Aug			Strength 1 Sept			Strength 1 Oct			Strength 1 Nov			Strength 1 Dec			Strength 1 Jan			Strength 1 Feb		
	O	WO	EM	O	WO	EM	O	WO	EM	O	WO	EM	O	WO	EM	O	WO	EM	O	WO	EM
1105 Engr C Gp	17	....	79	17	....	80	16	....	79	16	....	78	18	....	66	16	....	66	17	....	66
1110 Engr C Gp	18	....	103	16	....	91	18	....	95	19	....	94	19	....	66	18	....	66	16	....	64
1111 Engr C Gp	16	....	66	16	....	63	17	....	68	16	....	67	17	....	67	....	....	....	....	....	....
1128 Engr C Gp	18	....	76	17	....	76	17	....	77	15	....	77	18	....	65	17	....	65	18	....	62
1160 Engr C Gp	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	16	....	66
5 Engr C Bn	30	3	621	30	3	621	29	3	602	28	4	590	31	2	601	28	2	570	30	2	599
49 Engr C Bn	32	3	653	33	3	649	31	3	637	31	3	630	....	....	....	....	....	....	....	....	....
51 Engr C Bn	28	3	601	27	3	570	30	3	598	30	3	591	31	3	600	....	....	....	....	....	....
61 Engr C Bn	....	....	....	....	....	....	28	3	594	28	3	590	29	3	597	29	3	580	32	3	597
148 Engr C Bn	32	3	654	31	3	641	32	3	637	29	3	625	30	3	604	30	3	603	30	3	600
158 Engr C Bn	29	3	608	28	3	592	28	3	592	27	3	592	31	3	599	30	3	563	29	3	611
164 Engr C Bn	29	3	597	28	3	599	29	3	598	28	3	498	31	3	603	31	3	596	30	3	606
203 Engr C Bn	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	29	3	602	31	3	603
207 Engr C Bn	29	3	653	29	3	644	29	3	631	29	3	626	31	3	603	29	3	594	30	3	598
208 Engr C Bn	30	3	601	29	3	592	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
291 Engr C Bn	29	3	616	29	3	611	29	3	612	29	3	608	30	3	604	....	....	....	....	....	....
296 Engr C Bn	29	3	619	28	3	615	30	3	610	29	2	608	32	2	581	33	2	585	30	2	609
299 Engr C Bn	29	3	566	29	3	566	32	3	601	30	4	618	30	3	593	....	....	....	....	....	....
300 Engr C Bn	29	3	609	29	3	587	28	3	602	28	4	599	30	3	606	....	....	....	....	....	....
348 Engr C Bn	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	30	3	596	29	3	602
1255 Engr C Bn(−C Co)	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	23	3	421
C Co, 1255 Engr C Bn	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	163
1264 Engr C Bn	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	29	3	581
1699 Engr C Bn	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	23	3	421
86 Engr Hv Pon Bn	17	3	357	17	3	368	17	3	378	17	4	377	17	3	359	17	3	360	17	3	359
181 Engr Hv Pon Bn	15	3	349	15	3	365	16	3	362	17	4	361	17	3	360	16	3	358	17	3	357
552 Engr Hv Pon Bn	17	3	368	17	3	369	17	3	369	17	4	367	17	3	359	17	3	355	17	3	356
554 Engr Hv Pon Bn	....	....	....	17	3	356	17	3	356	17	4	353	....	....	....	....	....	....	....	....	....
602 Engr Camfl Bn	26	2	348	24	2	282	22	2	378	21	2	277	23	2	280	22	2	276	21	2	275
654 Engr Topo Bn	24	2	499	25	2	513	24	2	512	24	2	508	20	2	487	20	2	487	19	2	477
505 Engr Lt Pon Co	5	....	192	5	....	190	5	....	201	5	....	203	5	....	208	....	....	....	....	....	....
508 Engr Lt Pon Co	6	....	194	6	....	194	....	....	....	....	....	....	....	....	....	6	....	197	....	....	....

STRENGTH OF ARMY ENGINEER UNITS CONT'D

Unit	Strength 1 Aug			Strength 1 Sept			Strength 1 Oct			Strength 1 Nov			Strength 1 Dec			Strength 1 Jan			Strength 1 Feb		
	O	WO	EM	O	WO	EM	O	WO	EM	O	WO	EM	O	WO	EM	O	WO	EM	O	WO	EM
512 Engr Lt Pon Co	7	....	197	7	....	186	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
626 Engr Lt Equip Co	5	....	116	4	....	113	4	....	113	4	....	113	2	....	113	4	....	111	4	....	114
627 Engr Lt Equip Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	....	112	4	....	112	4	....	114	4	....	114
629 Engr Lt Equip Co	4	....	116	4	....	116	4	....	116	4	....	115	5	....	113	.....	.....	.....	.....	.....	.....
631 Engr Lt Equip Co	8	....	174	8	....	139	7	....	129	7	....	130	4	....	110	4	....	116	4	....	113
467 Engr Maint Co	6	....	172	6	....	183	6	....	185	5	....	181	5	....	181	3	....	173	6	....	174
962 Engr Maint Co	6	....	175	6	....	175	6	....	184	6	....	183	6	....	182	6	....	183	6	....	182
966 Engr Maint Co	6	....	186	6	....	184	6	....	187	5	....	185	6	....	185	6	....	184	6	....	182
974 Engr Maint Co	.....	.....	.....	6	....	185	6	....	185	6	....	185	6	....	185	.....	.....	.....	.....	.....	.....
1501 Engr W S Co	.....	.....	.....	6	....	133	6	....	131	6	....	131	6	....	129	6	....	129	6	....	125
1510 Engr W S Co	3	....	108	4	....	108	4	....	111	4	....	111	4	....	111	4	....	110	4	....	113
582 Engr D.T. Co	5	....	104	5	....	102	5	....	104	4	....	105	.....	.....	.....	4	....	101	.....	.....	.....
767 Engr D.T. Co	4	....	105	4	....	103	4	....	101	4	....	102	4	....	96	4	....	102	4	....	102
793 Engr D.T. Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	....	101
1353 Engr D.T. Co	.....	.....	.....	.....	.....	.....	4	....	100	4	....	99	4	....	104	4	....	104	4	....	98
1365 Engr D.T. Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	....	101
1368 Engr D.T. Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	....	101	4	....	103	4	....	103	3	....	92
465 Engr Depot Co	7	....	206	5	....	206	7	....	205	7	....	205	7	....	201	7	....	201	7	....	298
1219 Engr F F Plat	.....	.....	.....	.....	.....	.....	1	....	28	1	....	28	1	....	28	1	....	27	1	....	28
1236 Engr F F Plat	1	....	28	1	....	27	1	....	27	1	....	27	1	....	27	1	....	28	1	....	28
Total	595	49	11,716	615	52	12,191	612	52	11,993	606	51	12,050	576	44	10,888	480	38	9,305	577	46	11,084

Inclosure No. 2.

Intelligence

A. GENERAL

During this period the collection and dissemination of Engineer Intelligence consisted principally of terrain studies, road and bridge studies forward of the front lines, reports of new adaptations to Allied equipment, installations of engineer interest in enemy occupied territory, enemy engineer matériel (including mines and igniters), enemy methods and techniques, and other special studies. The Engineer Field Notebook (second edition) and Enemy Mine Handbook were published and distributed.

B. GENERAL INTELLIGENCE

Items of general intelligence collected by army engineer units were submitted through G–2 channels, in accordance with First Army SOP.

C. OPERATIONAL INTELLIGENCE

1. Sources

The principal sources of engineer intelligence during the period of this report consisted of reports submitted by engineer units of lower echelons in daily operations reports, interpretation of aerial photographs by APID, investigation of enemy installations and dumps by engineer technical intelligence teams, prisoner of war interrogation, captured documents, and reports from higher and equal headquarters.

2. Army Engineer Troops

The intelligence submitted by subordinate engineer units was useful primarily in evaluating engineer work to be done in the rear of front lines. Considerable information concerning new items of enemy equipment and enemy methods was received from subordinate units.

3. Dissemination

a. NOTES. Operational intelligence was disseminated in a continuing series of Engineer Intelligence Notes, of which Nos. 29 to 60 (1944), and 1 to 7 (1945) inclusive, were published. In addition to locations of quarry and gravel pits, enemy engineer dumps, and enemy demolitions, the notes included articles on mines, Siegfried fortifications, river crossings, waterways in Belgium, France, and Germany, German road nets, and miscellaneous engineer information.

b. ENGINEER DOSSIER. This source of information provided by OCE, ETOUSA proved valuable throughout the early part of the period. As the army advanced the areas covered by the dossier were left behind and no benefits were derived from this source during the latter portion of the period. The information disseminated during the period included studies of the rivers Seine, Oise, and Somme; water supply maps of Amiens, Mons; and information on the Sensee Canal and Canal de L'Oise a L'Aisne. To replace the dossier, reports of a similar nature, referred to the corresponding 1:250,000 scale map sheet, were prepared by OCE, ETOUSA and distributed to all units concerned.

c. SPECIAL REPORTS. Many publications and studies of vital interest to First Army units were received from SHAEF, Twelfth Army Group, and OCE, ETOUSA. Numerous reports were prepared for the army engineer staff, and several reports prepared by subordinate units were published and distributed.

d. CAPTURED DOCUMENTS. Information of great value was obtained from documents captured in Paris, Brussels, and Aachen. The principal items are listed below:

(1) Terrain studies, military geographies, road maps, and town plans of Northeast France, Netherlands, and Belgium.

(2) Photomaps of Germany north of Aachen.

(3) Yearbook for North German waterways giving stage and discharge data. and gauge zero of various stations along the Rhine.

(4) Construction plans, maps, and photographs of the Roer and Urft dams.

D. MATÉRIEL INTELLIGENCE

1. Matériel

a. SOURCES OF INFORMATION. The following sources of information of enemy engineer matériel were of value:

(1) Reports of army, corps, and division engineer units.

(2) Routine search of captured enemy dumps by engineer technical intelligence teams.

(3) Reports by other units, including SHAEF, OCE, ETOUSA, and engineer intelligence services of other Allied armies.

(4) Prisoner of War interrogation.

(5) Captured documents.

b. EVALUATION AND DISSEMINATION. Matériel intelligence collected from the various sources and evaluated with the assistance of the 2889th Engineer Technical Intelligence Team (Research) was disseminated in either the Engineer Intelligence Memoranda, ETIT charts, or in both. During the period of this report, Memoranda Nos. 22 to 33 (1944) and Nos. 1 to 5 (1945) inclusive, were published. Numerous enemy developments in mines, charges, igniters, and technical equipment as well as new methods of utilizing old matériel were reported. Many Allied techniques and methods were discussed. The publication of data pertaining to Allied techniques and methods in the Engineer Intelligence Memorandum were discontinued during December, this information thereafter being included in the Engineer Technical Bulletin.

E. INTELLIGENCE TEAMS

1. 2889th Engineer Technical Intelligence Team (Research)

The 2889th Engineer Technical Intelligence Team (Research) investigated all possible sources of enemy engineer matériel and prepared reports and charts on the technical composition and use of items found in dumps, installations, or in use in the First Army sector. The information contained in its reports,

submitted to the Office of the Chief Engineer, European Theater of Operations, was incorporated in the Engineer Technical Intelligence Memoranda and in ETIT charts. Nine charts (ETIT) depicting construction, manner of operation, and neutralization of various enemy mines, charges, and igniters were published during the period. The team, in addition to coordinating the work of all corps teams, distributed complete training sets, including charts, mines, charges, and igniters to all engineer troops.

2. *Corps Teams*

The Engineer Technical Intelligence Teams (Combat), attached to corps, investigated new and unusual items of enemy matériel found in the corps area of responsibility, and checked captured enemy dumps and installations for new items. Reports and samples of all new enemy matériel and methods were submitted to the army research team. Corps teams assisted in the preparation of intelligence items for distribution to corps and division units; conducted training of all corps units; and supplied units with training sets including mines, charges, and igniters. In overrunning some of the larger cities, the corps teams were unable to fully exploit available targets.

Intelligence from the interpretation of aerial photographs was prepared for the army engineer by personnel of the S–2 section located at the army photo interpretation center.

F. A.P.I.S.

1. *Road and Bridge Data*

Road and bridge data based on photo-interpretation was published on a 1:50,000 scale map conforming in area to that of the corresponding sheets, 6G1, 6G2, 7G3, and 7G4 of GSGS 4250. This method could not keep pace with the advance, and the series was discontinued. Later in the period, a 1:25,000 scale road and bridge overlay was prepared for 57 sheets within the army boundaries of map series GSGS 4414. Only 9 of these sheets included areas east of the Rhine River.

2. *Unusual Reports*

In addition to routine reports, there were prepared at APID reports of tank crossing sites on the Rhine River, a preliminary study of dam and valley characteristics along the Roer River, a road study in the Roer River, and a road study in the Roer and Urft dam area. A bank study of the Rhine River from Koln to Koblenz was overprinted on map series GSGS 4517, 1:12,500 scale, depicting bank characteristics.

3. *Routine Reports*

Special engineer reports, disseminated each day of new photography to corps and division engineers, contained such items as location of road blocks, quarries, antitank ditches, and debris reports. The debris report was a new item instituted during the period of this report and containing information with regard to the condition of roads, streets, and bridges in towns and cities in the area forward of our front lines.

Operations and Training

A. GENERAL

During the early stages of the period, the engineer mission was confined to the close support of corps, thus permitting corps units to work forward in opening routes of advance necessitated by the rapid advance across France and Belgium.

Constant road maintenance, of a hasty and temporary nature, was necessary to keep main supply routes open during the exploitation of the break-through at St. Lo. In the latter part of August and early September, road maintenance became secondary, and bridge construction assumed the position of primary importance.

As the rapid advance across France and Belgium came to a virtual halt at the Siegfried Line, a marked increase in mine warfare and defensive operations, including use of engineers as infantry, was experienced.

The formulation of plans for the Rhine River crossings resulted in extensive training during the months of October and November for this operation.

The production of lumber from sawmill operations for winterization and bridging requirements reached its peak during the latter part of November, with approximately one-half of the goal of 15,000,000 board-feet attained.

During the latter portion of December, the engineers were committed to extensive barrier operations, thereby contributing materially to the success of First Army in halting the counteroffensive.

During January and through the close of the period, the major effort of engineer units was devoted to maintenance and repair of the army road net. A major break-down of roads during the early portion of February resulting from thaw and heavy traffic, required an all out effort of all engineer units.

The approximate percent of effort spent on various engineer missions during the tactical phases of the period is set forth in Inclosure 1.

B. ORGANIZATION

1. *Activation and Reorganization of Units*

a. There were no units activated during the period.

b. The following type units were reorganized between 1 August 1944 and 22 February 1945:

Unit	*Date Reorganized*	*Old T/O & E*	*New T/O & E*
Engr Maint Co	14 August 1944	5–157, 1 Apr 42	5–157, 18 Dec 43
Engr L Pon Co	4 September 1944	5–87, 21 Aug 43	5–87, 11 Mar 44
Engr C Bn (Corps and Army Bns)	3 November 1944	5–15, 15 July 43	5–15, 13 Mar 44
Engr C Bn (Division Bns)	15 November 1944	5–15, 15 July 43	5–15, 13 Mar 44
Engr Topo Co (Corps)	24 November 1944	5–167, 3 Nov 43	5–167, 26 Aug 44
Engr Dp Trk Co	27 November 1944	5–88, 17 May 43	5–88, 9 May 44
Engr C Gp	5 January 1945	5–192, 14 July 43	5–192, 25 Aug 44
Engr Sur Lia Det	5 January 1945	5–500, 31 July 43	5–500, 26 July 44
Engr L E Co	23 January 1945	5–367, 22 July 43	5–367, 24 Aug 44
Engr Util Det	27 January 1945	5–500, 31 July 43	5–500, 26 July 44

2. *Troop List*

Composition of Troop List as of 22 February 1945 is contained in Inclosure 2.

3. *Combat Efficiency*

Units, for the most part, proved to be adequately staffed, trained, and equipped for their designated missions, resulting in high combat efficiency. Exceptions to this were caused by a lack of equipment or personnel rather than inefficiency or lack of training.

One of the most outstanding shortages of equipment developed in the light equipment companies. Only two truck-mounted cranes are authorized by T/E, yet four could have been usefully employed during the entire time. This demand was due not only to the requirements for engineer tasks, but was increased by the fact that other services were not equipped with sufficient cranes to handle their own supplies and continually required assistance. This shortage definitely reduced the efficiency of the light equipment companies.

Another case of reduced efficiency occurred within the communication system. Early in the mobile period following the break-through, it became impossible to maintain wire communication with army engineer groups. As a result, groups, the map depot, and engineer depot were issued SCR–193 radios and an army engineer radio net established. The same equipment was issued to all army engineer combat battalions and the heavy ponton battalions to further insure continuous communications while units were widely separated. This additional equipment proved invaluable to operations and added to the combat efficiency of all units.

A change in the T/O & E of the light ponton companies brought about a definite lowering of their usefulness. The new T/O & E substituted cargo trucks for dump trucks. Until this change, the companies had functioned in the dual role of delivering bridge equipment when and where needed, and when not employed in this capacity, of providing a pool of dump trucks to augment those organic to the combat battalions.

A point of decreased combat efficiency was noted in the depot company. The problem of engineer supply of a field army is entirely too large to be adequately handled by one company of the size prescribed by the present T/O. Operational necessity dictates the desirability of a central depot augmented by forward dumps supporting each corps. The need for a medical detachment at the depot for the depot company and attached units became very evident and in the first part of December a medical detachment of one officer and nine enlisted men was attached to the engineer depot company.

The lack of sufficient transportation in the engineer combat group has reduced their combat efficiency. This unit is designated as a purely tactical headquarters which means that its entire personnel belongs in its forward echelon, but due to insufficient transportation, requiring shuttling of the headquarters, only half of the personnel and equipment are available when the unit moves. During the rapidly moving period in August and September, groups were required to move every few days, consequently they were required to operate with half their personnel for as much as a third of the time. This factor tended toward a reduced combat efficiency which could be obviated with a small additional amount of transportation.

The lack of sufficient personnel was noted in the operation of the army map depot. A separate army map depot company is definitely required. Map distribution cannot be absorbed by the army topo battalion as an additional mission.

C. TRAINING

1. *Status*

The status of training of engineer units was satisfactory for normal engineer tasks. Additional training for contemplated special missions, however, was deemed necessary and during the period such training was undertaken.

2. *Mission*

Training missions were assigned by the army engineer. For the most part, training had as its objective, the perfection of operational technique incidental to the crossing of the Rhine River.

Training was conducted in the construction of both Class 40 and 70 floating Bailey bridges, operation of powered floating equipment, including such specialized equipment as amphibian trucks and LCVP's. Construction of various type of mine booms, drills and experimentation in loading, transporting, and unloading floating equipment of all types, and the construction of rafts and ferries was conducted throughout the period.

Schools were conducted in subordinate units on bridge construction, floating Bailey, treadway, and ponton; river crossings, radio schools, and weapons.

Experiments and demonstrations in bridge erection, road maintenance equipment, storm boats and power boats (British and American), and demolitions equipment were carried out during the period.

3. *Engineer Training of Other Arms*

There were no large-scale programs of engineer training in other arms. Engineer technical intelligence teams trained the static personnel at replacement depots in order to provide a means of training replacements in the technique of recognition and neutralization of mines and booby traps. Schools were conducted in mines and booby traps and operation of flame throwers by division engineer battalions for units of their respective divisions.

4. *Supervision and Inspection*

The supervision of training was decentralized to engineer groups. Frequent inspections by the army engineer or his representatives were made to determine the degree of efficiency. Arrangements for experiments and demonstrations by units were coordinated by the army engineer.

D. OPERATIONS

---

1. *Operational Plans*

Corps engineers continued in direct support of divisions, while army engineers provided close support for corps. Normal disposition of army engineer troops provided one engineer combat group in support of each corps, and one group employed on engineer work in the army service area.

During February, the readjustment of assigned engineer units dictated a change in the plan for their use. One engineer combat group was employed as the army service group, with the mission of operating engineer supply, engineer maintenance, and the army engineer transport service. Engineer work in the army rear areas was performed by two general service regiments.

Engineer plans for the crossing of the Rhine River were formulated during September, and contemplated two treadway bridges per corps, one heavy ponton bridge for each of two corps, and two Class 40 and two Class 70 floating Bailey bridges to be constructed by army engineers.

Plans for Roer River operations were formulated and executed during February.

2. *Orders and Operating Procedure*

Missions were assigned to army units by means of a series of Engineer Operations Orders of which Nos. 35 to 238 inclusive were published during the period. General tasks, assignment of engineer areas of responsibility, and fragmentary orders were issued or confirmed through this medium.

Changes in the forward army engineer boundary were effected by direct coordination between army and corps engineers. Changes in rear boundary of engineer responsibility were coordinated with the ADSEC engineer.

Orders containing specifications and supply data for major engineer tasks were issued in the form of a continuous series known as "Job Orders." Job Orders Nos. 13 to 105 inclusive were issued during the period.

3. *Engineer Annexes*

The availability of engineer services, including location of engineer dumps and depots, location and assignment of engineer maintenance companies, location of Army water D.P.s, location of the map depot, and camouflage services available were published under appropriate paragraphs of the Army Administrative Orders.

The publishing of Army Administrative Instructions was initiated during the month of November. Paragraphs were prepared on engineer supply, construction, and maintenance of routes.

4. *Standing Operating Procedures*

SOPs in effect at the start of period were not changed or rescinded until 1 December, at which time a completely new SOP was published as a First U. S. Army SOP, incorporating those changes and additions deemed necessary after six months of active combat. Changes in the engineer portions of the SOP included road and bridge reconnaissance procedures, a revision of the Daily Engineer Operations Report, procedure for army topographic service, and the policy for establishing and operating water distributing points.

Army Administrative Instructions were published establishing policies as to road maintenance and construction, bridge construction, engineer supply procedures, and methods of map distribution.

5. *Estimate of the Situation*

Engineer estimates of the situation were prepared for contemplated operations and were used as a basis for determination of troops and supply requirements. These estimates covered areas along the axis of advance and progressively toward the front.

6. *Operations Map*

A road situation map was maintained which reflected the current road and bridge situation in the army and corps areas of responsibility. Tactical bridges in place and bridges under construction were plotted on the map. This map proved useful in planning engineer work and also was used by traffic headquarters in routing convoys.

Road and bridge status maps were published as necessary for the information of all concerned. These maps showed the condition of roads open and the classification of roads and bridges.

7. *Roads*

The army road net was periodically projected in relation to anticipated tactical needs. Where existing road conditions permitted, in a semistatic condition, two axial roads per corps and sufficient lateral roads spaced at intervals of approximately five miles, were developed. Close coordination was maintained with traffic headquarters for the projection, development, extension, and maintenance of the army road net.

Army road net projections were based on map and aerial photo study. The Michelin map was used throughout for map study and route numbers. A system was devised whereby axial routes were lettered V, W, X, Y, and Z. This proved particularly advantageous on the long supply routes and through larger cities such as Paris, Namur, and Liege.

To adjust engineer means to a fast-moving situation, the number of axial routes was reduced from six to three between Domfront and Chartres. From Chartres, east across the Seine to the Senlis–Meaux army service area, the number of axial routes was increased to four. From this point to the German border, five axial routes were developed and maintained. During this time lateral routes were spaced

approximately 25 miles apart. Inclosure 3 shows the army road net developed during the period. During the entire period, until the advent of rain which began in November, all roads held up very well.

The rainy season affected the main axial roads very little, but the lateral roads near the German border were one to one and one-half way roads, and carrying very heavy traffic, required a maximum of maintenance. The roads into and leading from the army service area near Eupen required extensive maintenance.

During the first half of December abrasives were stockpiled along the road in anticipation of ice and snow conditions. Ice and snow removal plans were perfected by all engineer groups. Arrangements were made to use all civilian snow removal equipment as well as civilian labor to remove snow and spread abrasives. Engineer maintenance companies built and installed snow plows on 6 x 6, 2½-ton trucks.

During the German counteroffensive in the Ardennes, very few engineer troops were available for road maintenance as a result of large commitments for barrier construction. Despite heavy traffic and limited maintenance, the roads stood up very well. At the close of the period, snow and ice conditions made necessary a large expenditure of labor, materials, and equipment, spreading and stockpiling abrasive materials. Maximum utilization of civilian labor was attained.

Snow and ice absorbed the major effort in road maintenance during the month of January. Bulldozers, motorized graders, and improvized snow plows on 2½-ton trucks maintained roads open to traffic at all times. The early part of February found the army area covered with six to eighteen inches of snow. All roads held up very well during this portion of the period.

Warm weather and rain on 4 and 5 February melted the snow and thawed out road subgrades. Heavy supply traffic and concentrated troop movements over the road net during this period caused complete failure of many roads. In order to concentrate maintenance efforts, priority roads were designated and each of these roads classified. (See Incl. 4.) Roads particularly affected were N–31, Verviers to Monschau and N–28, Eupen to Aachen. A section of N–31, from the German border to Monschau, failed and became impassable overnight. The roads in the northern portion of the army area were generally better throughout the period than those in the southern portion.

Assigned engineer personnel and equipment were found inadequate to maintain even priority roads. Ten quartermaster dump truck companies were attached to haul road materials from railheads and quarries. A total of 5,500 men from armored divisions, infantry divisions and several TD battalions were attached to supplement engineer personnel. In addition, a total of 64,312 civilian man-hours were expended on drainage and general road repair.

Crushing capacities of local quarries and mobile crushing units were not capable of furnishing sufficient road metal in the Eupen and Butgenbach areas, and it was necessary to ship crushed rock by rail from the vicinity of Aywaille. Local quarries in the Aachen and Eschweiler areas provided sufficient rock for that section of the army area.

To provide a base on some sections of roads in the Monschau–Butgenbach and Malmedy areas, it was found necessary to employ corduroy, surfaced with crushed rock. A total of 8.37 miles of two-way, and 2.35 miles of one-way corduroy was laid and surfaced. This required 146,560 logs and 107,153 man-hours to accomplish.

On other roads, the repairs consisted of draining the failed sections, removing the material to a solid base, then filling with 3- to 6-inch rock and finishing with ¾- to 1½-inch crushed rock.

Engineer road maintenance was completed in five stages. Each stage being completed over the entire roadway before proceeding to the next stage. Stages were as follows:

Stage I: Removal of military obstacles and debris; filling of bomb and shell craters, and sign posting.

Stage II: Draining of water from the roadway surface.

Stage III: Repair of deep potholes in the used roadway surface and the surfacing of bomb and shell cratered areas.

Stage IV: Repair of deep potholes along the shoulder of the roadway and the improving of the wearing course.

Stage V: Reduction of traffic bottlenecks, easing curves, and widening the roadway to a minimum of 20 feet.

During and immediately after the St. Lo break-through, 75 percent of the effort was spent on Stages I, III, and V. This percentage changed radically with the swift advance across France to the Meuse River. During this period army troops spent 75 percent of their effort on Stage I, and 9 percent on Stage III, with 16 percent of the effort divided equally between Stages II, IV, and V. Corps troops spent 79 percent on Stage I, 15 percent on Stage III, with only 6 percent of their effort being devoted to Stages II, IV, and V. When the situation became static and wet weather began, the percentages again changed with both army and corps troops spending 40 percent of their maintenance effort on Stage I, 30 percent on Stage II, 15 percent on Stage III, 10 percent on Stage IV and 5 percent on Stage V. After a month of heavy traffic, which continued to the end of the period, maintenance time was divided as follows: Stage II, 20 percent; Stage III, 40 percent; Stage IV, 30 percent; with Stages I and V averaging 5 percent each. These percentages reflect the general condition of the roads during the advance across France and Belgium. The majority of the maintenance time was spent on Stage I, removing military objects and debris from the road and filling bomb and shell craters. Otherwise, the roads were excellent and remained so until it became necessary to concentrate heavy traffic on roads which originally had a poor subgrade and later became unstable due to rain.

The following tabulation shows the approximate number of man-hours expended in road maintenance, by stages, and certain other interesting road statistics:

Stage	*Army troops*	*Corps troops*
I	511,400	1,398,500
II	1,136,500	2,058,400
III	832,300	1,157,000
IV	655,000	684,700
V	98,700	258,000

Road statistics

	Army troops	*Corps troops*
Roads opened (miles)	4,969	2,367
Army road net opened to Cl 70 traffic (miles)	4,644	38
Road maintenance (man-hours)	3,233,900	5,556,600
Road construction (man-hours)	1,102,380	1,062,120
Signs posted (each)	114,780	39,920

8. Bridges

During the period following the St. Lo break-through to the beginning of the Battle of Germany, the destruction of bridges continued to be the principal obstacle created by the enemy. Corps engineers spanned these gaps with tactical bridges which were replaced on the army road net by Class 70, semipermanent, timber bridges. When time permitted, semipermanent bridges were constructed by corps engineer troops, but the major portion were built by army engineer troops.

This policy was followed except in cases where the movement was rapid and blown gaps were of excessive length. In these cases, it was expeditious to leave the tactical bridges in place rather than become involved in large-scale construction projects. In some cases bypasses were constructed around bridges which would require excessive time to reconstruct. Tactical bridges not on the army road net were removed and the road barricaded. Corps troops generally removed all treadway bridges but Bailey bridges were normally removed by army engineer units.

No semipermanent bridges were installed by the First U. S. Army across the Seine River. Seventeen tactical bridges were used in making the initial crossings. After the front moved forward a few miles, most of the supply traffic was funneled through Paris over existing civilian bridges. Types and lengths of tactical bridges constructed across the Seine River are listed below:

No.	Type	Total length (ft.)
2	Bailey bridge (floating)	1,150
3	Bailey bridge (fixed)	1,150
6	Treadway	3,848
3	Heavy ponton	1,720
1	Infantry support	483

The Meuse River and Albert Canal crossings were accomplished where planned except on N–2 near Maastricht across the Albert Canal, and on N–45 across the Meuse at Givet. The Albert Canal crossing was shifted south to Canne where a Class 40 Bailey bridge was installed and later replaced by a fill. A pile bent, steel I-beam stringer bridge, 605 feet in length, was constructed across the Meuse River at Maastricht. A pile bent, steel Gothic I-beam stringer bridge, 270 feet in length, was constructed across the Meuse River at Dinant. Ponton bridges were used at both of these points until construction of the semi-permanent structures were finished.

During the German counteroffensive in the Ardennes, no bridges, tactical nor semipermanent, were built. During this period, 70 bridges were demolished by our forces.

The period of the allied counterattack marked an increase in the number of bridges constructed, both tactical and semipermanent, due to necessity of replacing those bridges demolished by our forces during the German counteroffensive in the Ardennes, and those destroyed by enemy action.

Statistics concerning bridges are shown in the following tables:

	Military bridges (Semipermanent)		
	No. constructed	Total length (ft.)	Man hours to construct
Bridges constructed ..	193	10,737	1,096,200
Timber trestle	181	8,774	821,000
Pile bent	12	1,963	275,200
Culverts	126	5,247	79,420
Repairing and reinforcing existing bridges	79	.....	76,070

9. Barrier Operations

During the rapid advance across France and Belgium, comparatively few mines were laid by either friendly or enemy troops. The enemy established a barrier near Mortain but confined his mine-laying operations mostly to side roads. From this point to the Siegfried Line the advance was so rapid that mine laying on the main roads was not feasible.

The stabilizing of the front near the Siegfried Line forced both friendly and enemy troops to resort to laying mines. Friendly mine fields were generally located to protect lightly defended areas and for local security. Most fields were laid at battalion level but for the first time since the Normandy Campaign, mine fields were located for barriers of division and corps sectors. Enemy fields were encountered during each advance and the majority of time and effort on mine warfare from this point was directed toward sweeping and clearing mine fields.

Fields which had no effect on tactical operations were marked and charted but were not cleared. An army barrier map was published at intervals showing all friendly and enemy fields located and those fields which had been reported cleared. Two barrier maps were published during the period, on 1 November 1944 and 8 November 1944, and showed a total of 667 separate fields containing 22,000 antitank mines and 3,200 antipersonnel mines. Eight of these fields contained over 500 antitank mines.

The German counteroffensive in the Ardennes resulted in the establishment of barrier defenses in much larger scale than at any previous time. Barriers were planned and developed at army level. The division covering obstacles were breached by the initial thrust of the Germans and with the American forces falling back, the engineers of divisions, corps,

	Military bridges (Tactical)					
	Number Constructed	Total length (ft.)	Man hours to construct	Removed	Left in place No.	Left in place Length
Bailey bridge (fixed)	151	12,425	129,217	129	22	1,690
Bailey bridge (floating)	12	3,701	57,450	11	1	530
Treadway bridge	182	20,666	17,894	167	15	1,666
Footbridge	5	1,772	600	5	0	0
Ponton bridge	14	3,743	12,320	14	0	0

and army were committed to the installation of obstacles to cover the withdrawal and eventually to the establishment of the final defensive barrier. Many obstacles such as road blocks, abatis, and destroyed bridges were created at advantageous positions. Inclosure 5 shows barriers both planned and executed within the army area during the period.

a. AMBLEVE – OURTHE – LESSE OBSTACLE ZONE. The barrier created to seal off the German penetration consisted of two principal obstacle zones and six supplementary or "switch" zones. (See Incl. 5.) The final principal zone extended from Eupen to Butgenbach through Malmedy thence along Ambleve River to its junction with the Ourthe thence south along the Ourthe River to Hotton thence southwest through Marche to Jemeppe thence along the Wamme River to its junction with the Homme River at Jemelle thence along the Lesse River to the Meuse River. The large reentrant in this zone between Trois Ponts and Hotton was straightened out by the XVIII Airborne Corps which captured a large number of enemy vehicles at Stoumont.

The Ambleve – Ourthe – Lesse zone was pierced at one place—Rochefort—by a German armored force which reached Celles before running out of gasoline and being captured with the zone restored.

b. MEUSE BARRIER. The second principal obstacle zone was the Meuse River between Maastricht and Givet. All bridges between these two points were prepared for demolition. The major portion of this work was done by British and ASCZ engineers. None of these demolitions had to be executed. One minor railroad bridge was damaged when an enemy bomb set off prepared demolition charges on the bridge. 41,800 pounds of explosives were placed on the 15 bridges over the Meuse from Liege to Ardenne.

c. SUPPLEMENTARY OBSTACLE ZONES. Extending south from Ambleve–Ourthe–Lesse zone, three hasty zones were established. These were: (1) Along the Salm River from Trois Ponts to Bovigny established on 18–19 Dec. 1944. (2) Along the Ourthe River from Hotton south to its junction with the stream Rau de Laval thence along streams to Sibret thence along La Strange River and Sure River to Martellange on 20–21 Dec. 1944. (3) From junction of Lesse and Homme Rivers south along the Lesse to the vicinity of Gembes. These barriers were pierced and overrun but each contributed to the delay of the German advance.

Three additional supplementary obstacle zones were established as follows: (1) A hasty zone northeast of Bastogne was constructed and manned on the 18 Dec. by the 158th Engineer Combat Battalion. Since there were few natural obstacles this line consisted of road blocks, hasty mine fields, and dug-in positions. The 101st Airborne Division took over these light defenses and the 158th Engineer Combat Battalion was relieved for further work. (2) A "switch" position running from vicinity Remouchamps to vicinity of Limbourg was prepared and manned by the 1105th Engineer Combat Group on 19–21 Dec. (3) Complete plans for an obstacle zone along the Vesdre River from Eupen to its junction with the Ourthe at Chenee thence along the Ourthe to the Meuse were made. However, only the bridges across the Ourthe and the two bridges across the Vesdre at Chenee were actually prepared for demolition.

d. BARRIER STATISTICS. The barrier installation during the period 17 Dec. to 31 Dec. included a total of 505 mine fields containing approximately 115,000 AT mines and 2,000 AP mines. An additional 120,000 mines were used by divisions in defensive positions. During this period, 370 road blocks were constructed of which 257 contained AT mines, 34 were prepared for cratering, and 44 prepared and executed abatis. During this period, 257 bridges were prepared for demolition and 70 bridges were demolished.

The five largest mine fields laid in this zone are listed below:

Date laid	*No. and type*	*Coordinates*	*Unit laying*
23 Dec	4159 AT	K 922023	Co G, 1st Engr C Bn
31 Dec	3345 AT	K 942037 to K 938019	Co C, 1st Engr C Bn
20 Dec	3125 AT	P 5290	289th RCT
31 Dec	3057 AT	P 377898 to P 393892	308th Engr C Bn
28 Dec	2850 AT Vic	P 434877	Co B, 275th Engr C Bn

10. Fortifications

Until the Siegfried Line was reached, in the latter part of September, no major tasks involving the construction or destruction of hasty or deliberate field fortifications either friendly or enemy were completed. Destruction of the fortifications was accomplished by division and corps engineers. As infantry units captured strong points, pillboxes, and gun emplacements were rendered unserviceable by supporting engineer units. Experiments were conducted employing all types of explosives available, including mines and shells.

11. Engineer Reconnaissance

All engineer units pursued engineer reconnaissance vigorously to insure the collection of engineer information for evaluation and dissemination. Information secured through these sources was forwarded up and/or down to the next echelon through engineer channels.

An immediate reconnaissance of roads and bridges was initiated by all engineer units upon entry into a new area of responsibility. Information thus obtained was prepared in report form and forwarded by the most expeditious means to this headquarters, showing routes opened and classification of all roads and bridges encountered. All engineer equipment and/or supplies either captured or located were likewise reported.

12. Quarries and Gravel Pits

In contrast to the previous months, the month of August saw a sharp decline in the demand for road metal resulting from the rapid advance. Periods of heavy rainfalls during September and October necessitated an increase in the production of crushed rock and gravel in an effort to render secondary roads and service installations, such as dumps and depots, passable. With the advent of winter, the stockpiling of sand and cinders for ice control necessitated an all-out effort in the development of available sources, such as cinder pits, slag pits, and sand pits, quarries and gravel pits, to meet operational requirements.

The period of thaw with subsequent road failures which followed the subzero weather of December and January increased the demand for crushed stone in the forward portion of the army area. Due to the scarcity of quarries in this area it was necessary to ship crushed stone by rail from the Aywaille area. One engineer combat group was charged with the mission of producing and shipping the material, two engineer combat groups unloaded and distributed the materials. A total of eight civilian quarries were placed in operation and 38,600 tons were produced; 10,300 tons were delivered by trucks, and 28,300 tons were shipped by rail. A total of 5,965 tons of material were shipped from Adsec by rail. Two engineer combat groups unloaded 19,000 tons from 1,100 cars at four main sidings. The remaining cars were unloaded by quartermaster, ordnance, and corps units for placement in depot areas and corps roads.

During the period, sources of material were developed by units as follows:

	Quarries		*Gravel pits*	
Unit	*No. operated*	*Output Cu. Yds.*	*No. operated*	*Output Cu. Yds.*
1105th Engr C Gp	34	29,479	13	2,573
1110th Engr C Gp	31	59,218	47	70,156
1111th Engr C Gp	27	31,401	5	6,520
1128th Engr C Gp	30	44,373	21	15,543
Total	122	164,471	86	94,791

13. Sawmill Operations

The operation of sawmills by army engineer combat groups was undertaken during the month of September to provide tactical timber for a limited number of bridges. With the inception of the winterization program, three engineer combat groups were engaged on the job of placing in operation all civilian sawmills within their areas. A maximum of 155 mills were placed in operation, and a total of 14,000,000 board feet of lumber was produced prior to closing all mills with the changing tactical situation. After the German counteroffensive in the Ardennes, three engineer combat groups again engaged in the operation of a limited number of sawmills to produce tactical bridge timber. A total of 2,241,600 board feet of tactical bridge timber was produced. For the production of lumber for winterization and timber for bridges, a total of 913,900 military and 697,500 civilian man-hours were expended.

14. Camouflage

One camouflage company operated in support of each corps with the platoons in support of the divisions. Camouflage supplies were requisitioned and drawn through the company from the army camouflage battalion. The operating platoons of the lettered companies served the divisions which they supported by conducting camouflage inspections and, where applicable, made recommendations and supervised choice of positions, camouflage technique, and estimates of materials needed. H & S Company performed similar tasks for army units.

Major tasks completed during the period included—

a. Painting of tanks and armored vehicles with OD and black paint, employing a 5-man spray team consuming 15 to 20 minutes per vehicle.

b. Production of camouflage nets, using material from a captured dump, during the period 4–10 September. A total of 1,047 nets, 20′ x 21′, and 32′ x 31′, were produced, completely garnished.

c. The production of camouflage snow capes was initiated during the early part of November. Capes were produced by civilian factories under the supervision of the 602d Engineer Camouflage Battalion. A total of 8,500 capes were manufactured during the period 1 November to 15 December 1944.

d. In addition, miscellaneous tasks including the manufacturing of green garlands, posting of camouflage signs, and laying out of headquarters installations and gun positions were completed during the period. A method of tank camouflage, using Sommerfeld tread, natural material and paint, was developed.

15. Fire Fighting

No major fires occurred during the rapid advance through France and Belgium, however, the widespread disposition of supply dumps and army installations were such that two fire fighting platoons would have been inadequate to cope with two or more fires starting simultaneously at different points.

During the two-week period, 15 November–30 November 1944, two major gasoline fires occurred. The most notable of these two was the fire at the gasoline dump at Spa, Belgium where the accounted fire loss was 21,255 gallons of gasoline and three trucks. The other at Bastogne, Belgium Railhead, resulted in a loss of 7,000 gallons of gasoline.

On 24 December 1944 fire destroyed a large section of Malmedy, Belgium. Demolitions were used in several threatened sections and were very effective in extinguishing the fire. Three bombing attacks created more fires and necessitated the permanent installation of one fire fighting section. On 26 December 1944 new fires occurred in the same general area. The Malmedy fires of 24 to 26 December 1944 were the largest in the present campaign.

16. Water Supply

The policy for the operation of water distributing points by army engineers, included the operation of a minimum of two water D.P.s by each army engineer combat battalion, the closing time of which was directed by the army engineers; and the employment of two engineer water supply companies in support of corps and army troops, who opened and closed D.P.s at a location and time as directed by the army engineer. Division and corps engineers operated D.P.s as required in their respective areas.

Throughout the period, no difficulty was experienced in the development and operation of the numerous and readily available sources, such as streams and rivers, which were of sufficient capacity to satisfy all requirements. Relatively small amounts of carbon were employed due to the absence of disagreeable tastes and odors. The chlorine residual was maintained at or slightly above 1.4 ppm depending upon the atmospheric temperature.

The tankers of the 1510th Engineer Water Supply Company proved invaluable in serving such units as hospitals, bakeries, laundries, and replacement depots. In the operation of the two water supply companies, the employment of the 1501st Engineer Water Supply Company throughout the army area, and the 1510th Water Supply Company in close proximity to those installations requiring delivery, provided a very flexible system of operation.

During November, preparations were made for the winterization of both mobile and portable units. Experiments were conducted with immersion heaters, housings for pumps, and platforms for tanks. A technical bulletin was published during the latter part of the period setting forth recommendations for the operation of units during cold weather. Except for the occasional freezing of booster pumps, little difficulty was experienced.

Operation and output of corps and army water distributing points during the period were as follows:

Type unit	*Number operated*	*Total output*
Mobile	98	*25,233,260
Portable	1,171	70,369,082
	1,269	95,602,342

*Includes 8,548,947 gallons delivered by tanker.

17. General Construction

Five Prisoner of War inclosures were constructed during the period. All were started as 5,000-man inclosures but three were converted to 10,000-man size prior to completion. A total of 22,072 man-hours of military labor was expended on these projects.

Standard plans:

a. The standard bridge plan was revised during the period in order to incorporate several minor changes found to be advisable. The roadway width was increased to 22 feet, a pedestrian walkway was provided, and the top layer of decking was placed at a diagonal of 45° to the roadway. The standard plans for this bridge are included herewith as **Inclosure 6.**

b. Plans were made for the construction of a standard type building for the winterization of troops program. It was planned to provide for the winterization of the several different types of tentage carried by units as part of their T/E. Two sets of plans were prepared for the 20-foot x 100-foot building which was to serve as a mess hall and drying room, one was to utilize roofing paper as the exterior covering and the other corrugated sheet metal. The following drawings form the completed file on winterization:

Title	*File No.*	*Date*
Erection of general building	1–1	22 Nov 1944
Wood sheathed general building	10–1, 10–2	22 Nov 1944
Metal sheathed, type A, general building	30–1, –2, –3	3 Dec 1944
Tents	40–1	22 Nov 1944
Pup tents	40–2	22 Nov 1944

Distribution of the above plans was made to Corps Engineers and Army Engineer Combat Groups for their information. General distribution was not effected.

Extensive repairs to a number of buildings and winterization of ward tents for hospitals were carried out. A total of 21,000 man-hours, military, and 7,000 man-hours, civilian, were expended on this project. The winterization of ward tents was effected by installation of wall and floor panels which were prefabricated in a central carpenter shop and transported to the hospital sites.

Special plans were formulated for a high level fixed timber bridge to carry two-way Class 70 traffic over the Rhine River. The main features to be embodied in the plans were as follows: Navigation span, 90 feet; a 110-foot triple truss-double story Bailey bridge to provide the clear width for the navigation span; height of Bailey bridge, 22 feet above mean winter water level, which was assumed at 5 feet above mean water level; roadway clearance of 24 feet, guard rail to guard rail; roadway carried on pile and timber bent piers, piles in piers spaced 12 foot on centers; clear span between piers 35 feet; bank abutments to be 10 feet above mean water level; pedestrian walkways on either side of roadway; provision made to carry signal cables; ice and fenders on piers; over-all length approximately 1,500 feet.

The use of H–10 trusses for girders on two semipermanent bridges in the army area marked the first use of this type of expedient construction. The principal advantage found in using the H–10 trusses was the ease with which they may be transported and erected. The sites on which they may be used are limited by existing abutments, which are utilized in all possible cases.

18. Operational Supply Planning

Estimates of supply requirements were prepared for projected army areas (called phase

estimates) and for specific engineer missions.

Eleven phase estimates were made. Each phase estimate was an estimate of the amount of Class II and IV supplies needed for the projected army area as indicated by an operational terrain, road, stream, and bridge study. Phase estimates were revised as required by the constantly changing tactical situation.

Specific engineer missions, of which the most important was the Rhine River crossing, required special operational supply plans. Estimates of bridge materials required for the Rhine crossing were made during September and were revised periodically as changing conditions indicated.

6 Inclosures:

No. 1—Percentage of Engineer Effort Spent on Various Missions.
No. 2—Composition of Troop List.
No. 3—Army Road Net.
No. 4—Priority Army Road Net.
No. 5—Barrier Operation Plan.
No. 6—Standard Semipermanent Bridges.

PERCENT (APPROX.) OF ENGINEER EFFORT SPENT ON VARIOUS MISSIONS

	Period									
	August			*September*		*October*		*November*	*December*	*February*
	1–12 A Percent	*13–19 B* Percent	*19–26 C* Percent	*27–3 D* Percent	*4–12 E* Percent	*13–1 F* Percent	*2–21 G* Percent	*22–15 H* Percent	*16–15 J* Percent	*16–22 K* Percent
Road maintenance	40	40	40	25	13	12	5	9	14	31.5
Mine warfare	11	11	11	11	11	10	14	13	17	9.0
Administration	10	10	10	13	17	17	11	10	10	11.0
Bridge construction	9	9	9	17	25	24	2	2	2	6.7
Training	4	4	4	5	5	5	17	18	12	4.0
*Miscellaneous	2	2	2	2	2	1	12	8	9	6.9
†Operations of Depot	1	1	1	4	4	8	16	17	13	7.9

*Misc as Inf. role, etc.
†Incl. Sawmills, Hauling, etc.

Constant:

Maintenance of equipment...5.7%
Fortifications 4.6%
Engineer reconnaissance 4.6%
Topographic work 3.4%
Camouflage 2.5%
Water supply 2.0%
Fire fighting 0.2%

Period

A—Drive South
B—Falaise–Argentan Gap
C—Drive to the Seine
D—Battle of N. France
} Exploitation of St. Lo break-through

E—Push to Siegfried Line
F—Consolidation
G—Aachen Offensive
H—Preparation for New Offensive
J—Drive to Roer River
K—German Counteroffensive and Drive to Roer River
} Battle of Germany

Inclosure 1.

COMPOSITION OF TROOP LIST AS OF 22 FEBRUARY 1945

III Corps

1 Engr C Bn
9 Engr C Bn
15 Engr C Bn
303 Engr C Bn
1111 Engr Combat Gp, Hq & Hq Co
51 Engr C Bn
291 Engr C Bn
300 Engr C Bn
501 Engr Lt Pon Co
629 Engr Lt Eq Co (—1 plat)
994 Engr Twy Br Co (—1 plat)
1 Inf Div
9 Armd Div
9 Inf Div
78 Inf Div
1159 Engr Combat Gp, Hq & Hq Co
276 Engr C Bn
284 Engr C Bn
998 Engr Twy Br Co
72 Engr Lt Pon Co
Lt Eq Plat, 502 Engr Lt Pon Co
1 Plat, 629 Engr Lt Eq Co
1 Plat, 994 Engr Twy Br Co
299 Engr C Bn
672 Engr Topo Co
2942 Engr Tech Intel Tm (C)
Co "B," 602 Engr Camo Bn (In Support)

V Corps

2 Engr C Bn
33 Armd Engr Bn
81 Engr C Bn
103 Engr C Bn
269 Engr C Bn
1121 Engr Combat Gp, Hq & Hq Co
112 Engr C Bn
146 Engr C Bn
254 Engr C Bn
508 Engr Lt Pon Co (—LE Plat)
990 Engr Twy Br Co (—1 Plat)
610 Engr Lt Eq Co (—1 Plat)
2 Inf Div
7 Armd Div
106 Inf Div
28 Inf Div
69 Inf Div
1171 Engr Combat Gp, Hq & Hq Co
20 Engr C Bn
1262 Engr C Bn
1340 Engr C Bn
502 Engr Lt Pon Co (—LE Plat)
1 Plat, 610 Engr Lt Eq Co
668 Engr Topo Co
2891 Engr Tech Intel Tm (C)
Co "C," 602 Engr Camo Bn (In Support)

VII Corps

12 Engr C Bn
23 Armd Engr Bn
324 Engr C Bn
329 Engr C Bn
1106 Engr Combat Gp, Hq & Hq Co
49 Engr C Bn
237 Engr C Bn
297 Engr C Bn
298 Engr C Bn
507 Engr Lt Pon Co
988 Engr Twy Br Co
Lt Eq Plat, 508 Engr Lt Pon Co
1st Plat, 990 Engr Twy Br Co
238 Engr C Bn
505 Engr Lt Pon Co
8 Inf Div
3 Armd Div
99 Inf Div
104 Inf Div
1120 Engr Combat Gp, Hq & Hq Co
294 Engr C Bn
612 Engr Lt Equip Co
663 Engr Topo Co
2944 Engr Tech Intel Tm (C)
Co "D," 602 Engr Camo Bn (In Support)
1402 Engr Mobile S/L Maint Sect

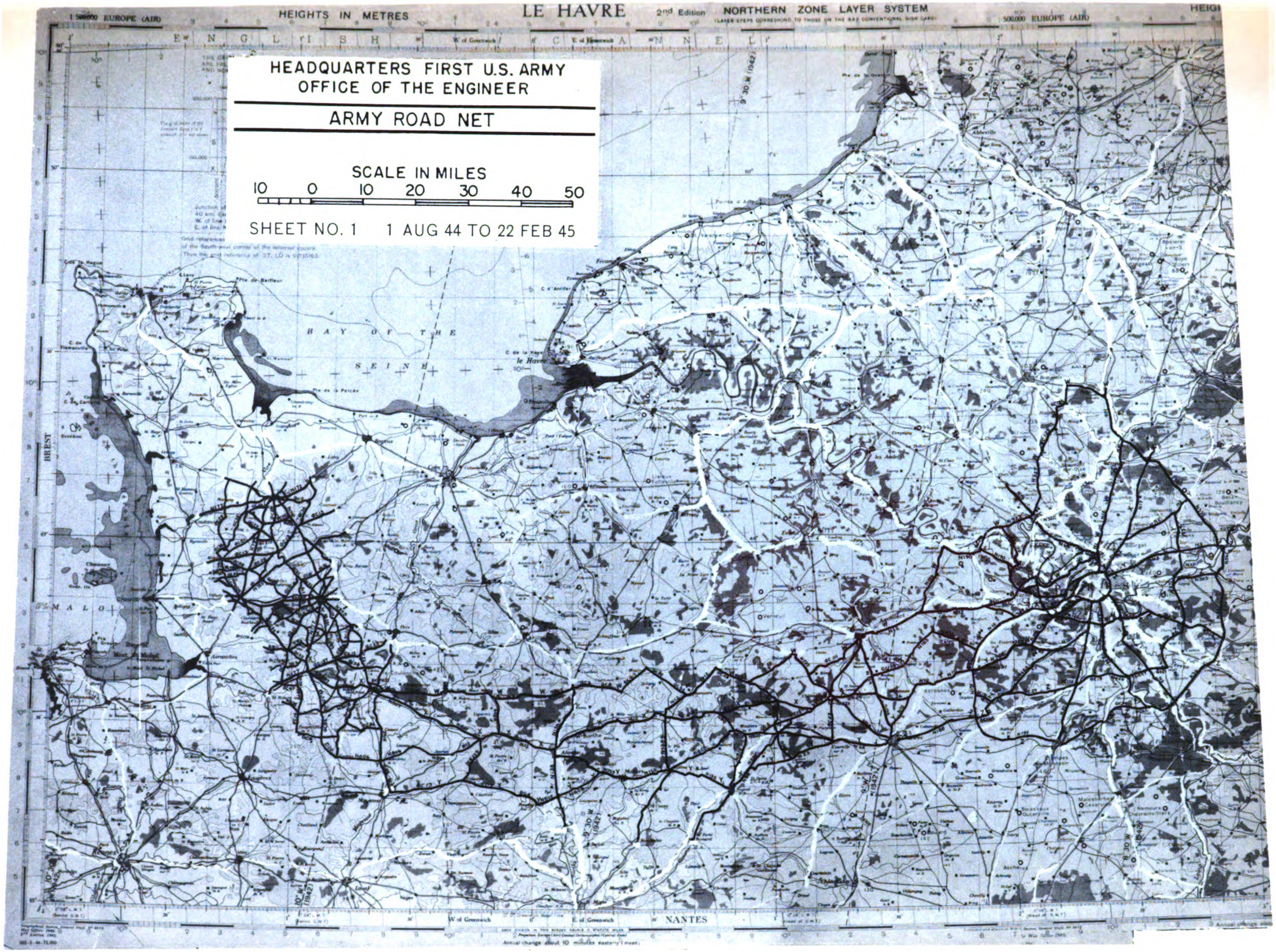
Army Troops

1105 Engr Combat Gp, Hq & Hq Co
61 Engr C Bn
296 Engr C Bn
348 Engr C Bn
1255 Engr C Bn (—Co C)
627 Engr Lt Equip Co
767 Engr Dp Trk Co
793 Engr Dp Trk Co
962 Engr Maint Co
1128 Engr Combat Gp, Hq & Hq Co
5 Engr C Bn
158 Engr C Bn
203 Engr C Bn
626 Engr Lt Equip Co
1353 Engr Dp Trk Co
467 Engr Maint Co
1110 Engr Combat Gp, Hq & Hq Co
148 Engr C Bn
164 Engr C Bn
207 Engr C Bn
1264 Engr C Bn
1699 Engr C Bn (—Co A)
631 Engr Lt Equip Co
1365 Engr Dp Trk Co.
1368 Engr Dp Trk Co
966 Engr Maint Co
1160 Engr Combat Gp, Hq & Hq Co
86 Engr Hv Pon Bn
181 Engr Hv Pon Bn
552 Engr Hv Pon Bn
1473 Engr Maint Co
465 Engr Depot Co
Det "A," 329 Harbor Craft Co (TC)
LCVP Unit #1 (U. S. Navy)
364 Engr G. S. Regt
580 Engr Dp Trk Co
365 Engr G. S. Regt
1363 Engr Dp Trk Co
1132 Engr C Gp, Hq & Hq Co (Not yet arrived)

Separate Army Troops

602 Engr Camo Bn (—A Co)
654 Engr Topo Bn
1091 Engr Util Det
1219 Engr F. F. Plat
1236 Engr F. F. Plat
Co "C," 1255 Engr C Bn (Atchd 654 Engr Topo Bn)
1501 Engr W. S. Co
1510 Engr W. S. Co
1682 Engr Sur Lia Det
2889 Engr Tech Intel Team (R)

Inclosure 2.



HEADQUARTERS FIRST U.S. ARMY
OFFICE OF THE ENGINEER

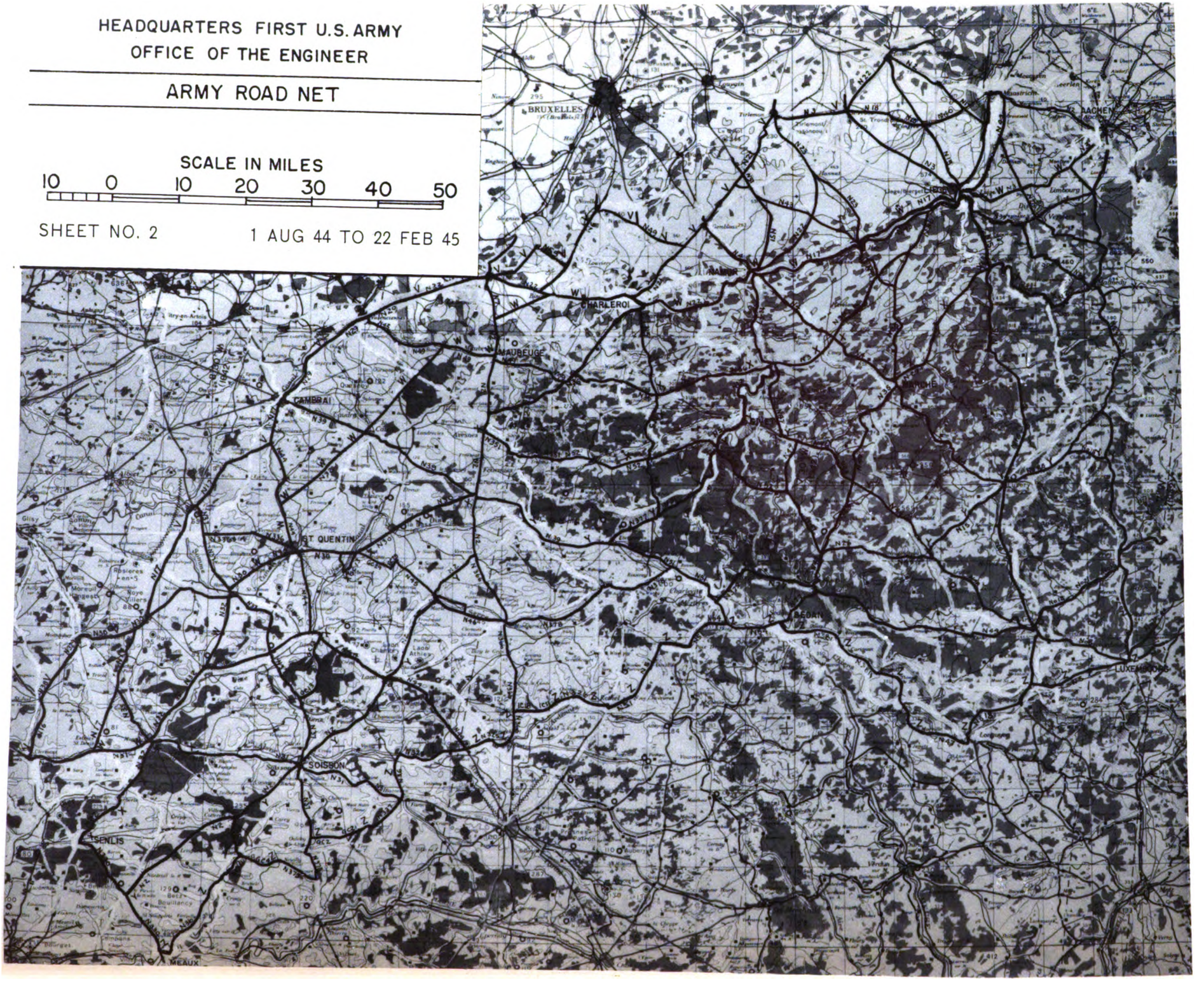
ARMY ROAD NET

SCALE IN MILES

10 0 10 20 30 40 50

SHEET NO. 2

1 AUG 44 TO 22 FEB 45

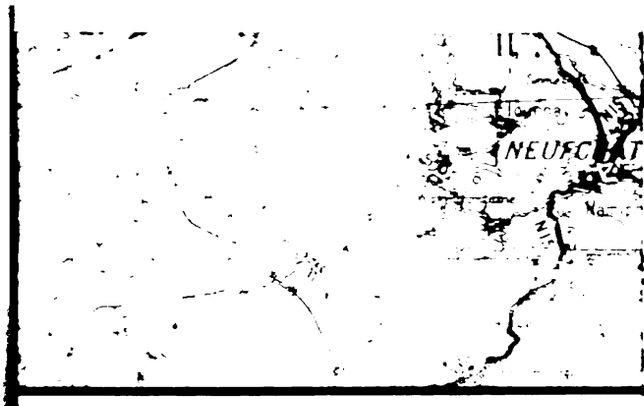


INCLOSURE 4

Priority
Army Road Net

INCLOSURE 5

Barrier Operation Plan



OPERATIONS

T U.S. ARMY

BREAKTHROUGH

0 DECEMBER 1944

INCLOSURE 6

Standard Semipermanent Bridges

COLONEL C.E.

DATE
AUG. 1944

SCALE $\frac{1}{4}$" = 1'-0"
SHEET NO.
FILE NO. 3/12

Supply

A. GENERAL

Lack of transportation presented the greatest problem in supply during the first part of the period and overshadowed the lack of balanced stocks in close support. Army transportation had to be used in quantity, and the transportation of three heavy ponton battalions was utilized initially. Later, the transportation of three combat battalions under the supervision of a group headquarters was substituted. The improved organization and centralized control gained through establishment of the Engineer Transport Service offset the reduced tonnage capacity and improved the transportation situation so much that by the end of September the transportation problem had been solved and some assistance made available to other services.

The change in the tactical situation late in September from one of rapid movement to one of general stability, a shift of part of the transportation load to rail, and improvement in facilities available at the depot site reduced the transportation problem. Depot stocks were built up, and attention shifted to development of balanced stocks and supply of fortification materials, required by the tactical situation and explosives needed for reduction of the concrete defenses of the Siegfried Line. The approaching cold weather was anticipated by initiation of a winterization program, and by November a large lumber production program was in progress. The projected Rhine River crossing plans were expanded continuously and procurement of much of the required material was accomplished.

B. SUPPLY PLANNING

The German counteroffensive in the Ardennes changed the situation to one of active defense and supply demand shifted to fortification materials and antitank mines. Army stocks proved inadequate to meet the unusually high demand, particularly for concertina and mines, and it became necessary to secure emergency deliveries from all available sources.

Severe winter weather during January followed by rapid thaws in February strongly influenced supply operations. The replacement of equipment lost in combat, the procurement and issue of supplies to support the eastward advance, combat of the snow problem, and then the failure of portions of the army road net of supply routes caused by thawing weather were the principal supply activities during the period following the German counteroffensive.

1. Determination of Requirements

Requirements for First Army to D-Day plus 120 were included in prescheduled requisitions submitted prior to the beginning of the operation. Plans to determine requirements sixty days in advance were pushed, but difficulty in accurate forecasting of the tactical situation was encountered. Requirements, therefore, were based upon experience, operational demands made as a result of actual needs, and advance planning for specific operations such as the contemplated Rhine River crossings.

Special requirements arising from the winterization program, reorganizations under re-

vised Tables of Organization and Equipment, the Rhine River crossing, anticipated operations in Germany, and the reductions of Siegfried Line defenses were given continual attention, and requirements requisitioned as rapidly as they were determined.

A PROCO (Projects for Continental Operations) for January, February, March, and April 1945 was prepared to cover all anticipated requirements of engineer troops for equipment and supplies in excess of T/E.

Determination of requirements to replace battle losses incurred during the German counteroffensive in the Ardennes was expedited by sending a liaison officer direct to divisions to secure accurate data. Depot stocks, plus equipment immediately available from Advance Section Communications Zone, were sufficient to replace the greater percent of items lost.

Recapture of ground and installations abandoned during the enemy counteroffensive reduced class II requirements through recover of equipment previously dropped as battle losses. Much of the equipment had suffered only repairable damage.

A replacement factor analysis for a "type" army was carried out comparing actual issues with T/O & E authorization on the basis of War Department replacement factors.

2. *Requisitioning Procedures*

Requisitions in August were submitted directly to Advance Section Communications Zone. During August, the 25th Regulating Station became operational. Beginning in September, requisitions were submitted to them; at first directly, but later through G-4 along with tonnage allocations requests, then directly again when tonnage allocations were discontinued.

The consolidated weekly requisition employed earlier in the campaign was replaced by daily requisitions to correspond with tonnage allotments and a weekly requisition to absorb excess tonnage which might become available. This procedure was effective until December when a new procedure was initiated on the basis of ten-day requisitions submitted a week in advance of effective date and without tonnage allocations.

All back orders, except those applicable to operational projects, were canceled by Communications Zone as of 272400 December 1944. Initiated in January, an annotated copy of the ten-day requisition showing action taken by communications zone was received.

3. *Transportation*

The basic transportation plan which involves the use of quartermaster transportation for all intra-army movement and depends upon communications zone for deliveries by rail or truck to the depot, was kept constantly in mind as an objective.

Transportation for supply was planned from week to week to meet the situation as it developed and is reflected in the action as described in C below.

C. SUPPLY OPERATIONS

---

1. *Basic Principles*

Issues were made on a requisition in single copy signed by any officer, except for Class II items which required a certificate that they did not exceed allowances, and for a few items in critical short supply or of critical importance, which were kept under centralized control. All materials in forward dumps were uncontrolled. Class V supplies were issued through ordnance on corps or army engineer approval.

A few minor changes were made in November which shifted the issue of tires for engineer equipment from the spare parts platoon

to ordnance depots and the control of camouflage materials from the engineer depot to the army camouflage battalion. An effort was made to shift the volume of issues at the depot to an earlier part of the day in order to permit more efficient operation by using natural light. The maintenance, storage, and issue of heavy equipment in the depot stock was assigned to the spare parts platoon.

A limited back order system was set up in the depot early in December to cover items involved in reorganization and new equipment. This system was instituted as a service to subordinate units to make it unnecessary for them to prepare requisitions at intervals only to find the items nonavailable.

Although the impetus of supply is from the rear, initiated by formal written requisition, it was found necessary, particularly during the period of the German counteroffensive and immediately following it, to expedite shipments by making telephone requests to all echelons to be followed by written confirmations.

During the German counteroffensive in the Ardennes, the depots and dumps were opened to all troops without regard to their normal source of supply. The authority to approve requisitions for controlled items was delegated temporarily to the depot commander to save time and transportation.

2. *Control System*

The supply control system continued to consist of a system of records and reports showing on-hand and on-order status of all items weekly, supply arrival data, record of receipts and issues, a weekly comparison of depot stocks with normal levels, and semimonthly status of heavy equipment.

Early in November special records and controls were set up to handle the local lumber production program and to improve the efficiency of local procurement and development of local sources of supply. The lumber control records were discontinued in January at which time materials reserved for winterization were released for other uses.

3. *Supply Processes*

The weekly requisition used at the beginning of the period was prepared by comparing the weekly inventory at the depot with normal levels required and entering the requirements so developed on the requisition which was then submitted and became the basis for resupply of the army depot. Resupply of forward dumps was accomplished by daily shipment from the army depot of items reported issued on the previous day, thereby maintaining forward depot stocks at a uniform level.

As the speed of movement decreased local procurement grew in importance and many shortage items were obtained from local sources. A purchasing and contracting officer was appointed in each army engineer combat battalion to facilitate local procurement.

4. *Depot and Dump Operations*

Depots in use during the period:

Depot	*Location*	*Opened*	*Closed*
E–2	Gourfaleur (T–4959)	1 Aug 44	28 Aug 44
E–3	Senonches (R–0317)	28 Aug 44	8 Sep 44
E–4	Trilport (S–5151)	4 Sep 44	7 Sep 44
E–5	La Capelle (O–2359)	7 Sep 44	15 Sep 44
E–6[1]	Modave (K–2707)	15 Sep 44	14 Jan 45
E–7[2]	Montzen (K–7437)	7 Oct	.....
E–8[3]	Leuze (J–997215)	23 Dec	.....

[1]E–6 was closed as the engineer depot 7 October 1944, but was maintained as a floating bridge park until 14 January 1945.

[2]E–7 was closed as the engineer depot 20 December 1944 and operated as a forward dump until 6 February 1945 when it was reopened as the army engineer depot.

[3]E–8 was closed as the engineer depot 6 February 1945 but remained open as a floating bridge park only.

Forward dumps in use during the period:

Dump	*Location*	*Opened*	*Closed*
E–21	Cerisy Forest (T–6771)	.....	7 Aug 44
E–24	Villedieu (T–3336)	.....	5 Aug 44
E–25	Beaumesnil (T–5738)	7 Aug 44	20 Aug 44
E–26	Fontenermont (T–4630)	5 Aug 44	10 Aug 44
E–27	Alencon (Z–3486)	19 Aug 44	1 Sep 44
E–28	La Brigaudiere (S–7975)	10 Aug 44	1 Sep 44
E–29	Senonches (R–0317)	21 Aug 44	1 Sep 44
E–30	Aigremont (R–7945)	29 Aug 44	9 Sep 44
E–31	Trilport (S–5151)	29 Aug 44	4 Sep 44
E–32	Granville (K–3138)	9 Sep 44	18 Sep 44
E–33	Anthee (O–8986)	9 Sep 44	12 Sep 44
E–34	Meziere (O–7936)	9 Sep 44	12 Sep 44
E–35	No dump assigned this number		
E–36	Modave (K–2709)	11 Sep 44	15 Sep 44
E–37	Pironpre	11 Sep 44	15 Sep 44
E–38	Verviers (K–7123)	15 Sep 44	26 Oct 44
E–39	Stockern (P–7165)	1 Sep 44	7 Oct 44
E–40	Margraten (K–6549)	18 Sep 44	19 Oct 44
E–41[1]	Elsenborn Camp (K–9008)	7 Oct 44	19 Dec 44
E–42	Staubeek (K–6762)	19 Oct 44	20 Oct 44
E–43[2]	Bourcy (P–6264)	20 Oct 44	19 Dec 44
E–44	Verviers Fontaine (K–7220)	19 Dec 44	26 Dec 44
E–45	Louveigne (K–5817)	5 Jan 45	6 Feb 45
E–46	Barvaux (K–4097)	14 Jan 45	30 Jan 45
E–47	Malmedy (K–7904)	30 Jan 45	.....
E–48	Stolberg (K–9441)	11 Feb 45	.....

[1]E–41 was partially evacuated and abandoned 19 December 1944. Additional supplies were recovered from this site early in February.

[2]E–43 was captured by the enemy 19 December 1944 with all equipment and supplies. Most of this material was recovered from this site early in February.

Throughout August the army was supported in engineer supply by an army engineer depot and two forward dumps. It was intended to keep these installations close behind the combat troops, but the speed of the advance and difficulties of transportation (shortage and traffic) defeated this purpose. The depot remained in its site near St. Lo (Gourfaleur) until 28 August when it was moved to Senonches, and although six forward dump sites were utilized during the month, this was inadequate to keep them as close to the front line troops as was desirable. The difficulty of planning the movement of one of these installations is illustrated by the fact that three additional sites for the depot were selected between the two actually used, but each of these fell too far behind the combat troops for use between the time it was uncovered and that when movement plan could be put into effect. Class V stock levels were maintained in both the army ordnance depot and the corps ASPs. There was a very light demand for explosives due to the rapidity of movement.

It was not until late in September that main supply installations became able to keep up with supported troops. The first move of the depot from Senonches to Trilport was in process when it became necessary to move forward to La Capelle instead. From here on, the depot was moved whenever the troops had advanced approximately 110 miles beyond it. In general, the depot moved one 100-mile move for every two 50-mile moves of the forward dumps. Three forward dumps were put into operation and maintained close liaison with the supported corps in order to anticipate and fill their needs rapidly. Due to the small demand for explosive supplies over an extended period, Class V stocks were not displaced forward at the normal rate, and when the Siegfried Line was reached, there was an immediate demand for explosives which was met with some difficulty. The slowing down of depot movement permitted some reorganization. In addition to interior changes a fire fighting team was attached to the depot, and an antiaircraft battery was furnished for its protection.

The engineer depot at Modave (E–6) was closed for the issue of Class II and IV supplies on 7 October but remained open as a floating Bailey bridge park for the Rhine River bridge equipment until 14 January 1945 at which time the equipment was displaced to the vicinity of E–8.

Depot E–7 was opened at Montzen on 7 October. The site for this depot was selected primarily to secure hard standings for supplies in wet weather, and to permit delivery of supplies by rail. This depot, for the first time, provided considerable covered storage for the protection of supplies as well as facilities for

offices and for mess and quarters for the depot company and other troops working in the depot. This depot was partially evacuated to E–8 on 20 December 1944 and was operated as a forward dump until reopened as the engineer depot on 6 February 1945.

Depot E–8 was opened at Leuze on 20 December 1944 during the German counteroffensive. All Class II items were evacuated from E–7 to E–8 and by 14 January 1945 all floating bridge equipment had been evacuated from E–6 to a new floating bridge park established in the vicinity of E–8. This depot was closed 6 February 1945 upon reopening of E–7 as the engineer depot, but was retained as a floating bridge park.

It was necessary to assign an engineer combat company to the depot during January and February to assist in unloading, storage, and inventory of supplies in order to clear the backlog of unloaded cars which accumulated because of heavy shipments from the communications zone and equipment evacuated from E–7. Severe winter weather and lack of adequate railroad sidings hampered operations.

The practice of maintaining one depot and appropriate forward dumps was continued. The normal level of two 130-foot double-double Bailey bridges per forward dump was raised to four, in anticipation of increased demand and slower resupply. Loaded treadway bridge equipment was held at E–7 as a mobile reserve in support of the projected Roer River crossing operations.

5. *Transportation*

The lack of quartermaster transportation for normal intra-army hauling at the beginning of the period resulted in extensive use of engineer tactical transportation. Initially two heavy ponton battalions and one light ponton company were used. This dropped to one heavy ponton battalion and the sporadic use of 50 quartermaster trucks. By the end of August, three heavy ponton battalions, two light ponton companies, and two engineer dump truck companies were being used. At this juncture the transportation of supplies had reached such proportions that a special transport service was set up. This organized the hauling facilities for greatly increased efficiency and freed the depot personnel from the management of transportation.

Upon the move of the depot from the Senonches area, a transshipment point was set up at Corbeil as the forward limit of shipment by Advance Section Communications Zone. As the army rear boundary advanced, this was moved to Soissons and then to Hirson. The Engineer Transport Service hauled from this point forward to the depot, and maintained liaison personnel to meet incoming shipments at the TSP, as no advance information was available about their arrival. The rail TSP was moved up as far as Huy, only a short distance from the depot (E–6).

In October, location of the engineer depot at a site where adequate trackage was available permitted a shift from truck transportation to rail transportation for most of the engineer tonnage requirements. As a consequence, the pressure was lifted on truck transportation, off-loading and on-loading from one truck to another at transfer points with attendant delays, extra labor was eliminated, and a generally improved situation resulted. The improvement in transportation facilities was reflected in larger deliveries to the depot, and with the expanded requirements caused by special projects combined to increase the tonnage in the depot to about 18,000 tons by the end of December. This dropped to about 17,000 tons in January but increased to about 22,000 tons early in February.

The problem of unloading freight cars was complicated by the receipt of varying classes of supplies in the same car. The time required for unloading with available depot personnel threatened to tie up a large number of railroad cars, and it became necessary to call on combat engineer troops to help unload the cars.

Transportation by engineer combat troops was discontinued in November except for occasional hauling of locally procured items, and arrangements were made to secure quartermaster transportation when needed. This arrangement generally was successful but had to be supplemented from time to time by engineer heavy ponton transportation.

D. SUPPLY STATISTICS

Tonnages averaged:

	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Weekly receipts	595	1,680	1,774	1,136	1,155	1,638	2,608
Weekly issues	455	550	651	535	1,821	995	1,306
On hand	3,620	4,900	12,667	15,499	17,204	16,771	16,904

Depot levels, Class II and IV:

	Maximum (long tons)	End of period (long tons)
August	3,976	3,332
September	7,047	7,047
October	13,507	13,507
November	16,318	14,923
December	18,483	17,788
January	16,771	16,771
February	22,135	22,135

Number of items carried in stock:

August	1,026
September	906
October	937
November	821
December	719
January	692
February	1,101

The principal shortages were:

Item	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Bags, sand, ea	....	....	76,000	1,000,000	....	....	....
Board, drawing, MG cal 30 w/case, ea	....	....	....	....	100	....	....
Board, drawing, 31"x 42", ea	....	....	....	....	30	....	....
Boat, rubber, recon, 6-man, ea	....	....	36	....	46	....	....
Bailey Bridge, erection sets, D-5001, st	....	....	....	....	....	15	15
Bridge, Bailey, fixed steel, 130' DD, ea	....	....	....	....	....	15	7
*Brushes, paint and sign writing, ea	....	....	....	....	212	1,212	1,200
Camouflage nets, ea	5,000	2,700	....	2,700	....	....	5,000
Camouflage net sets, #2, ea	....	....	....	....	100	100	100
Chespaling, rolls	....	....	....	2,500	2,500	....	....
Command post and fire direct equip, set	....	....	....	....	15	....	....
Compass, lensatic, w/case	....	....	....	....	....	5,000	....
Demolition equip, set #5, individual, ea	....	....	....	....	....	100	....
Electric lighting equip, set #2, 1½ KW	....	....	....	....	....	113	113
Files, Amer Std, all sizes, ea	....	....	....	....	2,292	....	....
Hose, fire cotton, rub lined, 1½" x 25', ea	....	....	....	....	....	225	....
Hose, suction and discharge, ea	....	....	60	....	....	....	....
Intrenching equip, Inf, set #2, sts	....	....	....	....	27	....	....
Lamp, electric, 40 W, 110 V, ea	....	....	....	2,500	....	....	....
Lamp, electric, 60 W, 110 V, ea	....	....	....	5,000	....	....	....
Lumber, 1" and 3" x 12", bfm	250,000	....	....	....	....	....	....
Lumber, 3" x 12" x 12', bfm	....	....	....	....	....	252,000	....
Paint, black and red, qts	....	....	....	3,200	1,600	....	....
Paper, map sulphite, reams	4,000	3,500	10,000	....	....	....	....
Paper, tracing, thin, gross	....	350	500	....	....	1,740	1,740
Pencils, china marking, ea	5,000	4,800	5,400	....	....	....	....
Pick, mattocks, ea	....	1,000	....	....	....	....	....
Pierced steel plank, 15" x 5', ea	....	....	....	750	....	....	....
Pierced steel plank, 15" x 10', ea	....	....	....	1,800	....	....	....

*See page 147.

Item	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Pioneer equip, sets	....	13	....	....	....	....	....
Protractors, all types	....	....	....	....	1,065	....	....
*Protractor, fan, 1/25000 scale, 26000 range, ea	....	....	....	....	....	150	150
*Protractor, semi-circ, 1 mil, 10", ea	....	....	....	....	....	150	150
*Protractor, semi-circ, 1 mil, 12", ea	....	....	....	....	....	40	40
Pumps, stirrup, ea	....	....	....	500	....	....	....
Sand, graining, lbs	....	....	2,000	....	....	....	....
Sand, quartz, water purif, lbs	....	....	4,000	....	....	....	....
Scotch tape, rolls	....	....	....	750	....	....	....
Stereoscope, magnifying, pocket	....	....	....	....	....	....	100
*Surveying equip, set #1 FA Bn, ea	....	....	....	....	15	7	7
Surveying equip, set #4 FA Topo Bn, ea	....	....	....	....	....	10	10
Surveying equip, set #5 FA Topo Bn, ea	....	....	....	....	15	....	....
Tank, canvas, water, 3000 gals, ea	....	....	30	....	....	....	....
Tape, tracing, rolls	....	....	....	....	3,000	....	....
Terneplate, 12" x 24", shts	....	....	....	....	15,000	....	....
Transit, engineers, 20 sec w/tripod	....	....	....	....	30	10	....
Truck, shop, hvy machine, ea	....	....	1	....	1	....	....
Truck, shop, light machine, ea	....	1	....	....	....	....	....

* Items marked with asterisk were received during the month in sufficient quantities to cover all shortages, the other remained short at the end of the month.

Average resupply time:

August	12 days
September	15 days
October	20 days
November	20 days
December	20 days
January	30 days
February	20 days

Materials requisitioned from local sources:

	Long tons						
	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Bricks, ea	....	....	....	....	....	....	8,000
Crushed rock, gravel, cinders, L/T	....	....	....	1,495	7,701	6,010	38,782
I-beams, steel cable, clamps, bolts, drift pins, pipe and miscl hardware, L/T	....	2,392	540	66	99	16	746
Lamps, electric, ea	....	....	11,000	....	....	....	....
Lime	....	....	....	5	1	....	5
Lumber, all sizes	....	1,351	1,090	12,703	7,214	1,261	7,393
Paint and whitewash	....	....	....	....	....	100	670
Snowplows, ea	....	....	....	....	....	....	6

Truck transportation used was as follows:

Source	Tonnages hauled						
	Aug	Sep	Oct	Nov	Dec	Jan	Feb
ADSEC	130	4,291	1,494	511	....	573	909
Army Engineer	4,480	3,995	5,584	980	....	1,657	3,532
Army QM	2,800	1,444	57	56	3,047	1,423	1,733
Army CWS	....	244	....	...	....	....	....
Army FA	....	805	....	...	....	....	4
Army Ord	....	....	....	15	....	9	....
Army Med	....	....	....	...	....	....	3

E. REAL ESTATE

Occupancy of real estate was generally of a very temporary nature during August and September because of the rapid advance of the army and the tactical situation did not permit formal acquisition except in the case of a few semipermanent installations. When the situation became generally static, and the weather colder, the demand for buildings created a renewed interest in the real estate problem. New instructions were issued by SHAEF pursuant to agreements made in connection with reciprocal aid, and arrangements were made for the location of Advance Section Communications Zone Town Majors in the army area to handle the formal acquisition of real estate.

During November a new form was prepared for use in connection with the occupancy of real estate and designated as "Certificate of Occupancy, FUSA RE Form No. 1." This form was published by G–5 First Army, with letter of instructions, and distribution was accomplished by the Resources Section of Civil Affairs Town Teams.

Certificates of occupancy were processed through the army engineer and forwarded to Advance Section Communications Zone Town Major (Real Estate Offices) for issuance of formal demand on the local government authorities in accordance with ETO SOPs Nos. 10B and 10L as follows:

November	406
December	1,334
January	2,728
February	4,989

Topographic Service

A. GENERAL

Topographic activities during the period 1 August 1944 to 22 February 1945 were characterized by practically complete absorption of all available facilities except those incidental to survey. The rapid movement of the army and the attendant demand for maps of an ever changing area fully utilized the total reproduction capacity of topographic units. The large quantity of maps reproduced periodically exhausted supplies of paper on hand. The scope of the revision program and the compilation of various types of maps required the full time employment of all qualified personnel.

The Army map depot at Stavelot, Belgium, was abandoned on 18 December 1944 during the German counteroffensive in the Ardennes. All depot records were removed but none of the map stocks were removed or destroyed. The depot was recovered on 13 January 1945. No bulk stocks had been removed from the depot and while some of the buildings had been damaged, map stocks had suffered only minor damage.

B. MAPS

1. Planning

Long range bulk map requirements were submitted to Twelfth Army Group. Every effort was made to submit these requirements sixty days prior to delivery. Uncertainty as to First Army's projected zone of operation, changes in tactical plans, and the rapid rate of advance at times made this impossible. Loss of the map depot necessitated emergency requests to Twelfth Army Group for maps of the operational area.

The quantity of each sheet required was based on the position of the army boundaries with respect to the geographical location of the sheet and the overlapping coverage required by adjacent corps. Sheets covering an overlap of 30,000 yards on each army flank were required normally.

There follows tabulations of the map quantities required of the various scales of maps available of France and Belgium and those of Germany.

a. FRANCE AND BELGIUM.

Map	*Sheets within the sector*	*Sheets along the flanks*	*Remarks*
	Copies	*Copies*	
1:25,000 Topo...	7,500	7,500	For half scale issue, quantity based on printing capacity
1:25,000 Photo..	2,500	1,250	
1:50,000 Topo...	28,000	15,000	
1:100,000 Topo..	7,500	4,000	
1:100,000 Road..	30,000	30,000	
1:200,000 Road..	100,000	50,000	
1:250,000 Topo..	9,000	4,500	
1:500,000 Topo..	2,000	2,000	
1:1 Mil Topo..	1,500	1,500	
Town Plans.....	3,500	....	

b. GERMANY.

Map	*Sheets within the sector Copies*	*Sheets along the flanks Copies*	*Remarks*
1:25,000 Topo...	15,000	7,000	
1:100,000 Topo..	50,000	20,000	
1:250,000 Topo..	10,000	5,000	
1:500,000 Road..	50,000	25,000	
1:500,000 Topo..	2,000	1,000	
1:1 Mil Topo..	1,000	500	
Town Plans.....	3,500	....	

Late in January operational stocks of three sheets of a new 1:50,000 scale map series of Germany, GSGS 4507, were received through Communications Zone channels. By February 22, kodalines of ten additional sheets had been received and reproduction accomplished by army topographic elements. Thirty thousand copies of each sheet within the army sector and fifteen thousand copies of each flank sheet were required.

During the rapid advance across France and Belgium it was necessary to have available for issue, maps of areas many miles in advance of the front lines. When resistance stiffened and the rate of advance became considerably slower, adequate map coverage was on hand to meet anticipated needs for sixty days in advance.

Early in October the need for revision of the 1:25,000 scale map of Germany became apparent. This map had been prepared by the British by copying German maps, some of which were dated prior to 1900 and all of which were dated prior to Germany's occupation of the Rhine Province in 1936.

During the progress of the "Revision Program" only a minimum number of copies of the unrevised sheets were printed. Initial printing quantities of the revised sheets were as follows: 15,000 copies of each sheet within the area of heavy troop concentration, 10,000 copies of all other sheets within the army sector, and 7,000 copies of each flank sheet.

Use of the 1:500,000 scale roadmap of Germany revealed many defects, for example, lack of an adequate road classification and route numbering system; lack of the military grid; need for revision from recent data; and too low a density of roads.

The preparation of new road maps of Germany was undertaken on 29 October 1944. The 1:250,000 scale topographic map series GSGS No. 4346 was used as the base map.

2. *Procurement*

The map procurement plan established by Twelfth Army Group, charged communications zone with the responsibility of securing and physically placing the maps required by First Army in the Communications Zone Advance Depot serving First Army. According to this plan, maps once placed in this depot could not be withdrawn without the approval of First Army. It was contemplated that the First Army map depot would stock only maps of the immediate operational area.

The above stated plan was not followed during the month of August and the first part of September due to the lack of adequate stocks in the depot designated to support First Army. As a result the First Army map depot stocked not only maps of the immediate operational area but also maps for projected operations.

During the latter part of September, when the advance slowed, maps of the immediate operational area were stocked in the army map depot while maps not in the immediate operational area were stored in the Advanced Communications Zone Depot serving First Army.

Subsequent to the abandonment of the Stavelot depot, in response to our map requirements, Twelfth Army Group arranged for emergency map shipments to First Army not only from our normal source, Communications Zone, ETOUSA, but also from 21 Army Group (British) and Ninth U. S. Army.

First U. S. Army was under control of 21 Army Group for the period 20 December 1944–18 January 1945. Map requests for small-scale maps were then processed through 21 Army Group, although the source of supply remained Communications Zone, European Theater of Operations, U. S. Army. The chain of supply from Communications Zone base depots to Communications Zone Advanced Depot No. 18 and thence to First Army Depot, remained unchanged.

3. *Distribution*

Maps were issued in quantities prescribed in the First Army Map Allowance Table (see Inclosure 1) so far as available stocks permitted.

Since the largest scale road map of Germany was of a 1:500,000 scale, and as no 1:50,000 scale topo map series of Germany had been published, it was necessary to give the 1:100,000 scale topographic map a much wider distribution. This was accomplished by issuing to all units a quantity of 1:100,000 scale topo maps equal to the normal allowance of 1:50,000 scale topo maps.

During the latter part of the rapid advance across France and Belgium, army reproduction facilities allowed the printing of only 5,000 copies of each 1:25,000 scale topo map and in only one color, black. This quantity was only sufficient to meet the needs of artillery units and for staff planning. Each division was issued 400 copies of each sheet.

The increased opposition along the German border created a need for a map showing greater detail than is shown on the 1:100,000 scale topo map. Additional printing of the 1:25,000 scale topo map was accomplished and all units were provided with full scale issue.

For three days following abandonment of the map depot at Stavelot, map issues were made direct to army formations from the Advanced Communications Zone Depot serving First Army. On 21 December the restocked Army map depot opened at Hannut, Belgium.

Abandonment of map depot at Stavelot, Belgium, on 18 December 1944 resulted in the loss of the following maps:

Scale	*Before*	*After*	*Loss*
1:4,000,000	435	400	35
1:2,000,000	465	385	80
1:1,000,000	5,376	5,257	119
1:800,000 (communications)	1,545	1,195	350
1:200,000 (roadmap)	55,669	53,205	2,464
1:100,000	564,113	544,906	19,207
1:25,000	1,475,600	1,113,400	362,200
1:25,000 (overprints)	69,400	41,250	28,150
Town plans	57,570	52,250	5,320
Thruway town plans	887	63	824

Company "C," 1255th Engineer Combat Battalion, was assigned to First Army on 16 January 1945, for the purpose of operating the army map depot. This unit was attached to the 654th Engineer Topographic Battalion, whose survey company had previously been operating the depot. One officer and twenty-two enlisted men, experienced in map distribution, were transferred from the 654th Engineer Topographic Battalion to Company "C," 1255th Engineer Combat Battalion. The army map depot was organized with personnel of Company "C" at a strength of four officers and one hundred thirteen enlisted men in conformance with a "Proposed T/O for Army Map Depot Company," as submitted to higher headquarters by the Office of the Engineer, First Army, except for the three map liaison officers. Personnel of Company "C" rendered excess through lack of assignment in the map depot company were placed on detached service with other army engineer units.

The quantities of the various scales of maps issued during the period 1 August 1944–22 February 1945 are included in Inclosure No. 2.

C. REPRODUCTION

1. Maps

All 1:25,000 scale maps used by First Army were printed by First Army topographic units. The 1:25,000 scale revision program required duplicate printing of one hundred and fourteen sheets.

A tabulation of map reproduction accomplished by First Army topographic units

during the period 1 August 1944–22 February 1945 is included in Inclosure 2.

The accumulated total of standard map reproduction accomplished by the army topographic units during operations on the continent to 22 February 1945 is shown graphically in Inclosure 3.

2. *Miscellaneous*

Requests for reproduction of booklets, record cards and forms of all types skyrocketed during November. From November 1944 to 22 February 1945 the amount of miscellaneous reproduction accomplished was limited only by press capacity that could be assigned to this work. There was a continuous backlog of requests throughout the period.

Reproduction *other than* of standard maps that cleared through First Army Headquarters during the period 1 August 1944–22 February 1945 is tabulated below:

Method	*No. of Jobs*	*No. of Sheets*	*Total copies*
Photolithography	438	1,420	2,709,711
Black and white	246	....	5,193
Ditto	47	....	3,749

This does not include miscellaneous reproduction work accomplished by corps topographic companies. The photolithographic reproduction was accomplished by army topographic elements while the black and white and ditto reproduction was physically accomplished by the Map Section, Office of the Engineer.

D. SURVEY

1. *Mapping*

During the last few days of October and the month of November, for the first time during operations on the continent, survey units were employed in a mapping role. Field surveys were made to assist in the revision of the 1:25,000 scale topographic map of Germany.

2. *Fire Control*

Due to the availability of trig data and the large number of existing control points, engineer survey elements were not required to assist the artillery observation battalions in establishing fire control. However, the control used by the artillery was periodically checked and found to be of a high order of accuracy.

3. *Trig Data*

Complete coverage of trig data within the army area was available at all times.

E. MAPPING

1. *Tours Photomap Project*

Annotation and reproduction of a part of the tours photomap project continued until the latter part of August when it became definitely known that it was in the Third Army area of interest, at which time it was turned over to the Third Army topographic service. Thirty-four sheets were annotated and prepared for reproduction during August.

2. *First Army 1:100,000 Scale Roadmap*

By 1 September it was realized that drafting of the First Army 1:100,000 scale roadmap could not be accomplished rapidly enough to serve the army in its rapid advance across France. This project was discontinued, after twelve sheets had been compiled and reproduced during August.

3. *Revision of 1:25,000 Scale Topo Map of Germany*

While ground work for revision of the 1:25,000 scale map was begun in October, the actual revision program began 1 November 1944.

A total of one hundred fourteen sheets were included in the initial program. The first

twenty-seven sheets revised, were prepared for reproduction in one color and printed in black, but due to requests from the troops, color separations were later prepared. The remaining eighty-seven sheets revised, were prepared for reproduction in two colors. All water detail was printed in blue, while the remainder of the map was printed in black.

Material available for use in the revision program included captured German maps of later date than those utilized in production of the original sheets, intelligence photography, the 1:100,000 scale topographic map series GSGS 4416, intelligence reports, and recently revised British War Office kodalines.

Three different methods of compilations were used in the revision by the army topographic units engaged therein.

a. Two units utilized a lithographic copy of the base map as a work sheet and from this, drafted their final additions and deletions on a film positive of the base sheet.

b. One unit made an enlarged film positive of the base sheet, drafted the additions and deletions on this enlarged film positive, and then made a reduction to final size. This method permitted drafting to be accomplished more readily.

c. Another unit drafted on a lithographic copy of the base map mounted on metal plate. Deletions were made by "painting" with white show card color. Where an area required extensive revisions, a complete redraft was made on a separate piece of paper and "stuck up" in the proper position on the face of the map. This redrafted lithographic print then became the final revised copy.

4. *Preparation of 1:250,000 Scale Emergency Roadmap of Germany*

Four sheets of a 1:250,000 scale roadmap of Germany were prepared and published. This map was prepared for reproduction in four colors. The 1:250,000 scale topographic map series GSGS No. 4346 was used as a base. Aerial photographs were utilized to check questionable areas.

The only class of roads in Germany that is known to be marked on the ground with route numbers, is the Reichstrassen. In view of this fact, higher headquarters established an arbitrary set of route numbers for the Autobahn and the Landstrassen I road nets, which in addition to the Reichstrassen route numbers were added to the map.

Preparation of the map was accomplished by making a blue line board from the red separation negative and drafting corrections and additions to the road net thereon. Route numbers were "stuck up" on this board. The road casings for the Reichstrassen and Landstrassen I which appeared on the black separation were eliminated for clarity. Spot elevations were also removed to avoid conflict with the added route numbers.

5. *Rhine River Photomaps*

A total of one hundred fourteen photomap sheets were prepared and published. The scale of these photomaps was approximately 1:10,000. A strip approximately ten miles wide along the Rhine River from Dusseldorf to Koln was covered by twenty-two sheets. A similar strip along the Rhine River from Bonn to Koblenz was covered by sixty-two sheets. The Duren area was covered by three sheets, and an area east of Monschau by twenty-seven sheets.

6. *Road and Bridge Sheets*

Publication of road and bridge intelligence was set up as a continuing project on 1 December 1944. Material prepared by Army Engineer is drafted and "stuck up" on overlays and then overprinted on 1:25,000 scale base maps. For this project the base maps are printed in griblet brown with water detain in blue, while the intelligence information is overprinted in black. Sixty-two sheets were published prior to 22 February 1944.

7. *Rhine River Bank Study*

A Rhine River Bank Study consisting of eleven sheets was completed. Data furnished by the Office of the Engineer were plotted on traces and overprinted on 1:12,500 scale Rhine River Maps, GSGS 4517.

3 Inclosures:
No. 1—Map Allowance Table.
No. 2—Maps Issued and Reproduced.
No. 3—Field Production of Standard Maps.

MAP ALLOWANCE TABLE

Revised, July–'44

Unit	Each of (5)	Strategical			Tactical										
		Europe (Topo) 1:4,000,000 GSGS 2957	Europe (Topo) 1:1,000,000 GSGS 2758	Europe (Air) 1:500,000 GSGS 4072	Road Maps 1:200,000 & Others	Topo Maps 1:250,000	Topo Maps 1:100,000	Topo Maps 1:50,000	Topo Maps 1:25,000	Photo Maps (1) 1:25,000	Town Maps (2) 1:10,000±	Defense Overprints 1:50,000	Defense Overprints 1:25,000	Trig Station Data Maps	Map Indices
Army Hq (3)	1	5	20	10	75	20	25	30	10	10	30	50	10	4	30
Corps Hq (3)	1	5	20	5	80	20	35	75	25	5	35	75	25	2	20
A/B Div. (4)	1	10	33	40	900	300	6300	950	850	200	150	50	750	1	40
Armd. Div. (4)	1	8	50	20	4000	1000	200	1400	700	180	150	50	400	1	50
Inf. Div. (4)	1	5	40	40	1700	200	190	1200	1000	170	150	50	800	1	45
AA Artillery:															
Brig Hq/Hq Co (M)	1	0	1	2	15	5	5	10	5	1	10	1	5	1	5
Gp Hq/Hq Co (M)	1	0	1	1	15	2	2	15	5	1	5	1	5	1	5
Bn, Gun (M)	1	0	1	1	110	2	2	30	10	1	5	1	5	1	1
Bn, A W (M)	1	0	1	1	115	2	2	50	50	1	10	1	5	0	1
Bn, A W (Spec)	1	0	1	1	125	2	2	50	50	1	10	1	5	0	1
Bn, Searchlight	1	0	1	1	140	2	2	60	5	1	2	0	0	0	1
Bn, Balloon B (VLA)	1	0	1	1	45	4	5	20	15	1	5	1	5	0	1
Adjutant General:															
MRU—(Y)	1	0	0	0	0	3	0	3	0	0	0	0	0	0	1
MRU—(Z)	1	0	0	0	0	3	0	8	0	0	0	0	0	0	1
Cavalry:															
Regt, Rcn (MECZ)	1	1	5	0	480	25	25	240	230	45	15	0	90	0	5
Hq/Hq Tr	1	(1)	(3)	0	(60)	(10)	(10)	(15)	(30)	(5)	(5)	0	(30)	0	(2)
Tr, Service	1	0	0	0	(60)	(5)	(5)	(10)	0	0	0	0	0	0	(1)
Squad	2	0	(1)	0	(180)	(5)	(5)	(100)	(100)	(20)	(5)	0	(30)	0	(1)
Gp Hq/Hq Tr	1	1	5	0	25	10	10	30	30	5	2	0	10	0	1
Sq, Rcn (MECZ)	1	0	1	0	250	60	50	150	150	30	5	0	35	0	1
Tr, Rcn (MECZ)	1	0	1	0	45	5	5	30	30	4	1	0	5	0	1
Tr, Rcn W. Ln. Sec	1	0	1	0	50	5	5	35	35	4	1	0	5	0	1
Tr, Ag (MECZ)	1	0	1	0	30	5	5	20	20	5	1	0	5	0	1

Co, Tank (Lt. Cav.)	1	0	1	0	40	5	5	25	25	5	1	0	5	0	1
C W Service:															
Bn, (MTZ)	1	0	1	0	90	10	10	55	55	10	2	0	45	0	1
Co, Cml, (Decon)	1	0	0	0	15	1	1	5	0	0	0	0	0	0	1
Co, Smoke, Gen	1	0	0	0	40	2	2	5	1	0	0	0	0	0	1
Co, Depot	1	0	0	0	10	1	1	7	0	0	0	0	0	0	1
Co, Lab	1	0	0	0	3	1	1	10	0	0	0	0	0	0	1
Co, Maint	1	0	0	0	10	1	1	5	0	0	0	0	0	0	1
Civil Affairs Regt		1	1	0	75	100	45	50	45	0	20	0	0	0	1
Engineer:															
Spec Brigade	1	0	17	0	795	87	71	460	234	9	37	0	234	0	18
Gp Hq/Hq Co	1	0	1	0	15	10	10	25	30	1	5	0	30	0	5
Regt, Combat	1	1	9	0	225	20	20	105	110	9	5	0	110	0	5
Hq/Hq Co	1	(1)	(5)	0	(55)	(10)	(10)	(25)	(30)	(5)	(1)	0	(30)	0	(3)
Bn, Combat	2	0	(2)	0	(85)	(5)	(5)	(40)	(40)	(2)	(2)	0	(40)	0	(1)
Regt, Shore	1	1	11	0	205	25	25	145	150	35	7	0	150	0	5
Hq/Hq Co	1	(1)	(5)	0	(25)	(10)	(10)	(25)	(30)	(5)	(1)	0	(30)	0	(2)
Bn, Shore	3	0	(2)	0	(60)	(5)	(5)	(40)	(40)	(10)	(2)	0	(40)	0	(1)
Regt, Gs	1	0	1	0	125	15	15	80	85	5	10	0	0	0	5
Hq/Hq Co	1	0	(1)	0	(35)	(5)	(5)	(30)	(35)	(1)	(2)	0	0	0	(3)
Bn	2	0	0	0	(45)	(5)	(5)	(25)	(25)	(2)	(4)	0	0	0	(1)
Bn, Avn	1	0	1	0	135	5	2	40	10	1	2	0	10	0	1
Bn, Cam	1	0	1	0	65	10	10	40	40	1	2	0	40	0	1
Bn, Combat	1	0	1	0	85	5	5	40	40	2	2	0	40	0	1
Bn, Hv Pon	1	0	1	0	35	10	10	25	25	1	2	0	0	0	1
Bn, Railway	1	0	1	0	35	5	5	35	35	1	1	0	0	0	1
Bn, Topo	1	0	1	0	80	10	10	30	30	1	2	0	0	1	1
Bn, Water Supply	1	0	1	0	135	10	10	35	35	1	2	0	0	0	1
Co, Amph Trk	1	0	0	0	165	2	2	10	5	1	2	0	0	0	1
Co, Depot	1	0	1	0	20	2	2	10	0	0	0	0	0	0	1
Co, Dump Trk Y	1	0	0	0	50	1	1	5	0	0	0	0	0	0	1
Co, L Equip	1	0	1	0	25	2	2	5	0	0	0	0	0	0	1
Co, L Ponton	1	0	0	0	60	1	1	10	0	0	0	0	0	0	1
Co, Maint	1	0	1	0	30	2	2	10	0	0	0	0	0	0	1
Co, Pol	1	0	0	0	25	1	1	10	0	0	0	0	0	0	1
Co, Port Rep	1	0	0	0	5	1	1	10	2	0	1	0	0	0	1
Co, Topo	1	0	1	0	20	1	1	10	0	0	1	0	0	1	1
Co, Treadway	1	0	0	0	75	1	1	5	0	0	0	0	0	0	1
Co, Water Supply	1	0	0	0	25	2	10	10	5	0	2	0	0	0	1

Unit	Each of (5)	Strategical			Tactical										
		Europe (Topo) 1:4,000,000 GSGS 2957	Europe (Topo) 1:1,000,000 GSGS 2758	Europe (Air) 1:500,000 GSGS 4072	Road Maps 1:200,000 & Others	Topo Maps 1:250,000	Topo Maps 1:100,000	Topo Maps 1:50,000	Topo Maps 1:25,000	Photo Maps (1) 1:25,000	Town Maps (2) 1:10,000±	Defense Overprints 1:50,000	Defense Overprints 1:25,000	Trig Station Data Maps	Map Indices
Field Artillery:															
Hq/Hq Btry Corps (M)	1	0	1	5	25	10	10	10	40	1	2	0	20	1	5
Brigade	1	6	26	55	915	120	120	370	430	130	22	0	390	1	21
Hq/Hq Btry	1	(3)	(10)	(5)	(25)	(20)	(20)	(20)	(40)	(10)	(5)	0	(40)	(1)	(5)
Regt, 155 How	2	(1)	(5)	(15)	(255)	(30)	(30)	(105)	(115)	(35)	(5)	0	(105)	0	(5)
Hq/Hq Btry	1	((1))	((1))	((5))	((25))	((10))	((10))	((25))	((25))	((5))	((1))	0	((25))	0	((3))
Bn, 155 How	2	0	((2))	((5))	((115))	((10))	((10))	((40))	((45))	((15))	((2))	0	((40))	0	((1))
Regt, 155 Gun	1	(1)	(5)	(15)	(280)	(30)	(30)	(105)	(115)	(35)	(5)	0	(105)	0	(5)
Hq/Hq Btry	1	((1))	((1))	((5))	((30))	((10))	((10))	((25))	((25))	((5))	((1))	0	((25))	0	((3))
Bn, 155 Gun	2	0	((2))	((5))	((125))	((10))	((10))	((40))	((45))	((15))	((12))	0	((40))	0	((1))
Bn, Observation	1	0	(1)	(5)	(100)	(10)	(10)	(35)	(45)	(15)	(2)	0	(35)	0	(1)
Gp, Hq/Hq Btry	1	1	1	5	25	10	10	25	35	1	5	0	5	1	3
Regt, 105 How	1	1	5	15	215	30	30	110	115	25	5	0	115	0	5
Hq/Hq Btry	1	(1)	(1)	(5)	(35)	(10)	(10)	(20)	(25)	(5)	(1)	0	(25)	0	(3)
Bn, 105 How	2	0	(2)	(5)	(90)	(10)	(10)	(45)	(45)	(10)	(2)	0	(45)	0	(1)
Bn, 105 Armd	1	0	1	5	165	10	45	45	15	5	2	0	15	0	1
Bn, 105 How	1	0	1	5	90	10	10	45	45	5	2	0	45	0	1
Bn, 4.5" Gun	1	0	1	5	90	10	10	45	45	5	2	0	45	0	1
Bn, 155 Gun Trk	1	0	1	5	80	10	10	40	35	5	2	0	35	0	1
Bn, 155 How Trk	1	0	1	5	80	10	10	40	40	5	2	0	40	0	1
Bn, 8" How	1	0	1	5	85	10	10	40	40	5	2	0	40	0	1
Bn, 240 How	1	0	1	5	85	10	10	40	40	5	2	0	40	0	1
Bn, Observation	1	0	1	5	165	10	10	45	45	5	2	0	45	1	1
Finance Section	1	0	1	0	1	1	0	0	0	0	0	0	0	0	1
Medical:															
Gp Hq/Hq Det	1	0	1	0	10	5	5	5	0	0	2	0	0	0	1
Gp Aux Surg	1	0	1	0	10	5	5	5	0	0	2	0	0	0	1

Regiment	1	1	4	0	195	20	20	115	0	0	5	0	0	0	5
Hq/Hq Co	1	(1)	(2)	0	(25)	(10)	(10)	(25)	0	0	(1)	0	0	0	(3)
Bn, Medical	2	0	(1)	0	(85)	(5)	(5)	(45)	0	0	(2)	0	0	0	(1)
Bn, Hq/Hq Det	1	0	1	0	10	5	5	15	0	0	2	0	0	0	1
Bn, Armored	1	0	1	0	130	25	5	30	5	0	1	0	0	0	1
Bn, Gas Treatment	1	0	1	0	55	5	0	50	0	0	2	0	0	0	1
Bn, Motorized	1	0	1	0	60	5	0	40	0	0	2	0	0	0	1
Hosp, Conval	1	0	0	0	20	1	0	10	0	0	2	0	0	0	1
Hosp, Evac	1	0	0	0	10	1	0	20	0	0	2	0	0	0	1
Hosp, Evac (MTZD)	1	0	0	0	45	1	0	20	0	0	2	0	0	0	1
Hosp, Field	1	0	0	0	20	1	0	25	0	0	1	0	0	0	1
Co, Ambulance	1	0	1	0	40	1	0	5	0	0	1	0	0	0	1
Co, Clearing	1	0	1	0	10	1	0	10	0	0	0	0	0	0	1
Co, Collecting	1	0	1	0	20	1	0	5	0	0	1	0	0	0	1
Co, Med Laboratory	1	0	1	0	10	1	0	5	0	0	0	0	0	0	1
Co, Supply Depot	1	0	1	0	15	1	0	5	0	0	1	0	0	0	1
Military Police:															
Bn, Field Army	1	0	1	0	85	10	10	40	0	0	5	0	0	0	1
Co, Army, Corps	1	0	1	0	25	1	1	7	0	0	2	0	0	0	1
Platoon	1	0	1	0	20	5	1	5	0	0	5	0	0	0	1
Ordnance:															
Gp Hq	1	0	1	0	12	2	2	4	0	0	4	0	0	0	1
Bn, Hq/Hq Det	1	0	1	0	5	1	1	10	0	0	5	0	0	0	1
Bn, Am, Hq/Hq Det	1	0	1	0	20	5	2	55	0	0	5	0	0	0	1
Co, Ammunition	1	0	1	0	10	2	1	10	0	0	0	0	0	0	1
Co, Collecting	1	0	1	0	40	2	1	5	0	0	0	0	0	0	1
Co, Depot	1	0	1	0	10	2	1	5	0	0	0	0	0	0	1
Co, Evac	1	0	1	0	35	2	1	7	0	0	0	0	0	0	1
Co, Maint, M	1	0	1	0	30	2	1	10	0	0	0	0	0	0	1
Co, Maint, AA	1	0	1	0	20	2	1	7	0	0	0	0	0	0	1
Co, Maint, Army, Hv	1	0	1	0	25	2	1	5	0	0	0	0	0	0	1
Co, Maint, Auto, Hv	1	0	1	0	25	2	1	7	0	0	0	0	0	0	1
Co, Maint, Auto, M	1	0	1	0	25	2	1	5	0	0	0	0	0	0	1
Co, Maint, Tank	1	0	1	0	25	2	1	10	0	0	0	0	0	0	1
Co, Mvd	1	0	1	0	25	1	1	5	0	0	1	0	0	0	1
Bomb Disp Sqd	1	0	1	0	1	1	0	1	0	0	0	0	0	0	1
Photo Interp Det	1				12	10	10	10	25	5	5	6	6	2	4
Stock:															
Army Hq	1	10	30	20	100	40	100	100	25	10	10	5	10	1	40

Unit	Each of (5)	Strategical			Tactical										
		Europe (Topo) 1:4,000,000 GSGS 2957	Europe (Topo) 1:1,000,000 GSGS 2758	Europe (Air) 1:500,000 GSGS 4072	Road Maps 1:200,000 & Others	Topo Maps 1:250,000	Topo Maps 1:100,000	Topo Maps 1:50,000	Topo Maps 1:25,000	Photo Maps (1) 1:25,000	Town Maps (2) 1:10,000±	Defense Overprints 1:50,000	Defense Overprints 1:25,000	Trig Station Data Maps	Map Indices
Corps Hq	1	2	5	5	600	100	40	270	250	40	30	5	100	0	10
A/B Div	1	4	6	8	158	47	80	63	50	15	20	5	10	0	9
Armd Div	1	2	12	5	230	140	40	205	75	24	30	5	25	0	8
Inf Div	1	1	2	2	215	131	20	195	165	28	31	5	5	0	6
Army Depot:															
Active Areas	1	20	50	50	3000	1200	300	2000	1500	200	200	60	1000	2	60
Inter Areas	1	20	50	20	500	200	100	500	200	10	50	10	20	2	60
Rear Areas	1	25	25	25	100	50	50	25	5	5	5	2	2	2	50
Quartermaster:															
Gp Hq/Hq Det	1	0	1	0	10	10	10	20	0	0	5	0	0	0	5
Gp, Truck, Hq/Hq Det	1	2	5	0	10	5	5	15	0	0	4	0	0	0	5
Regt, Truck	1	0	5	0	745	35	35	100	0	0	10	0	0	0	5
Hq/Hq Co	1	0	(2)	0	(10)	(5)	(5)	(10)	0	0	(4)	0	0	0	(2)
Bn, Truck	3	0	(1)	0	(245)	(10)	(10)	(30)	0	0	(2)	0	0	0	(1)
Bn, Hq/Hq Det	1	0	1	0	10	1	1	15	1	0	0	0	0	0	1
Bn, Gas Supply	1	0	1	0	125	10	10	30	0	0	5	0	0	0	1
Bn, Service	1	0	1	0	200	10	10	30	0	0	5	0	0	0	1
Bn, Truck	1	0	1	0	250	10	10	30	0	0	2	0	0	0	1
Co, Car(& Trns)	1	0	1	0	70	1	1	10	0	0	1	0	0	0	1
Co, Depot Supply	1	0	1	0	5	1	1	5	0	0	1	0	0	0	1
Co, Gas Supply	1	0	1	0	30	1	1	5	0	0	1	0	0	0	1
Co, Gr Reg	1	0	1	0	25	1	1	10	3	0	1	0	0	0	1
Co, Railhead	1	0	1	0	10	1	1	5	1	0	0	0	0	0	1
Co, Service	1	0	1	0	5	1	1	5	0	0	1	0	0	0	1
Co, Truck	1	0	1	0	60	1	1	5	0	0	0	0	0	0	1
Platoon, Car	1	0	0	0	15	1	1	5	0	0	1	0	0	0	1
Platoon, Gr Reg	1	0	0	0	5	1	1	2	0	0	1	0	0	0	1

Lab Petrol	1	0	0	0	5	1	1	5	0	0	0	0	0	0	1
Ranger Battalion	1	0	1	0	35	10	10	50	50	5	5	0	50	0	1
Signal:															
Bn, Separate	1	1	1	0	100	10	10	50	45	0	5	0	0	0	1
Bn, Armored	1	0	1	0	140	50	10	50	5	0	5	0	0	0	1
Bn, Construction	1	0	1	0	105	10	10	35	30	0	5	0	0	0	1
Bn, Operations	1	0	1	0	115	10	10	30	25	0	5	0	0	0	1
Co, Depot	1	0	1	0	30	1	1	10	0	0	0	0	0	0	1
Co, Installation	1	0	1	0	15	1	1	10	1	0	1	0	0	0	1
Co, Photo	1	0	1	0	40	1	1	20	0	0	0	0	0	0	1
Co, Pigeon	1	0	2	0	60	2	1	10	0	0	0	0	0	0	1
Co, Radio Int	1	1	1	0	40	1	2	10	0	0	0	0	0	0	1
Co, Repair	1	0	1	0	35	1	1	10	0	0	0	0	0	0	1
Co, Service	1	0	0	0	5	1	1	15	0	0	0	0	0	0	1
Sec, Carr Tele	1	0	0	0	1	1	1	2	0	0	0	0	0	0	1
Sec, Radio Link	1	0	0	0	1	1	1	1	0	0	0	0	0	0	1
Sec, Rad & W Repair	1	0	0	0	5	1	1	1	0	0	0	0	0	0	1
Team, Center	1	0	1	0	2	1	1	5	0	0	0	0	0	0	1
Unit, Photo Lab	1	0	0	0	5	1	1	5	0	0	0	0	0	0	1
23rd Spec Troops	1	1	4	0	170	10	10	150	75	12	2	0	0	0	2
Tanks:															
Gp, Armd, Hq/Hq Det	1	1	1	0	35	5	20	20	40	5	5	1	40	0	5
Bn	1	0	1	0	165	45	50	105	40	10	5	0	40	0	1
Bn, Light	1	0	1	0	155	45	45	85	40	10	5	0	40	0	1
Tank Destroyers:															
Gp, Hq/Hq Det 2 (Lt Med)	1	0	1	0	15	25	10	25	40	5	5	0	40	0	5
Bn	1	0	1	0	170	40	10	45	40	10	2	0	40	0	1
Bn, Towed	1	0	1	0	215	40	10	45	40	10	2	0	40	0	1
Airborne Division:															
Div Hq	1	2	10	10	80	25	200	25	5	5	20	50	5	0	5
Regt, Inf Gldr	1	1	5	4	50	35	560	170	170	35	30	0	170	0	5
Hq Regt Tr	1	(1)	(2)	(1)	(20)	(5)	(140)	(20)	(20)	(5)	(30)	0	(20)	0	(2)
Bn	3	0	(1)	(1)	(10)	(10)	(140)	(50)	(50)	(10)	0	0	(50)	0	(1)
Regt, Inf Prcht	1	1	5	4	50	35	2200	170	170	35	30	0	170	0	5
Hq Regt Tr	1	(1)	(2)	(1)	(20)	(5)	(400)	(20)	(20)	(5)	(30)	0	(20)	0	(2)
Bn	3	0	(1)	(1)	(10)	(10)	(600)	(50)	(50)	(10)	0	0	(50)	0	(1)
Div Arty	1	1	5	8	200	60	1410	225	225	45	10	0	225	1	5
Hq/Hq Btry	1	(1)	(1)	(4)	(40)	(20)	(140)	(25)	(25)	(5)	(10)	0	(25)	(1)	(1)
Bn, Prcht	1	0	(1)	(1)	(40)	(10)	(520)	(50)	(50)	(10)	0	0	(50)	0	(1)

Unit	Each of (5)	Strategical: Europe (Topo) 1:4,000,000 GSGS 2957	Strategical: Europe (Topo) 1:1,000,000 GSGS 2758	Strategical: Europe (Air) 1:500,000 GSGS 1072	Tactical: Road Maps 1:200,000 & Others	Topo Maps 1:250,000	Topo Maps 1:100,000	Topo Maps 1:50,000	Topo Maps 1:25,000	Photo Maps (1) 1:25,000	Town Maps (2) 1:10,000±	Defense Overprints 1:50,000	Defense Overprints 1:25,000	Trig Station Data Maps	Map Indices
Bn, Gldr	3	0	(1)	(1)	(40)	(10)	(250)	(50)	(50)	(10)	0	0	(50)	0	(1)
Bn, AA	1	0	1	1	40	10	200	40	20	20	0	0	0	0	1
Bn, Engr	1	0	1	1	40	10	450	40	40	10	2	0	0	0	1
Special Troops:															
Co, Hq Div	1	0	1	0	20	5	60	5	0	0	0	0	0	0	1
Co, Med A/B	1	0	0	0	40	10	80	10	0	0	2	0	0	0	1
Co, Ord A/B	1	0	0	0	20	2	40	5	0	0	0	0	0	0	1
Co, Qm A/B	1	0	0	0	60	2	50	5	0	0	0	0	0	0	1
Co, Sig A/B	1	0	0	0	40	5	100	5	0	0	0	0	0	0	1
Tr, Rcn (Prov)	1	0	0	0	20	10	60	10	0	0	1	0	0	0	1
Co, Prcht M (Prov)	1	0	0	0	20	2	200	5	0	0	0	0	0	0	1
Plat, MP	1	0	0	0	10	5	40	5	0	0	5	0	0	0	1
A.S.P.	1	0	0	0	2	2	10	2	0	0	0	0	0	0	1
Division Reserve	1	4	5	8	158	47	80	63	50	15	20	0	10	0	9
Total	1	10	33	40	900	300	6300	950	850	200	150	50	750	1	40
Armoured Division:															
Div Hq	1	2	10	10	50	25	25	130	20	10	20	50	20	0	5
Regt, Armd	2	1	5	1	680	120	30	175	115	40	25	0	115	0	10
Hq	1	(1)	(2)	(1)	(10)	(15)	(10)	(20)	(10)	(5)	(5)	0	(10)	0	(3)
Bn, Tank M	2	0	(1)	0	(130)	(30)	(5)	(35)	(30)	(10)	(5)	0	(30)	0	(1)
Bn, Tank L	1	0	(1)	0	(125)	(30)	(5)	(35)	(30)	(10)	(5)	0	(30)	0	(1)
Special Troops:															
Hq	1	0	0	0	(65)	(1)	(1)	(10)	0	0	(1)	0	0	0	(1)
Co, Rcn	1	0	0	0	(70)	(10)	(2)	(20)	(15)	(5)	(2)	0	(15)	0	(1)
Co, Serv	1	0	0	0	(100)	(2)	(1)	(10)	0	0	(1)	0	0	0	(1)
Co, Maint	1	0	0	0	(50)	(2)	(1)	(10)	0	0	(1)	0	0	0	(1)

Regt, Armd Inf	1	1	5	0	410	135	25	180	125	21	20	0	125	0	5
Hq	1	(1)	(2)	0	(60)	(35)	(10)	(40)	(20)	(3)	(4)	0	(20)	0	(1)
Bn	3	0	(1)	0	(100)	(30)	(5)	(35)	(35)	(6)	(5)	0	(35)	0	(1)
Co, Serv	1	0	0	0	(50)	(10)	0	(10)	0	0	(1)	0	0	0	(1)
Bn, Armd, FA	3	0	1	1	170	40	5	45	30	5	5	0	0	⅓	1
Bn, Armd, Engr	1	0	1	0	275	45	5	60	80	15	2	0	0	0	1
Bn, Armd, Rcn	1	0	1	0	220	50	5	70	55	25	5	0	0	0	1
Div Train	1	0	5	0	570	155	20	175	20	0	5	0	0	0	4
Hq	1	0	(2)	0	(60)	(30)	(5)	(35)	(5)	0	(2)	0	0	0	(1)
Bn, Maint	1	0	(1)	0	(230)	(50)	(5)	(55)	(5)	0	(1)	0	0	0	(1)
Bn, Med	1	0	(1)	0	(130)	(25)	(5)	(30)	(5)	0	(1)	0	0	0	(1)
Bn, Sup	1	0	(1)	0	(150)	(50)	(5)	(55)	(5)	0	(1)	0	0	0	(1)
Special Troops:															
Co, Hq Atchd	1	0	1	0	130	70	1	70	5	0	1	0	0	0	1
Co, Serv	1	0	1	0	75	10	2	10	0	0	1	0	0	0	1
Co, Armd Sig	1	1	1	0	170	10	2	15	0	0	1	0	0	0	1
Division Reserve	1	2	12	5	230	140	40	205	75	24	30	0	25	0	8
Total	1	8	50	20	4000	1000	200	1400	700	180	150	50	400	1	50
Infantry Division:															
Div Hq	1	2	10	10	20	25	25	100	65	20	20	50	65	0	5
Regt Inf	3	0	5	1	225	30	30	185	170	23	26	0	170	0	7
Hq/Hq Co	1	0	(2)	(1)	(25)	(10)	(10)	(30)	(35)	(5)	(5)	0	(35)	0	(1)
Bn, Inf	3	0	(1)	0	(40)	(5)	(5)	(40)	(40)	(5)	(5)	0	(40)	0	(1)
Co, Serv	1	0	0	0	(40)	(1)	(1)	(15)	0	(1)	(2)	0	0	0	(1)
Co, Cannon	1	0	0	0	(20)	(2)	(2)	(10)	(10)	(1)	(2)	0	(10)	0	(1)
Co, Antitank	1	0	0	0	(20)	(2)	(2)	(10)	(5)	(1)	(2)	0	(5)	0	(1)
Div Arty	1	1	6	25	400	30	30	210	215	50	10	0	215	1	5
Hq/Hq Btry	1	(1)	(2)	(5)	(35)	(10)	(10)	(30)	(35)	(10)	(6)	0	(35)	(1)	(1)
Bn, 105 How	3	0	(1)	(5)	(90)	(5)	(5)	(45)	(45)	(10)	(1)	0	(45)	0	(1)
Bn, 155 How	1	0	(1)	(5)	(95)	(5)	(5)	(45)	(45)	(10)	(1)	0	(45)	0	(1)
Tr, Cav Rcn	1	0	1	0	45	5	5	15	20	1	1	0	5	0	1
Bn, Engr	1	0	1	0	85	5	5	40	40	2	2	0	0	0	1
Bn, Med	1	0	1	0	60	5	0	40	0	0	2	0	0	0	1
Special Troops:															
Hq	1	0	1	0	35	1	1	10	0	0	1	0	0	0	1
Co, Ord L Maint	1	0	1	0	30	1	1	10	0	0	0	0	0	0	1
Co, Qm	1	0	1	0	60	1	1	10	0	0	0	0	0	0	1
Co, Sig	1	1	1	0	55	1	2	10	5	0	0	0	0	0	1

Unit		Strategical			Tactical										
	Each of (5)	Europe (Topo) 1:4,000,000 GSGS 2957	Europe (Topo) 1:1,000,000 GSGS 2758	Europe (Air) 1:500,000 GSGS 4072	Road Maps 1:200,000 & Others	Topo Maps 1:250,000	Topo Maps 1:100,000	Topo Maps 1:50,000	Topo Maps 1:25,000	Photo Maps (1) 1:25,000	Town Maps (2) 1:10,000±	Defense Overprints 1:50,000	Defense Overprints 1:25,000	Trig Station Data Maps	Map Indices
Plat, MP	1	0	0	0	20	5	1	5	0	0	5	0	0	0	1
Division Reserve	1	1	2	2	215	31	29	195	145	28	31	0	5	0	6
Total:	1	5	40	40	1700	200	190	1200	1000	170	150	50	800	1	45

NOTES: 1. Indicated quantity to be allotted in cases of dual coverage with 1:25,000 Topo Maps. When latter maps are not available, allottments of Photomaps will be made on basis of 1:25,000 Topo Maps.

2. Allowance of town maps is based on Hq. Staff use only. Additional quantities will be made available for troop use as required.

3. Army and Corps allowances do not include stocks, given independently later.

4. Division allowances do include reserve stocks given later.

5. In each case, allowances given are for a single unit. Where more than one unit is included as a subdivision of a larger unit, and so indicated by a number other than one in the column "each of," the individual allowances must be multiplied by the number of units in summing the parent unit allowance.

6. Units subordinate to a larger unit, whose individual allowance is part of, and duplicated in, that of the larger unit, are indicated by brackets, and indentation of unit Designation.

Inclosure 1.

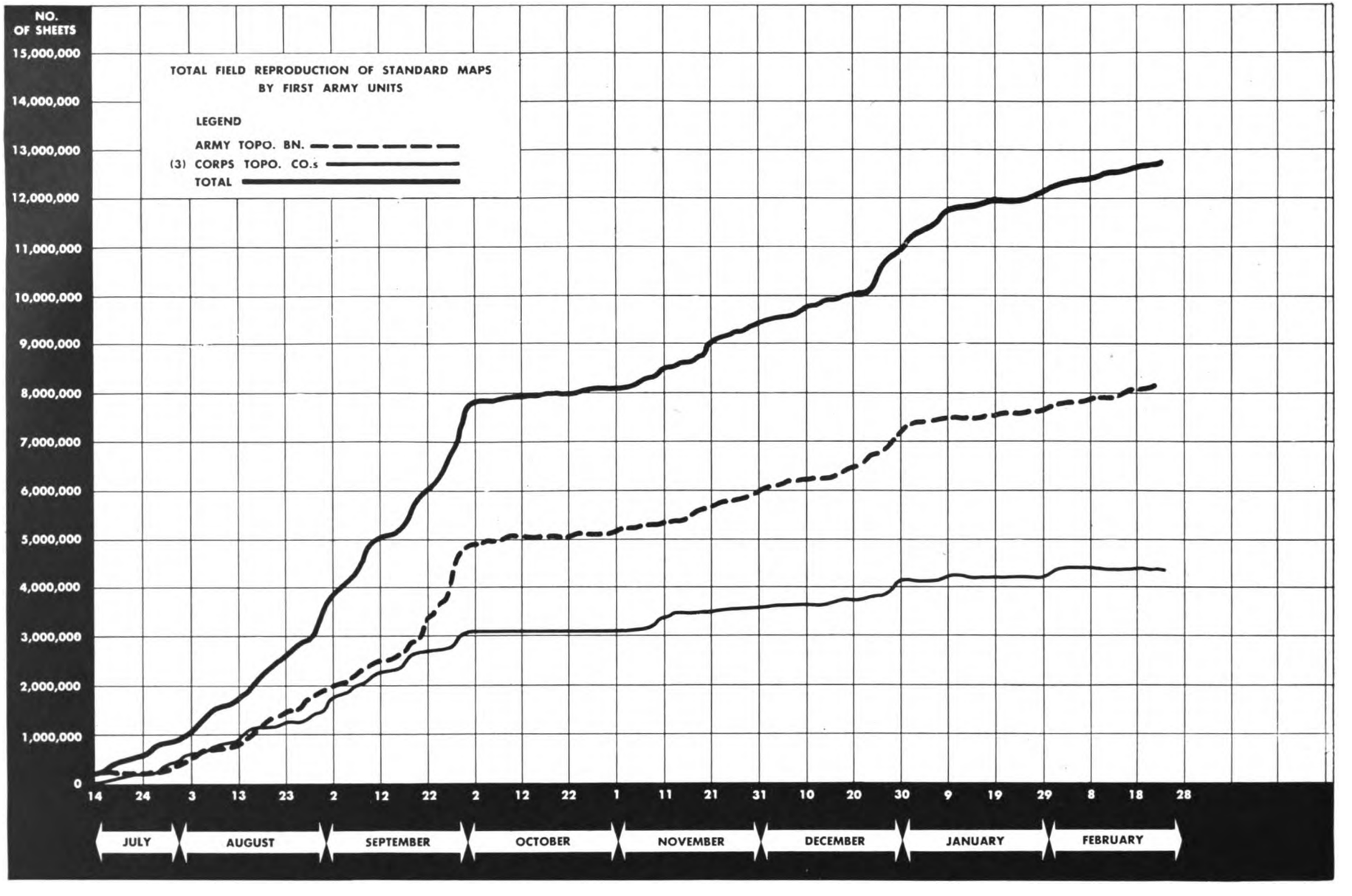
2957	Europe	1:4,000,000	852
4464	Europe	1:2,000,000	216
2758	Europe	1:1,000,000	6,727
4438	Europe (Communications)	1:800,000	839
4072	Europe	1:500,000	11,121
4369	Great Britain	1:500,000	1,059
4478	Germany (Roadmap)	1:50,000	93,465
2738	France	1:250,000	21,137
3982	Europe	1:250,000	26
4042	NW Europe	1:250,000	89,864
4042A	Political Map	1:250,000	410
4346	Germany	1:250,000	102,947
4346A	Political Map	1:250,000	1,240
	Emergency Roadmap of Germany	1:250,000	34,260
4238	(Roadmap)	1:200,000	458,487
4249	France	1:100,000	82,313
4336	Belgium and NE France	1:100,000	213,802
2541	Holland	1:100,000	5,208
4416	Germany	1:100,000	156,519
	First Army Roadmap	1:100,000	103,770
4471	France	1:50,000	1,380
4250	France	1:50,000	1,020,431
4507	Germany	1:50,000	169,088
4040	NE France and Belgium	1:50,000	1,735,665
4507	Germany	1:50,000	57,075
4041	NE	1:25,000	1,879,281
4427	Holland	1:25,000	21,130
4347	France (Western)	1:25,000	401,136
4411	France	1:25,000	2,464
4414	Germany	1:25,000	2,608,879
4414	Defense Overprints	1:25,000	368,695
4414	Road and Bridge Data	1:25,000	64,189
	Cherbourg Project (Photomap)	1:25,000	26,846
	Brest Project (Photomap)	1:25,000	49,502
4517	Rhine River Strip Map (1st Ed.)	1:12,500	965
4517	Rhine River Strip Map (2d Ed.)	1:12,500	3,939
	Town Plans	24,818	.....
	Thruway Town Plans Misc. 77	.....	352
	Thruway Town Plans Misc. 80	.....	938
	Indices	.....	8,228
	GSGS Notes of Germany	.....	213
	GSGS Notes of France	.....	156
	Defense Legends	.....	2,164
	Photomap of NW Germany	.....	3,229
	Photomap of Rhine River	.....	5,863
	Photomap of Germany Series "Z"	.....	58,884
	Photomap Mosaics No. 34	.....	1,200
	Map Allowance Table	.....	128
	Map Distribution Letter	.....	46
	Glossary of German Topo Terms	.....	620
	AMS Roadmap of France	.....	50

MAPS REPRODUCED

1:25,000 Topo	1	4,990,500
1:25,000 Topo	2	3,763,075
1:25,000 Topo	3	1,650,000
1:25,000 Topo w/Defense Overprint	2	279,900
1:25,000 Topo w/Defense Overprint	3	388,400
1:25,000 Topo Road and Bridge Data Overprint	3	10,000
1:50,000 Topo	4	285,100
1:100,000 Roadmap	2	480,000
Photomaps	1	309,600
Town Plans	1	7,200
1:250,000 Roadmap	4	140,050

This report covers the period from 1 Aug 44 to 22 Feb 45.

Inclosure 2



Inclosure 3.

ANNEX NO. 8

SIGNAL

SECTION REPORT

Annex 8
Table of Contents

ANNEX 8

I. Introduction

This is a report of the Signal Corps activities of the First United States Army Signal Service for the period 1 August 1944 to 22 February 1945. This report covers the various phases of the Signal Corps units after the St. Lo break-through, the capture of Paris, and operations within Germany.

At the outset of this phase, army communications underwent a crucial test in that the set-up changed from a somewhat static to a highly mobile network. This change was necessitated by the rapid advance of our front lines which required almost continual movement of the army, corps, and division command posts.

The following is a concise account of Signal Corps functions, problems and solutions, and the lessons learned.

II. Exploitation of the St. Lo Break-through

A. PERIOD 1–12 AUGUST 1944

1. Communications

When the successful campaign of First Army forces on the Normandy front threatened to develop into a break-through, the need for a projected command post became evident. Toward this end plans were laid for the establishment of the Tactical Echelon of First Army Headquarters. From the signal standpoint, the purpose of this "flying column" command post was to maintain tactical communications between the army commander and the corps. With the success of our break-through imminent, the Tactical Echelon departed Army Headquarters Command Echelon at Canisy for a forward location in the vicinity of Sept. Freres at 0900B, Tuesday, 8 August 1944. To meet the communication demands of this echelon the Signal Officer of First Army provided one local telephone to each staff section represented; two radio-link telephone circuits to each corps, and two radio-link telephone circuits to the Army Headquarters Command Echelon. Two telephone switchboards, a TC–4 and a TC–12, were used at the beginning of operations. The TC–12 was held for standby operations. Later on, however, with the increase in traffic a telephone switchboard TC–10 was installed. The teletype installations were direct circuits at the outset and were subsequently augmented with an additional teletype machine and a switchboard TC–3. There was one radio-link teletype circuit to each corps and one to the Army Command Echelon. In addition to the wire–radio-link installations, three SCR–399 radio sets were used to establish one radio command net to corps; one station in the Twelfth Army Group Command Net and one point-to-point circuit to the Command Echelon. Normal message center facilities were provided including four dismounted messengers, six motor messengers, and such air liaison planes as were necessary. The telephone code name MASTER TAC was assigned to this echelon. As a result of the rapid movement of this echelon it was impossible to place wire communication, thereby necessitating utilization of radio-link equipment on both telephone and teletype circuits. Several difficulties were encountered with radio-link, some of which were the inadequacy of equipment and trained personnel to operate it. The selection of sites for constant changes in command post locations also presented a problem in that the units often got out of range of the radio-link transmitters. This necessitated the use of relays which were critically short at that time. These problems were readily overcome with the addition of two hundred miles of radio-link systems and an increase in personnel for its operation. When the Master Tac Echelon was established the First Army Signal Executive Officer and one enlisted man, plus three officers and eighty-five enlisted men from the 17th Signal Operation Battalion were the signal personnel represented.

2. Supply

The resupply of signal equipment for combat replacement and maintenance was decidedly unsatisfactory during this period, only a very minor percentage of supplies requisitioned being received. After repeated requests to higher headquarters as to the status of

urgently required items it was revealed that stocks were not available on the continent or in the United Kingdom and that it was necessary to obtain the equipment from the United States. The output of wire, both W–110 and W–130, required for operations at this time was exceedingly heavy, and the replacement almost negligible.

B. PERIOD 13–19 AUGUST 1944

1. Communications

Wire contact with V Corps was lost on 17 August and contact with XIX Corps was lost on 18 August. This was the first time since the initial landing that the Army Headquarters had been out of wire communication with any of the Corps Headquarters. Contact was reestablished within four days. This break in communications was the result of the speed with which the forces were advancing and the lack of construction personnel to install wire facilities to these units. The burden of communications to corps fell on radio and messenger services. A considerable amount of high-precedence traffic was handled by the air courier service.

2. Supply

The resupply of vital signal equipment continued to be unsatisfactory. Another difficulty encountered was a lack of sufficient transportation to move signal supplies to new forward locations. This situation for a time was extremely critical inasmuch as it was practically impossible to get supplies to corps, divisions, and other subordinate units. This fact was due mainly to the extreme shortage of gasoline.

C. PERIOD 20–26 AUGUST 1944

1. Communications

The wire installations of the Main Echelon of First Army Headquarters were set up in ten-ton vans which eliminated the use of tentage and enabled a much speedier installation of wire facilities when changes were made in the locations of command posts. The construction teams completed approximately fourteen miles of rehabilitated French open-wire systems (eight circuits) running along the army axis. A ten-pin arm of American construction was also placed along the same route. The wire and radio sections of the First Army Signal Service were moved to the Tac Echelon. This change was necessitated by the fact that forward wire installations could only be planned and supervised from a position closer to the tactical situation. As the army approached Paris the utilization of existing commercial wire systems was also to be desired. Since it was not always possible to maintain wire contact with the corps' rapid advance, radio-link proved to be the solution for maintaining telephonic communication. However, considerable trouble continued to occur when lining up radio-link receivers. The receivers had a strong tendency to oscillate making alignment a critical and tedious operation. This trouble was solved by certain modifications made subsequently on all equipment in First Army. The Locator Section of the Army Message Center had perfected its operation to the point that messages and dispatches were dispatched easily to all addresses within the precedence that each carried. All message center activity was now coordinated and supervised at the Main Echelon of First Army Headquarters. At this time the air courier service provided five scheduled flights per day to each corps and any special flights to service high-precedence traffic that was necessary.

2. *Supply*

Due to the heavy demands for vehicles to transport rations, POL, and ammunition to the forward areas, the First Army Signal Servive experienced considerable difficulty in obtaining sufficient trucks to move signal supplies up closer to the front lines. Every effort was made to alleviate the shortages of transportation by utilizing organic vehicles assigned to all army signal units of this command.

D. PERIOD 27 AUGUST–3 SEPTEMBER 1944

1. *Communications*

Wire communication dropped considerably during this period owing to long-distant movement and shortage of gasoline for construction troops. The main axis communication was primarily the French PTT cable. This was not very satisfactory because the repeater stations had been destroyed by the enemy which limited the talking range to about sixty miles. Another difficulty experienced was getting circuit arrangements made in Paris. The Paris PTT was tied up in "red tape" and other lengthy procedure with the Franco-American Commission which did not move fast enough for army communications. Due to the rapid movement of the corps it was necessary on two occasions to send out radio-link relay stations in order to improve the reliability of communications. A great deal of trouble was encountered in keeping radio contact with the corps at night, especially when the units moved between seventy and one hundred and twenty miles from the First Army Headquarters where ground waves would not reach and the sky wave was very unreliable. Radio-link activity was marked by almost continuous shifting of terminals and relay stations caused by the advancing corps. The greatest problems were still the lack of trained technical men and receiver trouble. Sufficient men were in the radio-link section to operate the equipment on hand but there were only five or six men who had a thorough technical knowledge of the equipment. The motor messenger service from First Army Headquarters to subordinate corps was almost of no value in delivering high-priority traffic. The distances between the units were too great for efficient dispatch of messages. The air courier service continued to handle high-precedence traffic thereby assuring that deliveries were made in excellent time.

2. *Supply*

The transportation difficulties that existed during the previous period with respect to the movement of signal supplies to the forward areas were lessened to some extent by the allocation of two quartermaster truck companies to the Army Signal Service. There was no change in the status of the resupply of critical items of Signal Corps equipment.

E. PERIOD 4–12 SEPTEMBER 1944

1. *Communications*

More extensive use was made of existing Belgian underground telephone cables. The cable along the army axis, Charleroi–Huy–Liege–Verviers, was repaired but its use was limited to communications between echelons of the army and the army switching centrals. The repair of underground cables was not rapid enough to provide communications between the constantly moving corps and army headquarters. The German underground repeater station at Liege was found intact and was put back into service as quickly as pos-

sible to provide long-distance circuits to Twelfth Army Group and better communications to the British Sector. As the army approached the German border more difficult and frequent cases of sabotage to army communications were appearing. The cable to the XIX Corps was cut four times in one night with short sections from five to two hundred feet being removed. To counteract this spiral-four cables were placed overhead along the entire route. Radio circuits continued to handle the bulk of operational traffic. It was again found necessary to send out relay stations in order to keep in touch with distant stations which were at that time one hundred miles away. Faulty radio-link receivers continued to give some trouble but on a smaller scale as they were gradually being weeded out and returned for repairs. Since the corps headquarters were either in or fast approaching enemy territory the messenger runs that were scheduled at night were cancelled. A ruling was obtained that all urgent and operational priority messages that were received in the Message Center during the hours of darkness were held until the following morning unless the chief of the originating staff section desired the dispatches to be delivered immediately.

2. Supply

The signal supplies received on a daily tonnage basis from the Communications Zone were almost negligible to the point of complete supply failure. Approximately 10 percent of the tonnage that was ordered each day was received to cover combat replacement and maintenance requirements.

III. The Battle of Germany

A. PERIOD 13 SEPTEMBER–15 OCTOBER 1944

1. Communications

Direct service between the First Army Main and Rear Echelons to many army units was installed using existing underground cables of the Belgian RTT. These new installations eliminated several switching centrals. At the beginning of the period the army was utilizing three thousands and forty-five circuit miles of RTT cable. As a result of the then current static situation and the extensive use of commercial facilities the signal construction battalions had their first rest since D-Day. This period was used to reassemble and recondition tools and equipment. All personnel at the various test points were reinforced to cope with potential hostilities in occupied territory and steps were taken to limit to a minimum the opportunities for sabotage. Toward the end of the period work was begun on the rehabilitation and rerouting of local underground cables in the vicinity of Spa in preparation for the movement of First Army Headquarters to that locality. Since the Germans had completely wrecked the exchange and cableheads by burning, a six-position TC–10 switchboard was set up in a building adjacent to the Spa exchange. This switchboard was then connected by lead cable to a six-hundred-pair cable at the exchange. Through information gained in G–2 and CIC activities it was found that an underground cable existed between Aachen and Malmedy. Construction teams started rehabilitation of this cable but work was held up in some places because the enemy still held territory through which the cable passed. As adequate wire facilities became available the radio-link circuits between the army and corps were placed on a standby basis. The reliable wire network also resulted in a considerable decrease in radio traffic.

2. Supply

There was a slight improvement in the resupply of signal equipment essential for combat and maintenance purposes from the Communications Zone. The supplies received on a daily tonnage requisition basis were good from a tonnage standpoint. However, many critical items were not available. The only definite information that could be obtained on these shortages was that they had been extracted to the United States for shipment. It appeared that the supply cycle for items which had been in inadequate supply for approximately ninety days necessitated a much higher level of stocks being maintained by the Communications Zone so as to supply the armies adequately.

B. PERIOD 16–26 OCTOBER 1944

1. Communications

By the beginning of this period the telephone and teletypewriter equipment was installed completely at the new location of the First Army Headquarters at Spa, Belgium. High winds and rain caused a considerable number of spiral-four cables to be put out of service. The cables wore through wherever they touched trees and at some cable hangers. Only a few cases of rehabilitated civilian cables getting wet appeared. The movement of the Tactical and Main Echelons of the First Army Headquarters to Spa took place on the

25th and 26th of October. These two echelons were combined at this location to form the Command Echelon. The combining of these two echelons eliminated a great deal of wire construction. As the offensive against Aachen progressed construction personnel began work on underground cable facilities leading into that city. After the fall of Aachen underground cable facilities were available from that point to Eupen, Verviers, Liege, and Monschau. The type of spiral-four installation to be used in Germany presented quite a problem. The terrain lent itself very well to putting spiral-four cable on the ground behind trees and hedgerows. Although it led to the possibility of sabotage, it was found that where the installation was to remain over a period of four weeks the ground installation of cable proved much more satisfactory. As a result of reliable wire communications, the radio circuits to V and VII Corps were closed down on 21 October. The VIII Corps circuit was retained in service due to uncertain wire facilities. As the volume of radio activities decreased many operators became careless with a resultant threat to security. In order to counteract this, intensive training was started to improve procedure and eliminate excessive and unnecessary transmission.

2. *Supply*

The supply of field wire continued to arrive very slowly. Only three thousand, two hundred, and sixty-four miles of wire were received, although twenty-one thousand, three hundred, and ten miles were requisitioned. There was a very critical shortage of battery BA–40 at this time. This item was rationed and then only to front-line units. A substitute pack was issued to other units made up of batteries BA–2 and BA–23. The First Army assumed the responsibility of supplying signal equipment to Ninth Army units while the latter unit was moving into a new position in the line. The XIX Corps and subordinate units of this corps were also supplied by First Army until the time when Ninth Army was able to establish its depots. The static condition during this period caused a considerable increase in maintenance activities. Repairs were accomplished by the complete exchange of defective equipment or cannibalization of parts from new equipment. Due to the lack of spare parts in general, this procedure increased the replacement factor that was currently the most essential means of effecting the continuation of equipment serviceability.

C. PERIOD 27 OCTOBER–15 NOVEMBER 1944

1. *Communications*

The combining of the Tactical and Main Echelons of the First Army headquarters resulted in one of the largest and most intricate telephone and teletype installations that the headquarters had on the continent. To cope with this unusual installation repairs were made in the Belgian cable system which serviced the widely dispersed staff sections in the city of Spa, Belgium. The 32d Signal Construction Battalion rehabilitated four open-wire circuits along the Trois Ponts-Luxembourg Railroad Line. The 35th Signal Construction Battalion rehabilitated underground cable from Aachen to Kornelmunster. This cable was used to fulfill commitments to the rear of army and provided a complete underground route between the First Army and VII Corps. Due to the static situation at this time most of the construction work being done was on circuits that would be needed in the future. Personnel from the 17th Signal Operation Battalion were placed on duty in Aachen to clean up and make the repeater station in that city serviceable. The necessary repeater parts were furnished by the Bell Telephone Company in Brussels and civilian technicians were sent to Aachen to aid in the complete restoration of the station. Trouble was experienced with radio-link receivers principally due to spurious oscillation. A detailed analysis of several

receivers was made and it was found that the trouble could be eliminated. However, each receiver had to be checked individually as the faults were not the same in all sets. When it was learned that the oscillation could be eliminated, immediate steps were taken to modify all the receivers within First Army. This process took approximately two weeks to accomplish.

2. *Supply*

The percentage of supplies received against detailed requisitions for this period was low. On a tonnage basis, the minimum amount received against a 100-ton allocation was 1 percent and the maximum 35 percent. The over-all average was about 15 percent. The supply of field wire was very unsatisfactory and might have hampered future operations seriously had not prompt action been taken by Communications Zone to remedy the situation. During this period corps and divisions were rationed to the extent of only twenty miles per day. Requests for wire from organizations in rear areas were cancelled in an effort to conserve the minimum stocks on hand. At the close of this period depot stocks of field wire consisted of twenty-four hundred miles of wire W–110 and twenty-three hundred miles of wire W–130. This amount, based on past experiences and provided combat units had authorized allowances, would be ample stockage in a large-scale operation for approximately one and one-half days. Items of critical short supply, with the exception of battery BA–42, remained substantially the same. Fifteen tons of signal equipment via air transport from the United Kingdom assisted in materially improving the supply situation of a few items which were previously in critically short supply. However, due to the large percentage of previously reported items which had not been furnished on daily requisitions for considerable periods of time, depot stocks continued to become more and more unbalanced. Action was initiated to obtain maintenance parts, groups, and test sets type IE–10. These test sets and parts were essential for the maintenance of radio set SCR–522.

D. PERIOD 16 NOVEMBER–15 DECEMBER 1944

1. *Communications*

As the number of enemy V–1 weapons (flying bombs) increased over the army area an emergency telephone exchange was set up in the bivouac area of the 17th Signal Operation Battalion. The two-position TC–10, mounted in a six-ton van-type trailer and formerly used at the First Army Tac Echelon, was utilized as the emergency telephone switchboard. A one-position TC–3 switchboard was used for teletype traffic. Four carrier systems were also used in this emergency installation, one to each corps and one to Ninth Army. Special telephones were installed for use of the commanding general, chief of staff, deputy chief of staff, and chiefs of general and some special staff sections. These phones were painted with a red band so as to enable them to be distinguished from instruments on the regular exchange. Construction teams continued to rehabilitate cables going east of Aachen to Eschweiler. The 35th Signal Construction Battalion reconditioned all available submarine cable for use, if necessary, in placing communications across the Rhine River. An alternate army command post was established at Brand, Germany, on 3 December, to facilitate the quick movement of the headquarters in case the command post at Spa was damaged by enemy activity or the tactical situation required such a move. This installation insured limited service on a twenty-four hour notice and was composed of a six-position mobile telephone exchange and a mobile teletypewriter exchange which was held in readiness in case such an emergency arose. Some open-wire work between Bullingen and Stadtkyll was completed; however, this work could be carried out only as the tactical situation per-

mitted inasmuch as the construction teams were almost always working up in the forward areas of this sector. The Aachen repeater station was approximately 50 percent completed by 1 December. Radio activity was at a normal level throughout the period with a daily traffic average of two thousand, seven hundred, and twenty-two groups. As adverse weather conditions closed in over the First Army area the liaison and courier planes were grounded almost continually. This placed the bulk of the dispatch service on motor messengers. A new and expanded operations division was set up in the 17th Signal Operation Battalion to place fixed operational responsibilities for the various functions of the battalion in the hands of certain delegated officers. The Operations Center was divided into five sections, namely: teletype, locator, message center, cryptographic, and motor messenger sections. Each officer in charge of the various sections was made responsible to the Signal Operation Battalion Operations Officer (S–3), who in turn coordinated the functions of all sections so as to achieve a better performance of signal operations.

2. Supply

By the end of this period the flow of signal equipment was unusually good. The arrival of a four-hundred-ton trainload of supplies from the Communications Zone and also several hundred tons received via air shipment from the United Kingdom helped considerably to alleviate the critical shortages of wire, batteries, and certain types of radio sets. A very satisfactory resupply of photographic equipment was also received which helped immeasurably to mitigate the lack of photographic supplies. Combat losses of all types of Signal Corps equipment were exceptionally high during this period. In addition, several divisions that were assigned to the First Army arrived less large amounts of necessary supplies and T/E equipment. These conditions drew heavily on the stocks that were available in the First Army signal depots. By the end of the period the levels of reserve stocks on hand in the depots were sufficient for approximately fifteen days. This stock did not include those items which had been on the critical shortage lists.

IV. The German Counteroffensive and the Drive to the Roer River

A. PERIOD 16 DECEMBER 1944–11 JANUARY 1945

1. Communications

With a German break-through imminent in the Ardennes salient, the First Army Command Echelon was split into two sections, a command and a supply echelon. The supply echelon withdrew to the vicinity of Micheroux on 18 December. Communication facilities were established to this echelon on the same day through Marco Switch. The command echelon moved to Chaudfontaine on 19 December. The communication facilities of the First Army Rear Echelon at Chaudfontaine were taken over and augmented. Mobile telephone and teletype installations of the Command Echelon were cut into service during the night of 18–19 December and telephone and teletype service was available to all major units. The rear echelon of First Army moved to St. Trond on 19 December. On 22 December the command echelon moved to Tongres and was joined there by the supply echelon the following day. All movements of the various echelons' command posts were made on very short notice. The installation and operation of telephone and teletype exchanges and local stations at these command posts, with the overlap necessary to give continuous service, strained the facilities of the 17th Signal Operation Battalion to the utmost. In addition to these headquarters installations, two new army switching centrals were established in Remouchamps and Huy to service army troops which had moved back to these areas. There was no interruption of wire communications to any major unit throughout the enemy counteroffensive. Communication was established to the XVIII Airborne Corps on 19 December. Contact was maintained continuously with V, VII, and XVIII Airborne Corps. Communication facilities were maintained to the VIII Corps until after that unit was placed under the command of the Third U. S. Army. During the period of regrouping of units the army signal construction battalions installed approximately nine hundred miles of spiral-four cable, four hundred miles of field wire, four miles of fifty-quad aerial cable, and rehabilitated various commercial facilities. The scale of communications which was maintained at this time was made possible by the cooperation of 21st Army Group, Twelfth Army Group, Ninth Army, and the Advance Section Communications Zone in permitting the use of facilities under their control. Radio-link systems were maintained between army and each corps throughout the period. The First Army Headquarters had fourteen radio nets in operation. These included three 21 Army Group nets and one Second British Army net. There was no difficulty experienced with radio communication. Traffic was exceptionally light due to the availability of sufficient wire facilities. The quartermaster net was opened on 17 December. On the same day an air-ground net was established with the 153d Air Liaison Squadron and artillery planes for the purpose of observing the command post area as a precaution against enemy infiltrations. Excellent coordination in the message centers of the First Army Headquarters produced uninterrupted service during the period. When the initial German attack gained momentum several American units in the line were overrun, as a result of which stragglers, liaison teams, and convoys were in need of information concern-

ing the whereabouts of various units. The Locator Section was instrumental in routing these units and individuals to their proper destinations and also aided the dispatch of messenger traffic. Every scheduled messenger run was completed, although many times the messengers were forced to by pass enemy territory to get the message through. No messages were lost during this phase of operations. Encryptographed traffic was the heaviest since the invasion, reaching a peak of forty-eight thousand groups per day. This was in addition to enciphered traffic handled by personnel of the Second British Army Signals.

2. *Supply*

As a result of the German counterattack on 16 December in the Ardennes Forest, all signal supplies, with the exception of an operating stock, were moved from Verviers, Belgium, by rail and truck transportation to Charleroi. A subdepot remained at Verviers for the purpose of supplying forward units. Due to the loss of many signal items, the First Army stocks were depleted seriously. In addition to all radio repair, telephone equipment, and spare parts, all reserve signal supplies of the 2d Infantry Division were captured. Many of these items were replaced so far as available stocks permitted. Combat losses of the 99th and 106th Infantry Divisions were also replaced. The consumption of field wire at the outset of this period increased 500 percent over previous requirements. The Ninth Army Signal Supply Officer furnished the First Army five thousand miles of wire W–110, five hundred batteries BA–40, one thousand flashlights TL–122, and seven hundred batteries BA–39. The supply of this equipment helped to alleviate the shortages in First Army.

B. PERIOD 12 JANUARY–22 FEBRUARY 1945

1. *Communications*

Prior to the move of the First Army Command Echelon from Tongres, Belgium, the mobile telephone and teletype switching centrals were established at Spa. The command echelon of the army headquarters moved to Spa on 18 January and was joined the following day by the supply echelon. All major units, both subordinate to and higher than army, were transferred to the new telephone and teletype switchboards with no loss of contact. Work was started on the rehabilitation of underground cables necessary for the army communication systems which were damaged during December and early January. The scale of communications increased sharply after the move to Spa and exceeded the level which had existed prior to 18 December. Sufficient radio and radio-link equipment to duplicate all nets and circuits was established in advance of the move of the First Army Headquarters and the change-over was made without incident. Three radio nets to 21 Army Group were closed down on 16 January and the lateral net to the Second British Army was closed down on 21 January. A period of radio silence was imposed on VII Corps nets on 24 January. This radio silence was in effect while the VII Corps was in army reserve and was lifted when the corps moved to Kornelmunster for operation on 5 February. Due to the shortage of field wire in this theater, the Advance Section Communications Zone placed wire recovery teams on temporary duty with the First Army. These teams were utilized to recover all field wire not in use in the army area. To protect military communications using rehabilitated commercial facilities, the construction and operation battalions were directed to permit no civilian employee to enter rooms containing equipment carrying military traffic. To prevent sabotage, civilian employees were accompanied by army personnel when working on mainframes or cableheads. A more detailed plan for patrolling lines was also established and spiral-four and underground cable and terminals, as well as open-wire lines, were inspected daily by walking patrols.

2. *Supply*

Signal equipment losses resulting from the enemy counterattack were still excessive at the beginning of the period and replacements of these items from the Communications Zone were insufficient to meet the demands. By the end of January the supply of signal equipment with the exception of field wire had improved. Due to the heavy demand placed on the limited supply of field wire on the continent, wire W–110 and W–130 was rationed to First Army. It became necessary to do likewise to subordinate units. The Infantry and Armored Divisions were allotted twenty miles of wire W–110 and ten miles of wire W–130 per day. In cases of operational necessity additional wire was given to these units. As a result of the rationing of wire to units and the inadequate resupply, the stocks of First Army had been depleted to the extent that a large-scale attack could not be supported at that time. Attempts at wire recovery were practically nil. The heavy snow and cold weather made wire pick-up almost impossible. The bad weather conditions during this period also caused numerous difficulties in maintenance and operation of signal equipment. This was overcome in many instances by making waterproof bags for radio sets from admiralty cloth and Bostick cement. This system proved very satisfactory in the absence of standard waterproof bags which were not available at that time. The requirements for pole line material increased throughout the period. The supply of this equipment from the Communications Zone was unsatisfactory with only fifty miles of this material received of the three hundred and fifty miles which had been requisitioned. The resupply of signal stocks in the First Army during the month of January left a great deal to be desired. As a result of the reshuffling of units from one army to another early in February, there was a considerable increase in the consumption of field wire. The First Army Signal Supply received eight thousand, three hundred, and ninety-two miles of wire W–110 and three thousand, one hundred, and sixty-six miles of wire W–130 during February. The First Army Signal Supply Officer was advised that a bulk shipment of an additional five thousand miles of wire W–110 was to be made. However, further check revealed that this shipment had been delivered to Ninth Army. The amount of signal equipment in terms of tonnage received during the month of February was three thousand, six hundred and one tons by rail and eight hundred and thirty-eight tons via truck transportation. The delivery of radio sets SCR–300 and SCR–536 was very slow. Urgently needed waterproof bags were obtained for these radio sets through local procurement. Some bags for waterproofing power units PE–103 were also made. The Infantry and Armored Divisions were given priority on the issue of these bags. The long and continuous use of mine detectors SCR–625 made it necessary to replace those that were beyond the point of repair. The flow of signal equipment to the First Army throughout February improved somewhat over that received during January.

V. Other Signal Corps Activities for the Period

1 Aug. 1944 to 22 Feb. 1945

A. SIGNAL INTELLIGENCE SERVICE

The activities of the Signal Intelligence Service throughout the period were mainly of a routine nature. The monitoring services of the 113th Signal Radio Intelligence Company were made available for the purpose of spot-checking radio nets within the First Army command. Numerous violations of cryptographic and signal security were noted. Units with discrepancies in their procedure were directed to take the necessary corrective action. The Signal Intelligence Service also supervised the preparation and dissemination of all codes, ciphers, and cryptographic SOI material. Information obtained from captured documents and other intelligence data was compiled and distributed to units requiring such knowledge for operations.

B. TRAINING

The First Army Signal Service continued to operate and supervise two schools for the purpose of training radio operators. The one school was for Ordnance personnel and was under supervision of the Signal Corps, while the other school was operated by the 17th Signal Operation Battalion to accommodate Signal and Engineer students. The latter school was for enlisted men with a previous knowledge of radio code who were to be trained for high-speed operation. Although there was a shortage of radio operators in other branches, they were unable to spare personnel to take the necessary training to become proficient radio operators. This situation changed in January. Arrangements were made then to increase the school to handle one hundred and twenty students which were taken from all branches of the service utilizing radio communication. The course was also changed at that time to include the instruction of basic radio operators. The standards established by the school trained the students to attain a speed of fifteen words per minute. Most students achieved higher speeds by the end of the six-week period of instruction.

C. PHOTOGRAPHY

Photographic coverage of the First Army front throughout the battle of France and into Germany was handled by the photographers of the 165th Signal Photographic Company. The cameramen did outstanding work as revealed by the large number of pictures used by the War Department and also the commercial newspapers. The pictorial story of the fall of Paris was considered to be one of the most dramatic releases of the war. The excellent deployment of photographers with combat units made this coverage possible. A similar plan was used to cover the siege and ultimate fall of Aachen. At the time of the

German counteroffensive and the following counterattack by First Army troops, it became necessary to augment the personnel of the photographic company with cameramen loaned from Twelfth Army Group. These men assisted immeasurably in the release of photographers for front line duty and took some of the burden of routine coverage away from the company. The photographs and motion pictures of the "Battle of the Bulge" were used extensively in the United States. Special motion and still pictures were made of German atrocities against American prisoners of war, and other incidents of a like nature. As evidence of its outstanding work to furnish a comprehensive pictorial coverage of the war against Germany, the 165th Signal Photographic Company was awarded the Meritorious Service Unit Plaque, and personnel of the company were decorated with one Distinguished Service Cross, one Legion of Merit, four Silver Stars, thirty-two Bronze Stars, two Croix de Guerre, and thirteen Purple Hearts.

D. ENEMY EQUIPMENT IDENTIFICATION SERVICE

Large amounts of captured enemy equipment were picked up and analyzed by personnel of EEIS Detachments #2 and #10, attached to the First Army Signal Service. In cases where large quantities of equipment of a type were found, this material was rehabilitated and furnished to combat troops with instructions for its use. The type of equipment captured that possessed intelligence value varied from new forms of wire and cable to special radio direction-finding devices.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1945—667504