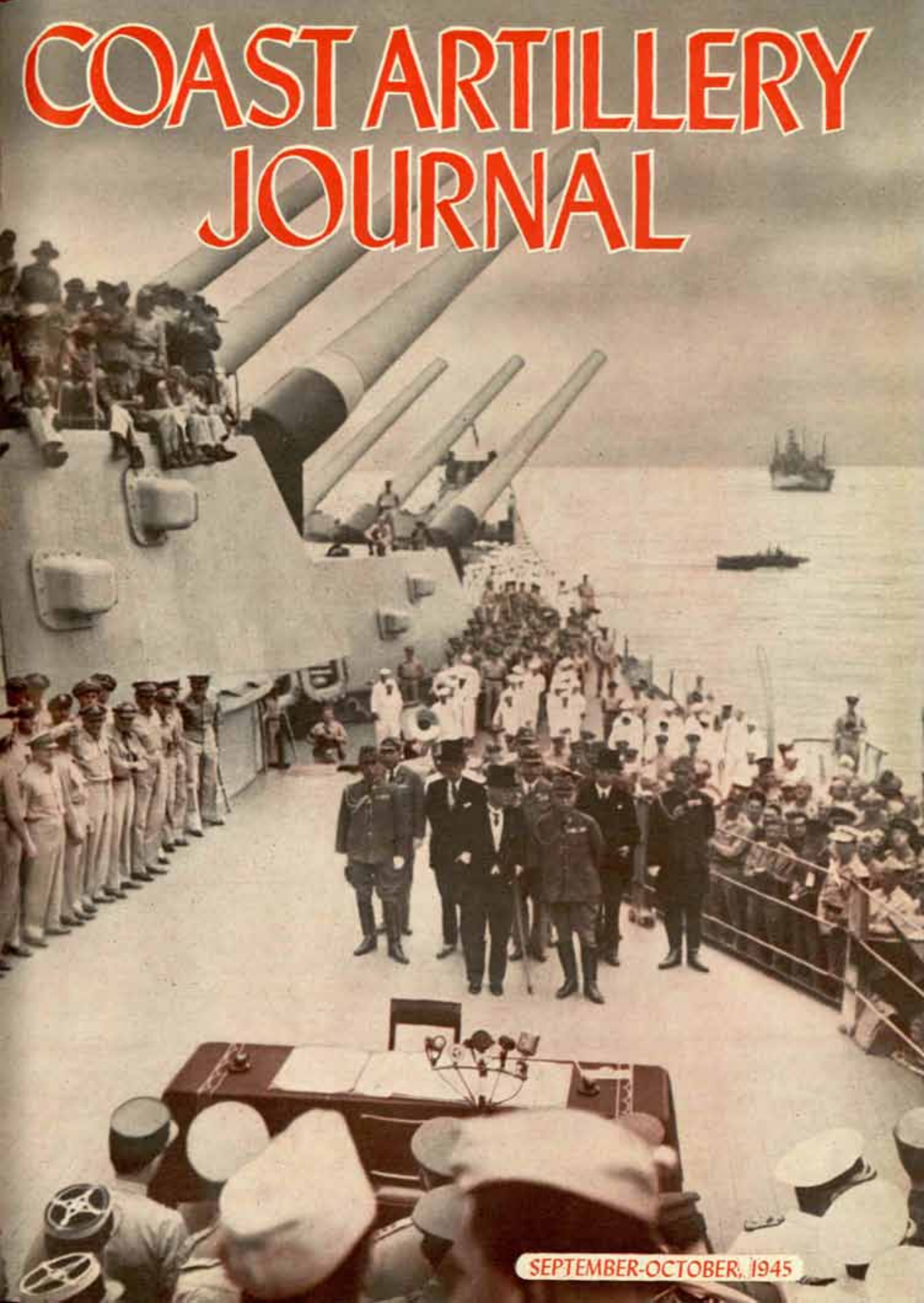
COAST ARTILLERY JOURNAL



SEPTEMBER-OCTOBER, 1945

Christmas Is Coming!

Let the JOURNAL do your Christmas Shopping (and Shipping) for you!

Books:

Books make the perfect Christmas Gift; they are appreciated by all. The JOURNAL will wrap your selection as a Christmas Gift, inclose a suitable card, and relieve you of all the bother and work.

You name the title (give second choice) and the recipient; we do the rest.

To assure proper handling of Christmas Gift book orders, cash should accompany the order. *We will refund overpayments in cash*, and give *discounts in book dividend coupons*, which may be used for the purchase of other books, or magazines.

Remember when you order that all titles are not always available, due to wartime conditions, but that the JOURNAL will make every effort to send the book you want. Alternate selections are desirable.

Order early to assure delivery by Christmas.

Magazines:

There are many wartime restrictions on magazine subscriptions, but a surprisingly large number of publications can accept new subscriptions. Write the JOURNAL for specific information on Christmas Gift Subscriptions.

When cash accompanies your order, *we will refund overpayments in cash*, and give *discounts in book dividend coupons*, which may be used to pay for other magazines, or for books.

Again, send your inquiries early, to assure delivery by Christmas.

COAST ARTILLERY JOURNAL

FOUNDED IN 1892 AS THE JOURNAL OF THE UNITED STATES ARTILLERY

VOLUME LXXXVIII SEPTEMBER-OCTOBER, 1945 NUMBER 5

CONTENTS

☆

PUBLICATION DATE: October 1, 1945

Published bimonthly by the United States Coast Artillery Association, Editorial and executive offices, 631 Pennsylvania Avenue, N.W., Washington 4, D. C. Terms: $4.00 per year. (Coast Artillery Association members, $3.00 per year.) Single copies, 75c. Entered as second-class matter at Washington, D. C.; additional entry at Richmond, Va., under the Act of March 3, 1879.

THE SECRET CO
THE ALLIES' NUM

By
Captain A. R. Dallmeyer, Ji
Coast Artillery Corps

"Target!"

Sensitive fire-control instruments showed a tiny pip thousands of yards out to the southeast.

Alerted by the siren from an M-4 tractor, men jumped to their posts as the whining remote control swung the heavy guns. Ammunition was uncovered, breechblocks tried.

Out of the darkness and the lowering skies toward the southeast, toward Germany, came a peculiar roar and an infinitely small yellow flame, moving rapidly across the heavens.

Second Lieutenant William M. Coppola watched the progress of the marks on the plotting board as they traced the path of the first threat of a new German attempt to destroy the most important (to us) port in the world. Twenty-five thousand yards, twenty thousand yards, fifteen. . . . Tensely, but confidently he waited. Then. . . .

"Commence firing!"

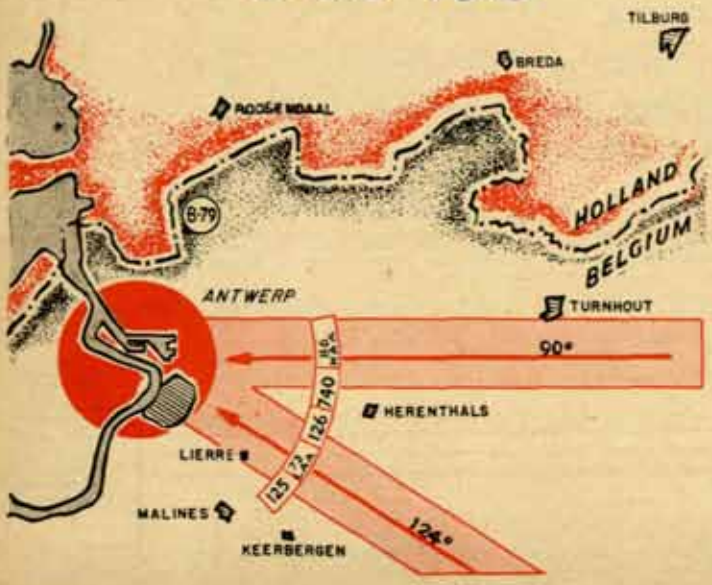
The inhabitants of the tiny village of Vierseldijk, B- gium, startled into wakefulness by four 90mm guns goi into action, looked from their windows just in time to s the blinding flash of an enormous explosion as the fi of Hitler's flying bombs—one of the vaunted V-1's—intend for Antwerp was exploded harmlessly in mid-air. The ro tiles rattled and the neat little houses along the Albe Canal shook.

Their surprise tripled when the same performance w repeated only three minutes later.

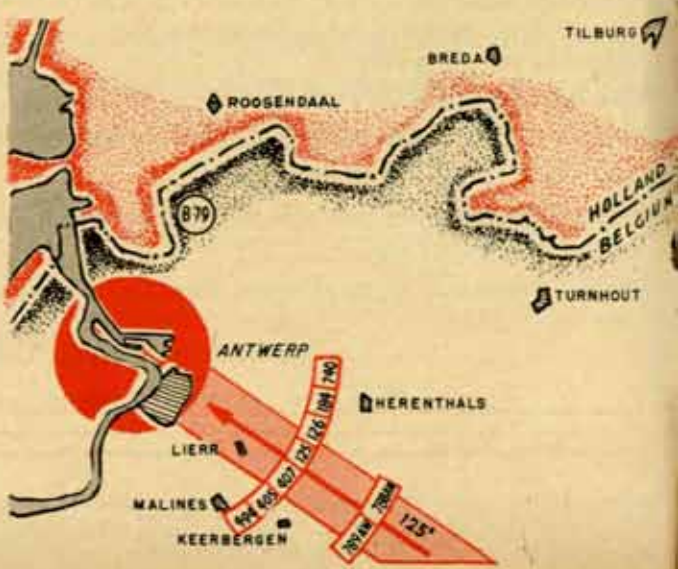
Then darkness and silence. In the gunpits and compute members of Captain Ring Kleinhesselink's Battery D, 126 AAA Gun Battalion, whooped with glee and congratulat each other. Two "Category A's"—"exploded in the air" on the first two flying bombs they engaged in Belgium!

Those successes were scored at 0430 and 0433 on th morning of the 27th of October, 1944. They were the fir of 2,183 flying bombs destroyed in saving the Allies' num ber one supply port, Antwerp. From that time until th 30th of March of this year, five months and five days late one of the most dramatic secret operations of the war was co ducted, the defense of the vital port facilities of Antwe by the antiaircraft artillery of "Antwerp X." In meetin these flying bomb attacks, the first directed at a strict military target, an all-out onslaught by 4,883 V-1's, th

Deployment Oct 28th



Nov 10th



ncreasing the number of batteries engaging increased the hances of a kill. The high speed of the target (300 to 450 mph) prevented any adjustment of fire. Automatic weapons ad been removed to the rear, in a third belt. Note on the raphs the increase in the attacks as the first supply ships ntered the harbor on November 28th. Sinking of one of ose ships might have disabled a large part of the harbor, ut no such damage was permitted.

An ominous lull came during the period just before the ulge, as the launching sites gained strength to support the ulge and as the German supply routes were apparently use to get up troops for their "Operation *Greif*." Then oth the old and entirely new sites in the northeast leaped nto action as Rundstedt's men started moving on the 16th. Note the "Direction of Attack" graph. The defenses were uickly shifted on the basis of previously made plans. The utheast launching sites turned their attentions to Liége nd thereafter the attack from the southeast, never more han about 50% accurate in aim, was spasmodic. About a ourth of all the bombs came from this quarter, however.

The new northeast sites offered the greatest threat, for bout half of the 4,883 V-1's detected by the far-flung warn- g services came from this area, with 75% accuracy in be- g headed for the eight-mile target area. They continued operation right up to the very last, apparently because hey were the easiest to supply. The chart of December 8th shows how the new attacks were met with strong de- enses. But these defenses didn't last long. Two days later, s shown on the next deployment chart, the number of bat- alions was sharply reduced as seven out of fifteen Ameri- an battalions moved to counter the German threat in the rdennes.

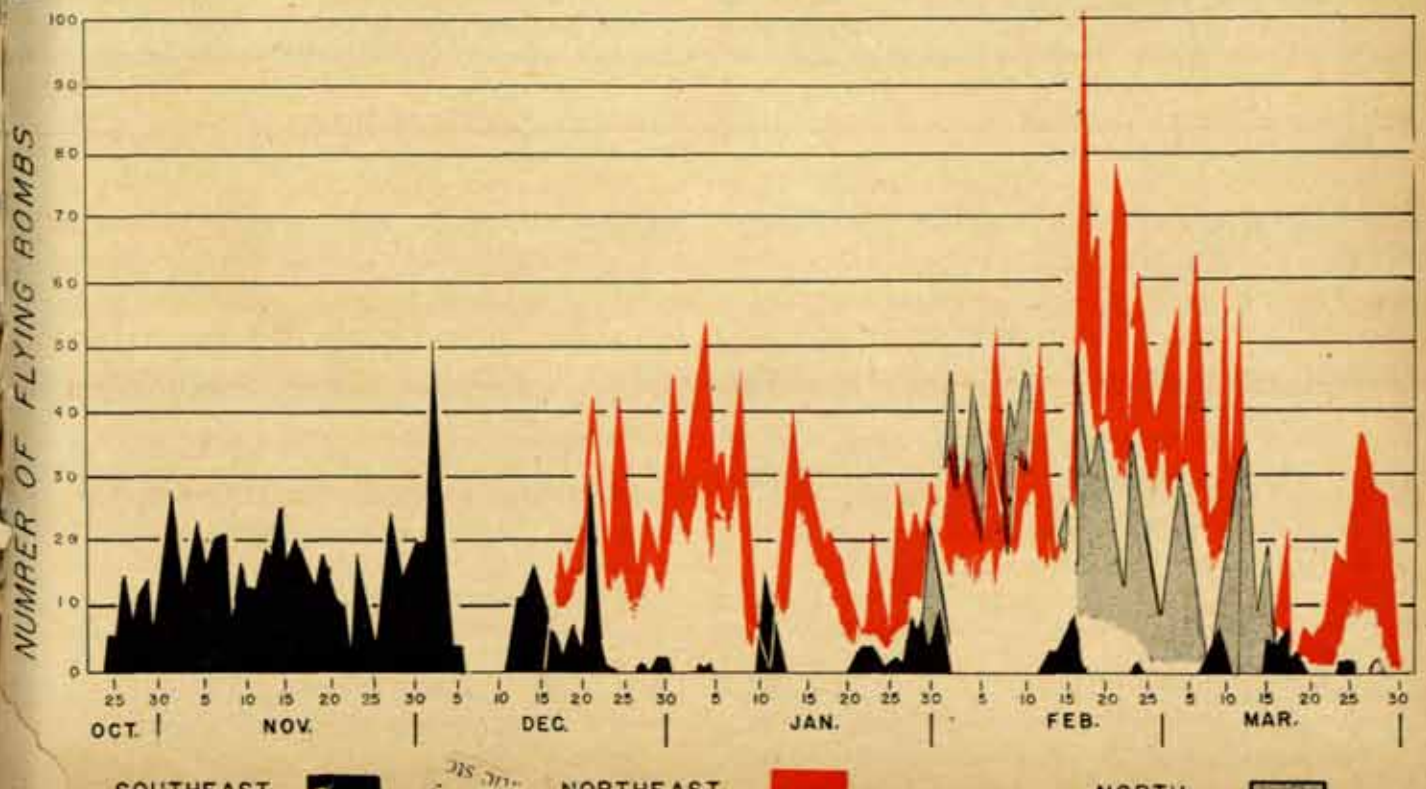
British units from Brussels were brought to Antwerp and deployed, to bring up the diminished strength of the defenses. Handicapped by lack of familiarity with both the particular target and the American fire-control equipment furnished them, they had an uphill fight—and they won. Antwerp X had been under orders not to fire on ordinary enemy planes, but those orders were modified as the *Luftwaffe* made its famous January first effort and the defenders shot down eight planes in one day. Simultaneously, the seven battalions which had been sent to the breakthrough area were proving the power of their training and experience by shooting down commendable numbers of piloted aircraft.

By the eleventh of January returning units permitted the defenses to be reëstablished in somewhat greater strength. The accompanying diagram shows the change effected. Note the graph of the attacks. As the Bulge petered out, so did the attacks, to a certain extent. It now seems that their usefulness in support of Rundstedt was lessening and the Germans were marshalling their forces for another and greater V-bomb attempt.

Toward the last of December the exceptionally fine warning services, principally British feeding through two American operations rooms, detected a single V-1 bearing down on Antwerp from due north. Nothing more developed at that time, however, although close watch was maintained and plans were made to counter any further threat from this quarter. The single V-1 may have been plane-launched, as many of those which reached London during this time were. But the north did contain a threat which materialized on January 27th, a month later.

At 2354 on that evening, a second flying bomb was spotted

Direction Of Attack



coming in from the north. Between then and morning, eight more streaked down the same path, with deadly accuracy. Now the German strategy was clear. Defeated on the ground and with its piloted aircraft, the Germans were redoubling their V-1 efforts. The graph shows exactly what developed. The V-bombs were the only method the Nazis now had for crippling the most important port in the world. And they used them, from three different launching areas simultaneously. The rapid drive north probably made the Germans think that the portion of Holland directly north of Antwerp would be cut off. Thus, their first launching sites were situated back toward Germany. But as the Rhine and Maas Rivers and the flooded area prevented our moving farther up, the Germans found themselves in possession of an area only forty-five to sixty-five miles north of their objective from which it was possible to hit the bull's-eye with better than 90% accuracy. Of the total attacks, some 25% came from these northern sites.

The answer was obvious and the defenders again found themselves on the move. The result of this redeployment is shown on the chart for January 31st.

The presence of airfield "B79" prevented deployment of the forces in the proper tactics to meet the new attack. Firing was not permitted over the field, either. One of the largest air bases in the area, with four wings of Spitfires, B79 was no easy thing to move. But it was moved and the heavy guns went into position right across the field as shown on the deployment chart for February 28th. Except for relatively minor changes, the defenses remained as shown up to the end of the attacks, which came on March 30th, with a spurt as the enemy launched his last stocks of V-1's.

The graphs show the fury of the attacks during February and March. There were nights on which guns were firing in one belt or another all night long. There were two fifteen-thousand-round nights. The heaviest twenty-four-hour period ended at 0600 on February 16th; during this time, the Germans launched 160 flying bombs at Antwerp. Certain batteries fired so many rounds that they were using the fourth set of 90mm gun barrels when the launching sites were finally overrun. The whole shipment of 90mm tubes for the entire ETO was given to Antwerp X when the volume of its firing was wearing out the guns. Breech mechanisms which normally would never require replacement were worn out and Ordnance maintenance personnel performed remarkable feats in keeping the equipment operating, even though the conditions were often far from optimum. Signal and Ordnance teams both were faced with an enormous job in keeping the delicate and sensitive equipment of this modern AA functioning at its peak. Nothing less than peak efficiency would do, for close misses produced no results and absolute accuracy was needed. The mud of the Low Countries and the freezing weather of the winter long fight afforded special problems both in maintenance and in normal operation. The "Category B's"—"caused to crash"—meant grief and injuries for the crews that shot them down, too—32 were killed and 282 injured, behind the lines, in areas where normally AA troops suffer no casualties.

But the defenses succeeded, setting AA records which may well never be surpassed. Of the 4,883 flying bombs known to have been launched, only 211 hit within the vital 8-mile area General Armstrong was instructed to defend. Of these, only 156 managed to get through the defenses, although they were fired upon. The rest could not be successfully engaged because of firing restrictions, friendly planes in the field of fire and so on. However, it should be pointed out that thousands of Allied bombers passed over and through the defenses during the five months of attack hundreds of fighters operated in the area and it was generally a scene of considerable aerial activity. In spite of this the guns of Antwerp X never fired on any plane without authority. Many stories of close liaison between air force and AA will come from this war, but few will equal the record of the men concerned with the air over Belgium and southern Holland.

It is a dramatic story, the story of Antwerp X. In the 15

days of attack, not one day of work was lost by the service troops and the civilian laborers unloading ships in the port of Antwerp. Millions of tons of supplies were brought in, right through the height of the attack, and those supplies—which went to six field armies—enabled us to beat the Germans in the spring of 1945. Had the Germans succeeded in their determined plan to destroy Antwerp, the result is conjectural. Certainly our supply ports of last fall were inadequate and overtaxed. Had we been unable to utilize Antwerp, our entire effort might have met failure when Utah and Omaha Beaches were knocked out by the winter Channel storms. The Bulge might have swamped forces less well supplied. And it seems certain that the war in Europe could not have been won until much later.

As it was expressed in a letter to General Armstrong by British Major General W. R. Revell-Smith, who succeeded Brigadier Calvert-Jones in command of GHQ AA Troops, and under whose command the defense of Antwerp was conducted: "This is a great victory; perhaps not heralded or understood by the world at large in the same way as they would appreciate a victory by other arms. The victories of other arms have territorial gains to show. You have not, but nevertheless this does not make it less important than any other form of major military success in its effect on the final outcome of the war."

No, Antwerp X cannot show territorial gains, except to say that it helped the field armies in full measure. But its victory is in exact conformity with one test: It met the enemy forces and defeated them. And it has cast a mold for the future. The tactics, the lessons of the battle to save Antwerp will be studied in detail as military leaders plan for things sure to come.

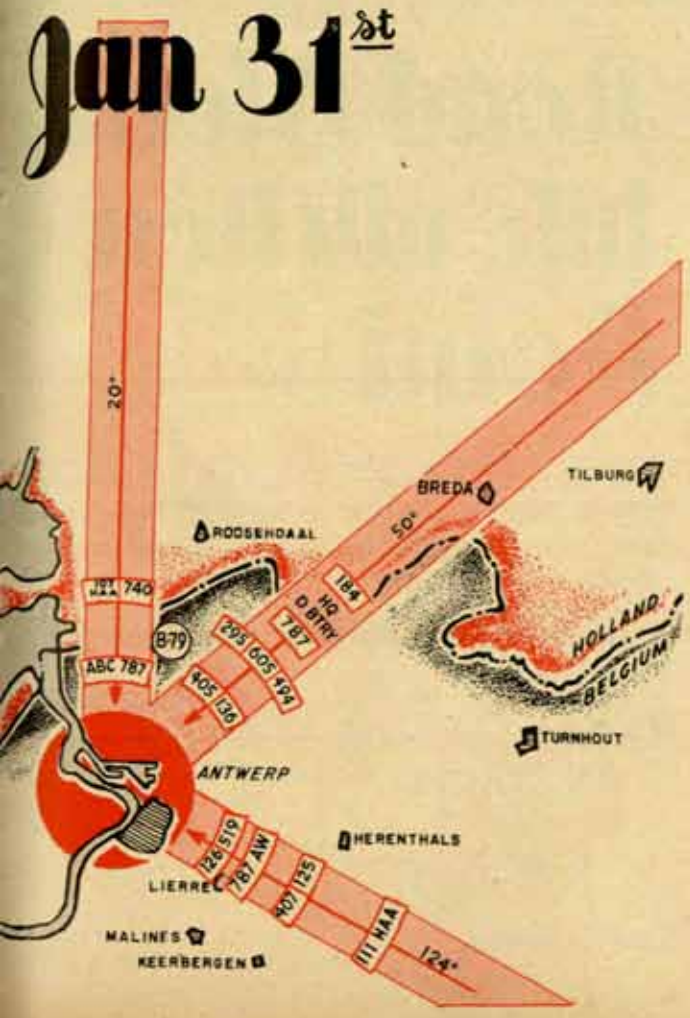
Recognition has already come to General Armstrong and the officers and men of Antwerp X in a letter dated 12 April from Field Marshal Montgomery, commander in chief of the 21st Army Group, which supervised the defense:

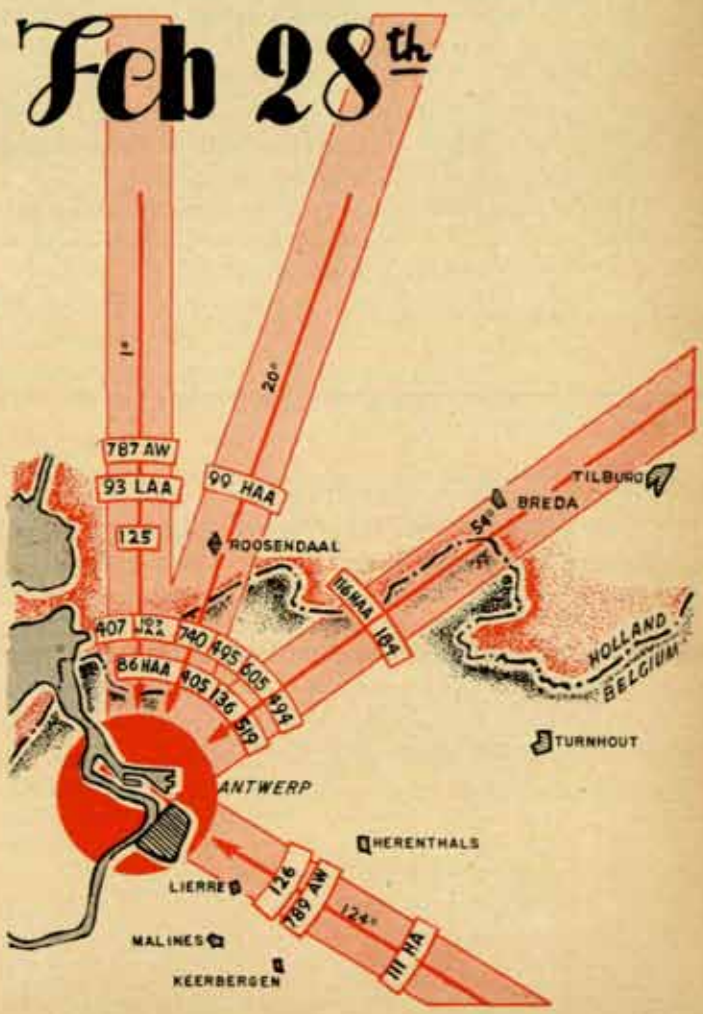
"The weight of the enemy attack, and the outstanding success you have had in combating it, have to remain an official secret for the time being. But this success, which has kept in full operation the main supply base of both 12 and 21 Army Groups, has profoundly influenced the present battle and made the success of the present operations administratively possible.

"You have been responsible for the complete integration of an American and British team of gunners. Under your command they have during the last three months raised the percentage of 'kills' from 65% to over 97%. This is considerably higher than has been achieved ever before.

"These results have been achieved only by continuous day and night firing and unceasing movement of units, with its consequent mental and physical fatigue. It has meant hard thinking and hard fighting.

"I wish to congratulate you, and all ranks under your command, upon the success of a major operation of this campaign."





Ground Defense Plan Antwerp X

By Captain William Edgar, Jr.

Coast Artillery Corps

During the Battle of the Bulge when Von Rundstedt was pushing back the Western Allies, the US antiaircraft defenses of Antwerp offered ground support to Headquarters Port Area No. 3 in event of a break-through by the Germans. It was generally believed that one of the prime aims of the German counteroffensive was to isolate and then destroy the Port of Antwerp.

The Commanding General, 50th AAA Brigade, heading the American AA defenses of Antwerp, formulated a plan by which his AA troops could be utilized as Field Artillery and Infantry, in emergency and for a short time, as well as continuing their job as Antiaircraftsmen.

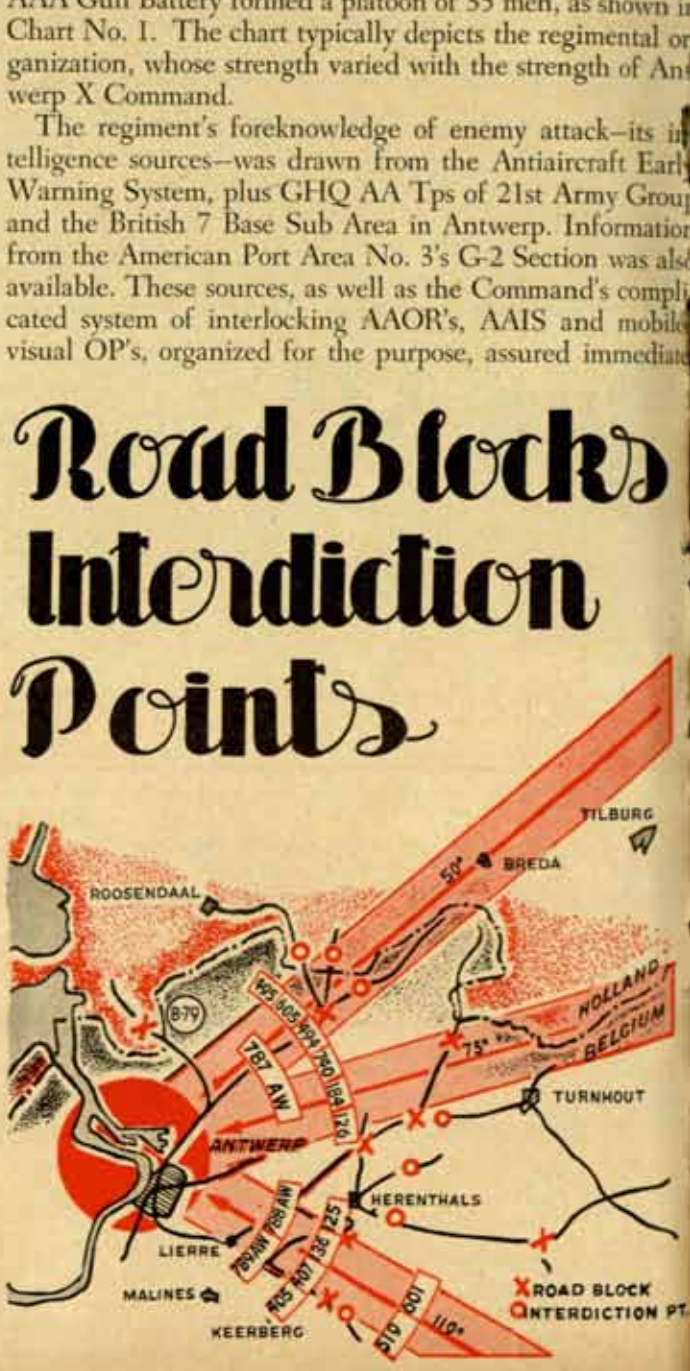
The purpose of this far-sighted and most ambitious plan was to delay, harass, or deny enemy troop movement by gunfire in the area occupied by AA troops and further, to meet the enemy as infantry using artillerymen, where they could be spared, cooks, bakers, clerks, and other non-killers 24 hours a day to maintain a holding action until relief in the form of a British or American mobile reserve could be committed from elsewhere along the front.

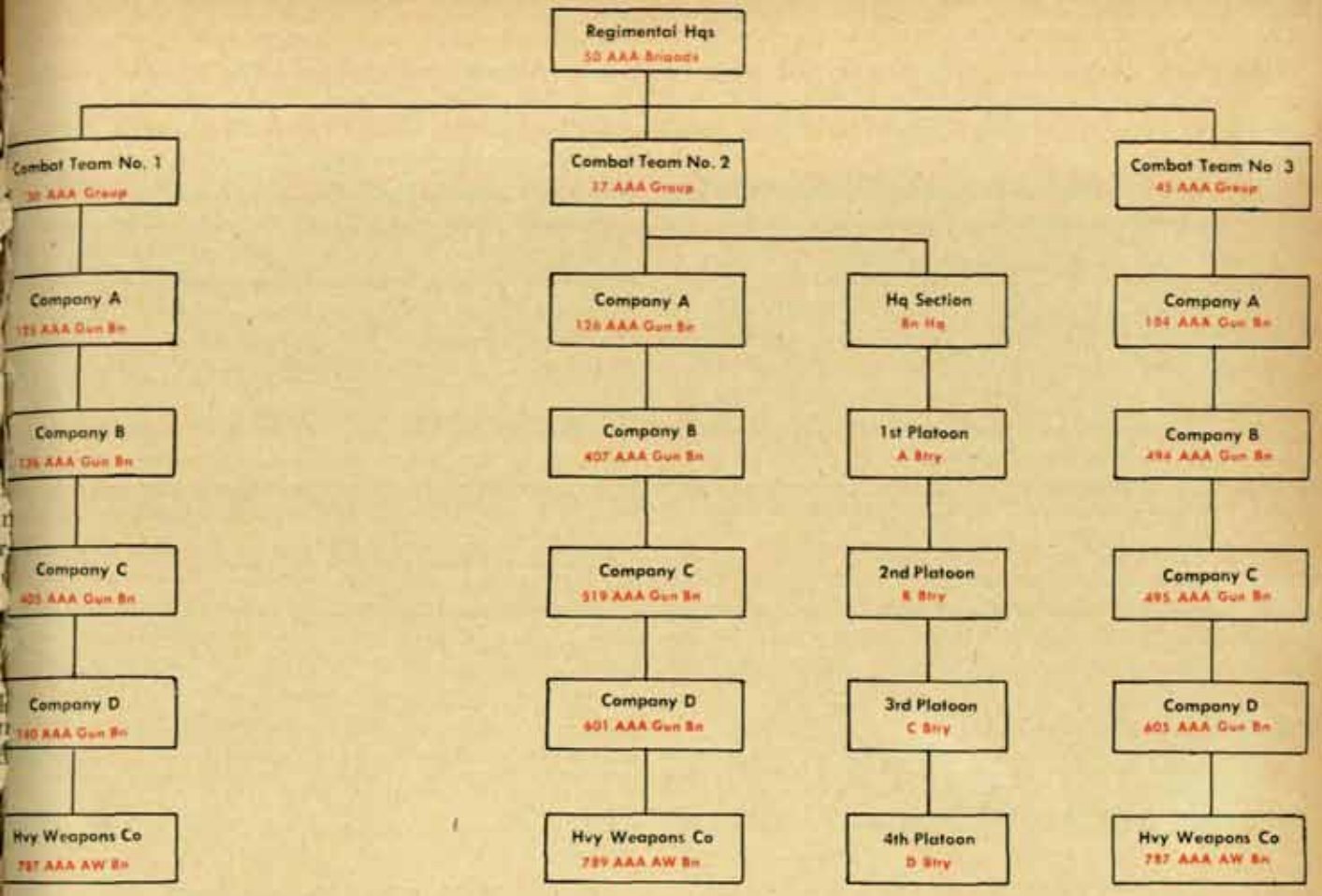
In order to accomplish a ground defense of the approaches to Antwerp, a document known as the "Ground Defense Plan, Antwerp X Command" was drawn up by the staff of the 50th AAA Brigade Hq. It included down to the last detail the manner in which the defense would be carried out, at the same time permitting continuous operation of the Command against its primary target, the Pilotless Aircraft, without interruption.

At once two main divisions of the General Plan were apparent--the first, Plan A, was a method of bringing fire to bear from antiaircraft tactical positions on road junctions, crossroads, bridges, defiles and various critical points. The second division--Plan B--called for the organization of task forces capable of meeting any threats by formations of enemy troops against the vital installations of the area. The same troops could not be used in both Plan A and Plan B because it was most likely that both plans would have to be used simultaneously under the title of Plan AB.

In general, Plan A necessitated no change in the normal control or organization. No movement of 90mm or 40mm guns was contemplated, as fire was to be brought to bear from the normal tactical disposition. However, Plan B obviously called for the reorganization of the AA personnel into infantry formations. A provisional regiment was set up consisting of as many combat teams as there were AAA Groups in the Command. Each combat team consisted of as many infantry companies as there were AAA Gun Ba talions in the Group, plus a heavy weapons company p combat team drawn from AW Battalions, and finally, eac AAA Gun Battery formed a platoon of 35 men, as shown i Chart No. 1. The chart typically depicts the regimental or ganization, whose strength varied with the strength of An werp X Command.

The regiment's foreknowledge of enemy attack--its in telligence sources--was drawn from the Antiaircraft Earl Warning System, plus GHQ AA Tps of 21st Army Grou and the British 7 Base Sub Area in Antwerp. Information from the American Port Area No. 3's G-2 Section was als available. These sources, as well as the Command's compli cated system of interlocking AAOR's, AAIS and mobile visual OP's, organized for the purpose, assured immediat





nd continuous information of enemy activity anywhere ithin the area to be defended—that was—the area from ntwerp North and East along the Albert Canal to Heren- 's, South to Aerschot, West through Keerbergen, Ma- nes, and back to Antwerp.

Intelligence as well as commands were to be communi- ated through normal early warning channels under the egis of 150th AAA Operations Detachment, supplemented, here possible, by wire to the provisional combat teams and dio where wire was impractical or impossible due to the uidity of the situation.

Inasmuch as the action to be taken by the infantry part f the Ground Defense Plan was to be of short duration, ecessary supplies were to be carried by the personnel and ransport taking the field. Emergency rations, POL, and mmunition for three days were available for instant use. esupply would come through normal AA channels, if ecessary. Exactly what each man would wear and carry on is person, as well as the exact amount to be loaded on the rucks, was stated and passed on to all concerned.

Frequent drills were held to insure the practicability of he plan and to perfect the training of the artillerymen urned doughboy in their new duties. Practice alerts were iven, inspectors went out to insure the proper execution f the plan and determine that the men involved had the ecessary equipment and knew their jobs. The first job as Plan A.

Plan A

In order to control the fire of the 90mm guns in their ground rôle of interdiction fire, the 150th AAA Operations Room was set up to function as a fire-control center. Battalions had their choice of operating Fire-Direction Centers or having their batteries prepare gridded fire-control maps and precalculate firing data to critical points within range of their guns.

Each battalion would receive its firing mission from the 150th AAA Opns. Room through normal early warning channels. So that firing could be "seen," each battalion organized a mobile spotting team equipped with a two-way radio to insure the battalion Fire-Direction Center knew how accurate was the fire.

A list of points to be brought under bombardment was given the battery, enabling the computation of data for all such points within range of the guns. However, only one primary target was assigned per battalion in order to bring the greatest amount of fire to bear on the most important places. See chart on page 8.

Upon reception of the alert, "registration" and "zero height of burst" fire problems were to be initiated, using the mobile spotting teams for sensings. Meteorological conditions for computation in these problems were to be sent to battalions through the AAA Opns Room from the Antwerp X Meteorological Section.

Further, Plan A called for each battalion to set up and defend a road block at a given point (see chart, page 8) utilizing sufficient bazookas, Molotov cocktails, machine guns and small arms, to do the job. Road block detachments were to be composed of squads generally organized as typical infantry squads. Battalion commanders fixed the number of squads in their detachments according to the number

of men and weapons needed to adequately defend the obstacle.

Plans for the demolition of bridges, et al., were prepared from a list of critical points selected by Headquarters, Antwerp X, but, only Hq, Antwerp X could authorize actual demolition.

The next and more difficult job to be undertaken was Plan B—a straight infantry rôle for the artillerymen.

Plan B

The Provisional Regimental Hq personnel headed by Colonel Harold P. Hennessy, Chief of Staff, Antwerp X Command, were drawn from the 50th AAA Brigade, Combat Team Hq personnel from the three Groups, and the Command Posts set up at Brigade and Group Headquarters. Neither the personnel nor installations of Hq 56th AAA Brigade were committed to any specific job, so that there was this complete establishment held in reserve for use, as necessary, in any emergency.

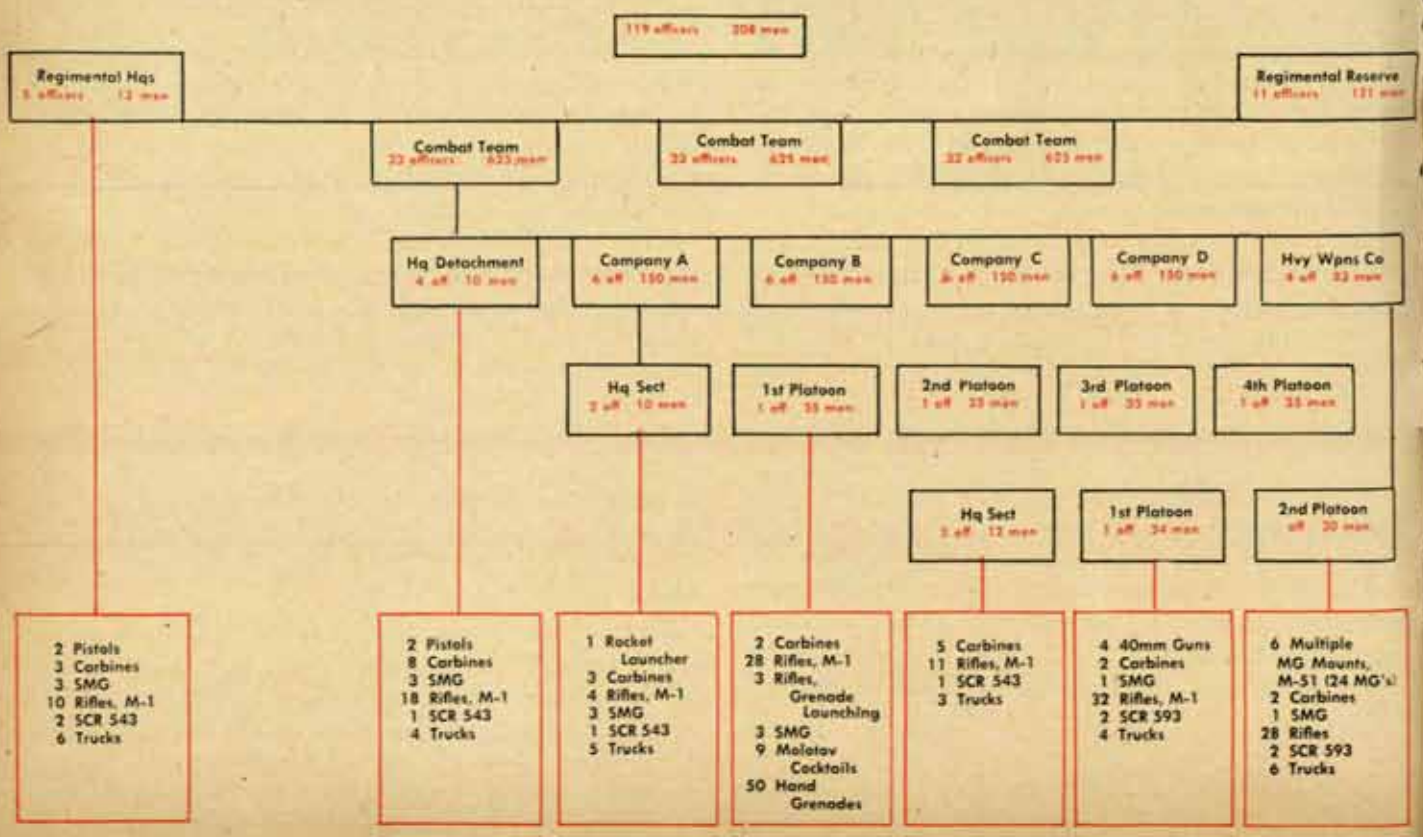
Each combat team, organized under a provisional Table of Organization and Equipment, was to be assigned one of several rendezvous points previously reconnoitered by the combat team commander, depending on the direction and type of enemy attack. The companies of combat teams were organized as shown in the chart.

Ultimately, the regiment was composed of 119 officers and 2,081 enlisted men, a force sufficiently large and well armed to give a good account of itself against anything the Hun could throw at it. Personnel were drawn from twelve AAA Gun battalions and two AAA AW battalions, besides the two brigades and three group headquarters mentioned above. They were organized in such a manner that privates served under their own NCO's and both served under their own officers, thus obviating the confusion inherent in a new organization.

From the chart, it is apparent that the lettered companies were designed to perform a straight infantry rôle, supplemented by a heavy weapons company equipped with anti-aircraft weapons, the 40mm Bofors automatic cannon and the M51 quadruple .50 cal. machine-gun mount, capable of giving them more than adequate support by infantry standards.

Because of the inherent strength of the regiment, its missions might have been legion and therefore, during the training drills many different problems were presented it. However, the most probable one in which the regiment would be employed was defense of the Port of Antwerp against paratroop or airborne attack.

The regimental staff went through this problem of defense. Troops arrived at the assigned rendezvous points. Road blocks were set up as scheduled; coördination of infantry deployment with artillery fire on critical points was practiced; mobile spotting teams took up their positions; routes of probable enemy approach were reconnoitered; time and space problems were solved—Antwerp X was ready.



Some Sidelights on Antwerp X

By Brigadier General George M. Badger, USA

EDITOR'S NOTE: *The extracts below are from an article General Badger submitted to the* JOURNAL *which duplicated portions of the story by Captain Dallmeyer. It is believed that additional light will be thrown on the operation at Antwerp by General Badger's comments. During the operation General Badger commanded the 56th AAA Brigade which consisted at different times of from two to three Groups of eight to ten battalions. This Brigade covered the sector of the defenses over which the greatest number of pilotless aircraft approached Antwerp.*

It was during a night in late November 1944. A heavy blanket of fog enveloped the flat countryside of northern Belgium. I was billeted on the second floor of an old chateau, or castle, as it is called by the natives. The building had formerly been occupied by German troops who had fled before the British some two months previous. It was the worse for wear. Downstairs was the AAOR furnishing early warning for the firing batteries which were deployed in a belt for the protection of Antwerp against the robot bomb.

My bed was a sleeping bag thrown upon a wooden bedstead which was in the room when the Americans had occupied the building. I awoke about three o'clock in the morning after rolling and tossing in my bed. It was deathly quiet outside. A chill and dampness permeated the atmosphere, lending an eerie feeling to the surroundings.

A clear strong voice broke the silence: "Diver two three dog two six able—Diver two three dog two six able."

Silence again reigned, only now it was emphasized. Nothing for perhaps thirty seconds, then "Diver two three charlie nine eight x-ray—Diver two three charlie nine eight x-ray."

There was no question about it. A robot bomb, flying on its deadly course, had been located by the early warning sources. Its location had been phoned to the plotters manning the operations board. Without a second's delay the information was announced by the teller to the firing batteries who were on twenty-four hour alert. It was the teller's voice which I had heard.

As I lay there, now fully awake and slightly tense, many thoughts raced through my mind. Would the batteries be alert? Would the horrible weather conditions interfere with the accuracy of fire? Where was the infernal machine headed? If we missed, what untold misery and damage would the missile cause? These questions, and many more, raced through my mind. The waiting seemed eternity. The eerie silence was perforated only by the clear steady voice of the teller announcing the flying bomb's onrushing course.

Suddenly a terrific roar burst forth. The angry guns were barking a challenge at the clever ingenuity of the Germans. Seconds later the bursting projectiles cracked loudly in the night air. Several batteries had now taken up the challenge and the ground and air shook in unison from the explosions. Beyond the din of firing I could plainly hear diver twenty-three puttering out its uncanny sound. The exhaust from its jet was sending out long flames in rapid succession and the noise resembled a loud, fast outboard motor, strangely traveling in the sky. It was coming nearer and nearer. Not only did the sound of the onrushing flying bomb come closer, but also the explosions of the projectiles were getting louder and louder as they chased their elusive target through the sky. Would the two ever meet in the thick wet fog that enshrouded everything?

Then, suddenly, a huge explosion. The building rocked upon its foundation; windows flew open; the bed lurched violently. There could be no mistake. Diver twenty-three had been killed in its tracks. Sounds of a few more exploding projectiles that were on the way before the target had been hit, and then deathly silence again. This time it was more omnipotent than ever before. After this strange and unreal battle between a pilotless aircraft and American antiaircraft gunners, it is little wonder that the new silence took on added power and authority. Modern warfare knows no limit to the ingenuity of the human mind. The human mind knows no limit in devising machines that will cause death and destruction. The American soldier and the excellent American equipment had answered the V-1—Hitler's overestimated secret weapon.

I turned over and went back to sleep.

* * *

The 80th British AA Brigade, commanded by Brigadier Deacon, first set up the defenses of Antwerp X; it had a light and two heavy regiments in position when the Americans first arrived in October. The 30th AAA Group, commanded by Colonel Ralph W. Russell, arrived in the Antwerp area on 23 October. At about the same time, the 407th, 740th, 125th and the 126th AAA Gun Battalions also arrived. The 56th AAA Brigade which I commanded was ordered to the Antwerp X defenses and arrived on 28 October, relieving the 80th British AA Brigade. During the next two weeks, the following American units arrived and were deployed: The 45th AAA Group, commanded by Colonel Ovid T. Forman; the 17th AAA Group, commanded by Colonel Carl R. Adams; the 22d AAA Group, commanded by Colonel Harold C. Mabbott; the 405th, 494th, 184th, 601st, 136th, 495th, 605th and 519th AAA Gun Battalions; and the 787th, 788th and 789th AAA Automatic Weapons Battalions. On 10 November, the 50th AAA Brigade, commanded by Brigadier General Clare H. Armstrong, arrived in the Antwerp area and assumed command of Antwerp X.

* * *

The supply of ammunition proved quite a problem at times. Due to the large amounts expended, 6,400 rounds daily average for February, it was difficult to keep the proper level on hand. On some occasions the supply ran dangerously low. Mixed lot numbers were another handicap. One battery commander once reported that he had fifty-six

IX Air Defense Command

A V-1, captured intact by AA gunners.

different lot numbers on hand. During February there was considerable old-type ammunition issued. This had a very great flash and loud report which interfered with the service of the piece. Men were blinded by the flash and several eardrums were ruptured due to the concussion of the blast.

* * *

The diver proved to be a worthy target for the antiaircraft gunners. Its ruggedness, small size, high speed and low altitude called for expert gunnery of the highest order. Its speed averaged about 350 miles per hour and the altitude averaged 3,000 feet, although some came over below 1,000. One was recorded at 14,000 feet, but it obviously had gone out of control. Many peculiar things happened when they were damaged. One was seen to circle four times before crashing. One had one-third of its wing torn off, but proceeded on its course. One was seen to turn almost over, after a projectile had burst under it, and then right itself and continue on. Several made the wildest gyrations after being hit—diving, banking and climbing before finally crashing to earth. Of course, danger always lurked when one was being engaged, as it was difficult to tell just where it would come down if it did not burst in the air.

The American antiaircraft units, as well as the British, stood up well during the gruelling test of five winter months of snow, ice, and mud, and under constant bombardment of Hitler's long-range vengeance weapons. Not only did the wounded fly bombs fall in close proximity to the firing batteries and various headquarters, but also the long-range stratosphere rockets (V-2's) frequently fell near by. Unfortunately, there were some fatal casualties as the result of these missiles, and many Purple Hearts were awarded. It was necessary for each battery constantly to man the equipment twenty-four hours each day, except for two hours allowed for maintenance. This required each battery to divide its personnel into reliefs which usually went on duty for twelve hours and off duty for twelve hours. The men at the guns remained in ready huts at the emplacements, subject to a moment's call. Even those who were off duty in their tents did not get much sleep, as the divers came over at any time, day or night. The constant roar of the guns, plus the danger of the falling bombs, did not create a situation that induced or promoted sleep. However, throughout the entire period morale was very high, practically no AWOL's, very few disciplinary cases, and a very low venereal rate.

Mention should be made of the personnel other than the antiaircraft men who were employed in Antwerp X. The medical detachments did exceptionally fine work in taking care of the health of the command. The sick rate was very low, notwithstanding the severe winter conditions. Not only did the medics look after the sick and wounded military personnel, but they aided the wounded and badly mangled civilian population whenever a bomb dropped into a near-by community. The 274th and 280th AA Ordnance Maintenance Companies did splendid work in keeping all ordnance matériel in an operating condition. They were considerably handicapped at times because of the scarcity of

spare parts and quantity of work for the means available. However, all the Ordnance personnel worked cheerfully during long hours in order to keep the guns firing. Other personnel, such as the postal service, finance section, and a detachment of the 32d Special Service Company of entertainers did well under the constant bombardment. The soldier and officer knew that he had an important job to do, and he did it well. Each member of the command of Antwerp X deserves the highest praise for his courage, fortitude and unceasing efforts to get the job done.

Not only did the stamina of the personnel get a thorough testing, but also the equipment received a thorough workout. It was necessary to put a fourth set of tubes on some of the guns. No set number of rounds was taken as a criterion for changing the tubes. Generally the lands near the forcing cone started to deteriorate between 1,500 and 2,000 rounds. When this occurred the tubes were promptly changed. Six breech rings blew off during this period. This usually occurred after about 100 rounds had been fired from a new tube. Considerable difficulty was experienced in maintenance of the M-7 power plants. This was particularly true until white gasoline was supplied. The fuse setters often wore loose and were difficult to keep in adjustment. Difficulty was experienced with some of the recoil systems after approximately 3,000 rounds had been fired from a mount.

All batteries were equipped with the M-9 directors. All of these were modified with proper potentiometer cards to provide the ballistic corrections as shown in FT 90AA-B-3. Some difficulty was experienced in adjusting the computer in a few cases after this modification was made.

The ordnance maintenance was of the highest order. All of the equipment held up well under the severe test of constant use and unfavorable weather conditions. It is believed the American gun equipment is superior to any antiaircraft equipment in the world.

The battery CP was usually set up near the computer. Future fuse range was taken from the computer. Thus the course of the target could be plotted and a decision made as to its engagement if it were approaching the vital area.

* * *

The story of Antwerp X would not be complete without mentioning the excellent spirit of coöperation and teamwork between the British and Americans. Frequently units of the two nations worked side by side. The British were most helpful in assisting the Americans in every way possible. Only the best of relations existed between the two armies during the entire period.

It may be of interest to record a few lessons learned during deployment of antidiver defense of Antwerp X.

1. Best form of defense is concentric belts about fifteen thousand yards apart.

2. Gun batteries should be about one thousand yards apart on these arcs.

3. Guns should not engage until target has a present position of 10,000 yards, thus giving a flak free zone and allowing computer output data to smooth before engaging.

4. Visual direction and angular height with radar slant range is the most accurate method of fire control, if visibility permits.

5. Volley fire (often erroneously referred to as salvo fire) proved more effective because of the elimination of dead time errors and helped eliminate personnel errors on fuse setting.

6. All fuses should be precut to three or five seconds to prevent ground bursts of improperly cut fuses.

7. Revetments saved many lives from explosion of bursting bombs.

8. At least four batteries on each belt should engage a single target.

Many more pages could be written on the experiences encountered in Antwerp X, but space in this article forbids. The antiaircraft troops received very little publicity (because of security reasons) during the actual battle, but the port personnel and the people of the city of Antwerp knew well the work they were doing. It is an important fact that all during this long-range bombardment not once did the port close because of the diver attack. It was only the antiaircraft artillery that kept off the fly bomb, as there were no fighter planes nor balloons used in the defenses. The men and the guns were there and they performed their mission well. All praise to General Clare H. Armstrong and his Antwerp X.

Antiaircraft Operations in the CBI Theater

By Lieutenant Colonel George A. Meigs, Coast Artillery Corps

EDITOR'S NOTE: *Colonel Meigs was AA Officer and Ground Defense Coördinator in the Upper Assam Valley during operations from fall of 1942 to June, 1944, and later commanding officer of an airborne machine-gun battalion during operations in Burma. He returned to this country in October of last year. This article is drawn from his personal experience and from operation reports.*

The Japs have had three excellent reasons for fighting in Burma: the country is a rich source of loot, it makes a good staging area for an invasion of India, and as long as they controlled Burma they could keep us from using the only practical supply route to China. Allied activity in the theater has centered around one tremendous project: to get supplies to China, whether by air or road.

The result has been a strange and intermittent war, shaped by weather and the terrain. During the large monsoon, from July to October, the country is a tropical mush. The "small" monsoon, April to June, is only slightly less torrential. Believe it or not, in a few areas of Assam and Burma, they get 600 inches of rain a year. In the Naga Hills, 250 inches is common. In most of the operational areas, 125 inches fell until we got down around Myitkyina where 80 inches was the rule. Farther south, however, a 600-inch area occurs again in the mountains around Tiddim.

"Crazy" is the only word to describe CBI weather. During the monsoon season railroads are washed out, roads disappear, your one pair of good shoes sprout long green whiskers and your tent rots over your head to let cascades of water through. The winters, on the other hand, are relatively dry, chill and dusty, with a northwest wind that whoops down off the Himalayas. The eternal prickly heat and malarial fevers give way to goose pimples and head colds. Instead of oceans of mud, your vehicles grind through chuck holes feet deep in dust, and a convoy is visible for miles in the clouds of dust it raises. Dust is everywhere, on the dried-out rice paddies, on the jungle growth lining the roads, in your eyes, your mouth, your food. And sometimes you wish the monsoon would come again.

But when the country dries out, and the everlasting battle of road blocks and broken bridges and air raids flares up again, each side trying to capture or wreck the communication lines of the other, then life becomes more interesting. You feel that at last you are accomplishing something.

It may be that this year the Japs will be expelled from Burma. Recently North Burma has been cleared of them, and the Ledo Road been pushed through to a junction with the old Burma Road, the route aptly rechristened after General Stilwell. Supplies are once more flowing to China by truck convoy, as well as over the Hump by air. The job is better than half done.

It has taken three long and arduous years to accomplish this, for the initial successes were all Japanese. In these operations American antiaircraft units have played a considerable part. It is their story which I propose to tell.

THE ASSAM PHASE

April of 1942 had seen the triumph of Jap ground forces in North Burma, and the famous fighting retreat of the Allies into Assam and India. It was realized that if we were to continue furnishing any of the sinews of war to China

NG FRONTS

hile the Japs were astride the Burma Road, it would have be by air. A construction program to provide the needed ransport airfields and fighter strips was inaugurated in the Upper Assam Valley, and these installations, of course, equired antiaircraft protection.

British forces in India originally had agreed to provide AA nd ground defenses for all airfields in India, wherever they ere threatened. However, there was a definite need for A machine guns, and it proved desirable to bring in our wn AA to provide further protection for U. S. installations.

In the summer of 1942, five airborne machine-gun batteries, trained at Fort Bliss, Texas, arrived in India and were assigned to Ground Forces, CBI. Two of them were ent on to Assam under the Tenth Air Force to bolster defenses of the two airfields then in operation. At the outset he AA defenses of each of these fields consisted of four British 3.7-inch guns, six British Bofors and the twelve caliber .50 machine guns of one American airborne battery. Ground defenses of air installations throughout Assam, ncidentally, were under American command.

Jap air activity up to the middle of September had been held to North Burma. At about that time, the first reconnaissance flights came over Assam, and intelligence warned of possible attacks on the two operational fields. The other three MG batteries were ordered up by air. However, they were not yet in position when the first attacks came on October 24, 25 and 27.

The enemy came in with bombers at 1,800 feet and fighters as top cover at 5,000. At this time there were few Allied fighters in the vicinity, and the local Tenth Air Force unit had only two pursuit planes in the air during these attacks. But the AA did very well. The two American MG batteries accounted for seven Japs destroyed and eleven damaged. Wrecks of seventeen enemy aircraft were later found in the Naga Hills, the work of British and American AA together. In the first raid, three Zeros attacked one MG position with three different MG crews working on them. The three enemy fighters were down with an expenditure of five chests of caliber .50 ammunition. All later attacks on airfields in Assam were from heights of never less than 20,000 feet. The Japs remembered their lesson.

Following this series of attacks, the Air Force units received additional P-40's which had been held at main base in India. Thus our fighter pilots and the British 3.7's had all the sport when the Japs did come over to bomb desultorily and not too effectively. However, we knew perfectly well that the only deterrent to a more active prosecution of the air war on their part was the presence of our weapons around each of the Assam airdromes as they were put into service. In February, 1943, four additional airborne MG batteries arrived in Assam, and were used to cover fields which had become operational, in conjunction with British 3.7's and Bofors. Two other batteries were retained in India. By spring many fighter strips and Air Transport Command bases were operating in the Upper Assam Valley, and all had AA protection, some of it exclusively British.

Meanwhile, the Ledo Road had been begun about January, 1943, by one battalion of U. S. aviation engineers and a combat engineer regiment. The whole year, in fact, was one of preparation for the return to Burma. The Chinese-American force (Merrill's Marauders being the American contingent) went into training in India in 1943. The British Fourteenth Army was being reorganized for the drive into Burma from the west.

Our own units were undergoing continual training. One officer per battery attended the British jungle warfare schools. Practical demonstrations of scouting and patrolling were conducted in jungle areas surrounding airfields, together with instruction in infantry combat tactics. British officers who had had experience with General Wingate in Burma gave lectures. We knew what lay ahead of us in Burma.

Upper Assam made a good training ground. While not as wild as North Burma—being moderately populated with tea gardens and rice paddies scattered up and down the valley—it is a remote part of the world. Lhasa, the Forbidden City of Tibet, lies among the Himalayas only 300 miles away. As a further indication of Assam's nature, a British tea planter once offered us the use of a piece of countryside for an airfield, adding as an afterthought that it had one possible drawback—we would have to look out for the wild elephants when taking off or landing.

Signal Corps

Fighting in Myitkyina.

Living conditions were not much better than those encountered later in Burma. As our tents rotted away in a matter of weeks and the ones we got from the British lasted hardly any longer, though three times as heavy, we early resorted to *bashas*. These were affairs made of bamboo, put together with reed lashings and thatched with buffalo grass. Inside they were lined with hessian cloth (burlap, to be less polite), and this kept many of the insects out. However, it was necessary to sleep under mosquito netting the year round. Assam and Burma are among the worst malarial regions in the world.

The temperature ranges from 31° in winter to 125° in summer, with the humidity high at all times. Prickly heat is a curse, some cases becoming infected and requiring hospitalization, or turning into impetigo. The natives know nothing of sanitation and seem to care less, thus all drinking water is chlorinated whether pronounced good or not —and frequently boiled as well.

There wasn't any question about the men being tough enough to take the rigors of the coming Burma campaign. They had had to be tough to survive Assam thus far.

The North Burma Phase

As 1944 approached the Allies knew the victory-flushed Japs, who thought themselves secure in North Burma, would almost certainly attempt to invade India. A dual operation was planned to meet the Jap attack, and to capture the Mogaung-Myitkyina line and exploit south and east to reopen the Burma Road.

The Japs started their drive as expected, up the Chindwin Valley to cut the railroad to Ledo at Dimapur. They by-passed Imphal and got up to the Kohima area before the British Fourteenth Army sent them staggering back into Burma with 50,000 dead and four divisions smashed or badly mauled.

In the north, meanwhile, with General Stilwell personally forcing the offensive, the Chinese and Merrill's Marauders were walking down the Ledo Road ahead of the engineers, subduing Jap strongholds one by one. Then they took off across country and outflanked Myitkyina—and the hard fighting really began.

The Ledo Road kept pace with the advance toward the planned junctions with the Burma Road, and in the wake of the road-building battalions came the airfield construction crews, hacking out strips which were islands of offense in the Burmese jungles. It is in this operation that American AA took part.

There was another, too. In October of 1943, we had flown two MG batteries into West China to cover the Mekong River area. These were used in 1944 for the Salween action, in which the Chinese drove south along the Burma Road from Yunnan Province, clearing out isolated Jap garrisons there. But we shall come to their activities later.

Actually, we have to go back into the fall of 1943 to get the full picture of AA in the Ledo River campaign, because the second American ground force combat troops in Burma behind the engineers but ahead of Merrill's Marauders, were men from an AA automatic weapons battalion.

By October, two semimobile AW battalions had arrived in Assam. One was used to cover the larger, more established airfields and release MG batteries badly needed for the lower 'dromes. The other battalion was stationed in the Ledo area covering concentrations of supplies along the road between Margherita and Lekhapani, a distance of fifteen miles. This huge supply area boasted a thin defense of British 3.7's as well. At this time, the Japs were hardly 100 miles away across the Naga Hills, and a successful raid could have wreaked irreparable damage. But they were at the end of their supply line as we were at the end of ours, and there was little either of us could do, metaphorically speaking, but sit there and glare at each other.

In November, a provisional MG battery of twelve guns was organized from personnel of this second AW battalion. The battery moved by truck to a point just inside the Burma border and walked down the Ledo Road to a point near Talang Ga, where it was thought we could establish an airdrome. This did not prove feasible, as the situation was still too fluid for anything of the sort, so the provisional battery walked back to an airfield under construction near the Jap lines. The minimum of equipment was dropped to them by parachute.

Christmas Day, 1943, one of the regularly constituted MG batteries departed by air from Assam for relief of the provisional battery. The airfield had been opened only two or three days previously, and no one knew what difficulties might be experienced in landing. However, all the C-47's got down without accident. This marked the beginning of AA support of offensive ground operations in North Burma.

In general, the AA mission there has been the protection of AAF airdromes and vital points along the Ledo Road, principally the fighter strips. Often Jap ground troops were to be encountered just beyond the perimeter of an AA defense, and there have been numerous brushes with snipers and patrols. Units from rear installations in Assam were leap-frogged to advanced airfields in Burma as they were needed, weapons and men usually being transported by air, vehicles and heavy equipment following down the Ledo Road.

Signal Corps

Myitkyina airstrip.

As typical an action as any occurred on the capture of Myitkyina Airfield in May, 1944. The fighting for this strategic communications center had been particularly bitter, and the Japs were hanging onto the field itself with grim determination. However, we had to have it in order that Allied ground forces operating in the northern Irrawaddy Valley could be adequately supplied by air-drop, as well as to force contact with the Burma Road beyond, and finally we took it.

Allied headquarters announced the capture of the airfield at 1500 hours. In accordance with prearranged plans the movement of airborne engineers and antiaircraft troops was begun immediately, and by 2015 the last plane load of AA machine guns, men and light equipment had arrived. The first plane, carrying the battery commander, four machine gunners, two guns, ammunition and extra gasoline for the jeep, overshot the runway and crashed in a gulley about 400 yards off the end of the field. No one was hurt, nor was any of the antiaircraft equipment damaged, but it was difficult to move it back onto the runway.

That was only one of the problems, however. No previous ground reconnaissance had been possible, all operations were carried out in darkness, there was but the one jeep with a trailer to shuttle the men and equipment to positions, and the field was still under fire from enemy snipers and mortars. Yet as 0100 hours all guns were emplaced and ready for action. After digging foxholes, the men not on guard attempted to get some rest.

Then, very early in the morning, the enemy broke through the perimeter defense and attacked the field. In the ensuing fight, one gun was damaged and put out of commission, with three men killed, and two members of the crew of another gun were wounded. So the AA defense was minus one weapon before the air attacks started. No more men had been brought than were absolutely necessary for the operation.

Three enemy fighters launched a dive-bombing and strafing attack in the afternoon. A fourth stayed high for top cover. They were greeted with a heavy concentration of caliber .50 fire, evidently quite a surprise to them. Two of the attacking planes were shot down, and the third was smoking heavily as it left. We lost one transport caught in landing approaches and set on fire, and three of the twenty-odd planes on the field were damaged somewhat by enemy machine-gun fire. AA casualties or damage: none. Ammunition expenditure: 1,500 rounds.

Subsequently, the Japs were considerably more circumspect in their air attacks on Myitkyina. As additional strips went into operation, more AA came in, and the heavy and accurate fire finally forced them to deliver most of the attacks at night, the favorite hours being predawn. These attacks were much less effective. A raid in November, 1944, is reported in which no damage was done except to some telephone lines, a 40mm revetment and an air mattress belonging to an Engineer officer, while we made claims of two planes damaged by 40mm fire and two by MG fire. About five enemy aircraft were involved.

Administration was always a difficult problem, even in Assam. The AA officer for the operational area was in charge of tactical disposition of all the widely scattered units and was held responsible for all functions, with additional AA continuing to come into the theater from time to time. This condition eventually became entirely too clumsy, and in June, 1944, an AAA Group was activated, its personnel coming from two deactivated MG batteries and an AW battalion. The remaining MG batteries were formed into airborne battalions of varying size, the composition of a battalion being determined by geographical location of its batteries. Seldom did a battalion have more than one of the batteries deployed within easy administrative reach, but at least the situation was not impossible.

At the time of the reorganization Group headquarters was in Assam, headquarters and the four batteries of one AW battalion were all in Assam, and headquarters and the four MG batteries of one of the airborne battalions were all in India. However, another AW battalion had one battery on the Burma Road at the Salween River in China, while headquarters and the other three batteries were in Assam;

Signal Corps

British troops man a Bofors at a drop near the Chindwin.

an airborne battalion had headquarters and four MG batteries in Burma with one left behind in Assam; two batteries of still another were on the Burma Road in China, while headquarters and the other batteries were in Assam, and so forth. Thus it will be seen that an ideal solution was not practicable.

In subsequent operations every effort has been made to keep the battalions as nearly consolidated as possible, so that each battalion commander can visit his units frequently with a minimum expenditure of time and gasoline, and so that radio communication will be as dependable as possible, but battalion control is occasionally difficult.

The China Phase

This assignment, in support of "Y"* Forces in West China, was very nearly the most rugged of the lot. The climate wasn't quite as foul as the Assam variety, but the terrain was like something out of a bad dream. Once a unit went into West China, it was cut off from normal contact with the rest of the world. All supplies had to be flown in, then trucked for the two days from the depot to the troops; all communications were by radio. And as radio performance anywhere in the region can only be described as freakish, communications were hardly dependable.

We had both 40mm guns and MG's with "Y" Forces. Both were used as ground support weapons, as well as AA. Possibly the adventures of the MG batteries were the most outlandish, if only for the reason that they could be lugged up and down mountains where it was impossible to take a forty.

Never did airborne AA feel more completely grounded. For moves, pack animals were employed as much as possible, but just as often shank's mare was called into play. On one occasion it took a day and a half to get four MG's, their crews and the necessary equipment up on top of a 1,500-foot "hill." Chinese soldiers provided the muscle to move the guns up. The trail appeared to climb the side of the hill at an angle of 90 degrees. So steep was the ascent that steps were cut into the hillside for 70 per cent of the trail. To make matters worse, it had been raining in typical monsoon fashion for five days and the mud was ankle deep.

However, the shooting was pretty good when they got up there—except when the clouds were so thick that they had to fire at shadows of Jap transports air-dropping supplies through the swirling mists to their besieged troops.

Another time, on another hill, it required sixty horses and mules and thirty coolies to pack up six guns, and supplies and equipment for eighteen men. The trail was fit only for mountain goats, and to add to the discomfort the Chinese guided some of the men in the wrong direction. But they got there eventually, despite the constant rain and exhausted gun crews.

In August and September, 1944, one MG battery in particular was kept busy in the Sungshan campaign, helping to clear the Burma Road of Jap resistance from the China side down as far as Lungling, so that supplies to the Chinese XI Group Army might be moved by truck. On numerous instances their caliber .50's supported charges by the Chinese troops, or repulsed Jap counterattacks. When weather permitted, various Jap installations were "strafed" by the machine guns.

With the aid of a 19½-power telescope, accurate fire control could be obtained by observing armor-piercing hits and/or incendiary bursts. Using this method, guns on the Kun Lung Po hills destroyed a combination rice depot and ammunition dump, and one other ammunition dump was blown up. On another occasion, harassing fire at *3,100 yards range* was placed on a Jap-occupied village with good effect.

On the afternoon of 7 September, the curtain fell on a complete Chinese victory in the Sungshan. Outside of twenty-five Japs who escaped, the entire garrison of over 2,000 was either dead or prisoner. The MG battery then set up to protect a Salween River bridge crossing.

Spread-beam searchlights have been used in conjunction with the automatic weapons in the interior of China. The lights have been valuable as homing beacons for lost pilots, also.

Early Warning in the CBI

Like Topsy, the warning system in the theater "just grew." The original stations, scattered in the Naga Hills between Assam and Burma, were laid out for the protection of the first Assam airfields by the fighter control squadron in the area. The stations were accessible by mountain trails only. Coolies were used to carry in the radio equipment. Supply was by parachute, and you only had to make one trip up to them to see why.

Early in 1943, Signal Corps personnel took over operation of the stations. As the number of fields to be protected increased, the system was naturally amplified. But not until November of that year were the signal units able to function with proper equipment. Yet the system was very efficient, even in the early days. Those boys were definitely on the ball.

Several factors precluded the establishment and operation of our own AAAIS. The peculiarities of the terrain in which we had to operate, the great distances involved, lack of equipment and sufficient personnel enforced de

*Now called the "Chinese Combat Command." It was a Chinese force, trained by Americans; it was used in the offensive against North Burma from the China side.

cendence on Air Forces facilities. However, radio nets emanating from the net control stations give adequate warning to all U. S. and British AA units, fifty minutes now as compared to fourteen minutes in the earlier days of defense. Very close liaison is maintained with fighter installations.

The area of operations of the Tenth Air Force is divided into air defense zones. For each of these zones, Signal Corps Aircraft Warning Battalions operate a filter room, from which the fighter controller can direct the interceptors. In each room an AA officer and one enlisted man are always on duty, the man being placed on a dais overlooking the board where all hostile or unidentified plane movements are plotted. He has telephone lines to such AA units as are within a few miles of the filter room, and an SCR-543 or SCR-188, over which the plotted positions are transmitted simultaneously direct to each battery in the air defense zone.

Each battery is also provided with an SCR-543, and with telephone lines from the location of this receiver to each gun position. These radios are also used for administrative purposes, permission first being obtained from the net control station to leave the net temporarily. Such messages are transmitted, of course, only during daylight hours when the threat of an air attack is practically nil.

As mentioned before, radio communication is definitely freakish. Quite good service has been obtained with the SCR-543 over airline distances (including mountain ranges) up to 450 miles. However, it is of interest to note that in one location, communication between two batteries with SCR-543 was limited to fourteen miles, while by contrast another battery about three miles beyond one of these just mentioned was able to communicate with units in China some 270 miles distant. Once a contact was made between an airborne battalion headquarters with an SCR-284 and Group headquarters with an SCR-543 over a distance of 388 miles.

Supply

Supply conditions have been variable, ranging from fair to bad. Short of supplies of every kind and description, the Assam installations were at first hard pressed to keep up maintenance of planes and rolling stock. In 1943 supplies from the Zone of the Interior began to come up in larger quantities. Current conditions in the various classes are improved, though Class II supplies are always scarce and difficult to get.

Airborne units under limited T/E's are most seriously handicapped, though all units suffer from lack of automotive and ordnance replacement parts. Gun parts for MG's are scarce, and for 40mm nonexistent. Each 40mm battalion was sent over with one extra gun which could be cannibalized, but that was the end of spare parts.

Organizational personnel must perform all echelons of maintenance possible with such facilities as are at hand, for lack of maintenance units. Sandbags were generally available in desired quantities, but other Class IV supplies were hardly to be had. Ammunition supply was satisfactory, though storage was difficult. Great care must be taken to keep caliber .50 ammunition chests dry; 40mm was kept in Navy chests which could be sealed with screwed locks.

The supply problem will always be critical in the CBI. It must be remembered that Burma is 13,000 airline miles from New York. Most supplies must come more than halfway around the world by boat, be freighted up the Brahmaputra River on barges or come up by rail from Calcutta to Ledo, and from there be trucked or flown to the using units. Otherwise it's air transport all the way.

History To Date

Recent events in the CBI are too well known to require detailed repetition here. The fighting for the Ledo-Burma, or Stilwell Road system is actually over. In January the first wheeled traffic in two and one-half years began moving overland from Assam through to China.

Now the British have taken Mandalay and are driving on south, and the Allied air forces (who have had complete air superiority for more than a year) are making life exceedingly uncomfortable for the enemy all the way to Rangoon. Rangoon will be taken by the time this article is published. In any case, it is certain that the Jap will never again be able to mount any sort of offensive in Burma.

Weather vs. Supply Lines*

"This is the ONE island in the Aleutians where the wind blows harder, the weather is colder, roads worse, soldiering is tougher, the snow drifts higher, and the sleet lashes more viciously than anywhere in the world." Every soldier who has served in the Alaskan Command, out in those bleak and barren Aleutian Islands, windswept and lonely, treeless and fog-soaked, will invariably claim that the island on which he was stationed was the toughest spot along the "Chain."

Although you hesitate to argue with men who have lived that lonely life for months and months without seeing any trace of civilization—each island is as bad as the next one. The "Williwaw," that sudden wind of hurricane intensity which is caused by the hot winds of the Japanese current meeting the cold blasts from the Bering Sea, stuns a man at first, and it never becomes an accepted condition. Sometimes this wind reaches a sustained velocity of 100 miles per hour, and many storms have torn away wind indicators which stopped registering at 150 miles per hour! Snow and sleet are accepted as a matter of course; but if the sun appears, men blink and rub their eyes and look in wonder at sun-cast shadows.

Probably the loneliest men in the Aleutians were the searchlight sections, scattered in out-of-the-way locations,

*Prepared by G-2 Section, AA Command.

atop mountains out on the narrow strips of land jutting into the Bering Sea, or on small islands, scattered all up and down the Aleutian chain. Supplying these sections was a difficult task when mere distance and transportation questions were involved; but when the weather turned bad, delivering rations and mail to these lonely men, and gas and oil and matériel for their lights, was a major problem.

Supplies were delivered, depending upon weather conditions, by truck, by boat, by tractor when the snow was too heavy for the trucks to break through—and on foot.

The roads near the camps were built of a fine volcanic ash, which made a good roadbed in summer, but which deteriorated rapidly from snow and freezing during the rest of the year. Many of the searchlight positions were from twenty-five to fifty miles from the main camps; and as they lay in different directions, it was impossible to have a regular "ration route." Each position had to have a separate ration truck. These trucks made a run from the Supply Section to the Searchlight Section and back about twice a week; and when the weather turned "bad," and trucks could not get through, then the slow and grinding journey was attempted by snow-plow tractor. When the *tractors* could not get through—which was often during the winter months—the searchlight sections had to depend upon their reserve rations to keep them going, but there was a limit, too, to the reserve rations, so every effort was made to sustain some sort of a regular schedule.

Imagine, if you can, taking a two-and-one-half-ton truck, loaded with rations, out across the volcanic roads and at the end of these roads (which usually stopped about a mile out of camp) making your way across a bleak white nightmare of tundra, with sudden snowstorms and clouds of fog, with blasting sleetstorms and bitter cold all along the way. Imagine potholes in the tundra which would drop your truck down upon its axles and leave you stranded perhaps thirty or forty miles from the nearest outpost—and you have some idea of the transportation problems involved insofar as supplying these searchlight sections. Add to these difficulties the ever-present chance that the Williwaw would strike, blind you with its intensity, drive your truck from the road, possibly turning it over, or at best stopping all movement, blast away your tarpaulins, and leave you shivering in your sleeping bag for three or four days waiting for the storm to subside, and it can be understood why some men who have lived under these conditions shudder whenever anyone mentions "The Aleutians."

Trucks have been lost for four and five days before tractor crews could finally reach them. These truck drivers were a rugged group of men, though; and when they were finally discovered, they usually had the situation well under control, and followed the tractor along to their eventual destination. One truck wandered away from the road during a Williwaw and was found by Navy search aircraft several days later, forty miles from the nearest road, with the driver and assistant driver living very comfortably. They had found a frozen caribou, built a fire, made a tent from a tarpaulin, and were living on caribou steaks and catching up on their sleep while waiting for a break in the weather. So the searchlight sections on the larger islands had the comforting thought that no matter how bad the weather came, either the truck or the tractors assigned to their section would eventually break through, with mail, and rations an supplies.

The searchlight positions on the smaller islands, isolate from their friends on the mainland sections, faced quit another situation. They depended on small Army boats t ferry their mail, rations and supplies to them; and if drivin a tractor or truck through the snows and sleets and sudde storms and perpetual fogs seems a difficult assignment, thei job was easy compared to the task facing the "Searchligh Navy." Some of these islands were a full day's trip fro the main supply depots; and the weather can change fift times a day, with each change usually for the worse! The supply boats ranged in size from thirty-foot open dories wit little cover to 100-foot barges and lighters; but the Aleutia weather had little respect for size, and the shores along th Chain are littered with the skeletons of large and small craf which were trying to get mail and supplies through to som isolated position.

For the most part, all of these craft were watched ove by the worrying eye of the Navy; but when the weathe turned bad, and fog closed in, and the Williwaw came screaming to life, all the Navy could do was to pray, and send out searching parties after the storm. If one of these ships were wrecked, the personnel and supplies were usually never seen again, for there are few beaches along the Chain, and jagged volcanic formations, rising sharply from the sea, offer little comfort to shipwrecked men, particularly when they are being lashed by snow and sleet and a Williwaw. On occasion, a barge would break away, and be presumed lost, only to be found several weeks later, and its crew intact and living a very comfortable life in some inlet or harbor. One supply barge which broke loose grounded in a small harbor, hidden away near an abandoned Aleut village; and when the crew were finally rescued, several weeks later, they resented their rescue! They had taken over the village, constructed a fine barracks for the six-man crew, and were living on caribou and the supplies which had landed with them, and were quite satisfied to remain there indefinitely!

The men who operated this complex supply line from the very end of the Aleutians on down to the Alaskan mainland were a faithful group who did their jobs well, and who lived a lifetime of experiences in their few months of work, and faced all emergencies with fortitude and common sense.

The searchlight positions which could not be reached by road or path or water—and there were many of them—had to depend on pack parties, which fought their way through storms, and up the sides of bleak and forbidding volcanic mountains, where the wind never died away completely, night or day, winter or summer, and where a misstep from what trails as did exist meant at best a bad fall, or the possibility of disappearing forever into the white hell of mountain crevices and caves.

Gas and oil were carried on backboard packs in 5-gallon containers, and other supplies, rations, mail were carried in small 35- and 50-pound packs. The roads reached as far as possible toward the foot of these mountains, and roads did exist farther on up; but since these roads were always snow covered, winter and summer, their use was naturally limited, and "foot parties" were the accepted rule.

Each set of supplies which came in on foot was im

portant, and quantities were kept to a minimum to save labor; but carrying up the bare necessities for operations was a full-time job, and virtually each man in the section had a self-taught course in mountain climbing.

Again the weather proved the greatest threat to the lives of these men, and to the equipment they had to carry. On a six-hour climb, for example, one might start at 0900 with a glimpse of the sun, and a warm breeze. Fine—but at 1015 a shrieking wind will flatten all the men against the nearest protection. Ropes are hurriedly strung and whatever shelter there is at hand gets immediate attention, for once over the edge of the path, or separated from the rest of the group, a man meets disaster. The snow and wind might cease at 1000, and prehaps a heavy fog will creep in from the sea, shrouding everything from sight, including the path at times. The snow turns to sleet, and backloads get heavier and heavier with each passing minute. Ropes are still used, for now the footing is treacherous and the going is tough.

At 1030 you break through the fog, and the slush starts to freeze. Perhaps the sun will break through for a few moments, just to give a sense of false encouragement—for ten minutes later the winds start to blow again. Up, up, up—you climb, wondering what the *next* weather will be.

While a halt is made for lun ' ou get your answer about the weather; for it is SOP that rain comes with lunch. By this time every man in the climbing party is soaked to the skin, both from exertion and the weather, and is wondering whether supply and rations are worth the effort.

It is axiomatic that a 5-gallon can of gasoline increases in weight five pounds per minute of climbing. After six hour of progress, the weight can be estimated roughly as several tons per can—according to the reports of the "Mountain Goat" detachment. At any rate, of all the methods of getting supplies and rations to these isolated searchlight positions, the most difficult was the climbing on foot, and these "Mountain Goats" were held in high esteem and affection by their luckier, if less rugged, companions at the top of the hill.

The matter of supplying isolated searchlight positions is, of course, of universal importance, for there are searchlights scattered on all the battlefronts where there are U. S. Army troops; but while there may be positions just as difficult to supply, and sections just as isolated as those in the Aleutians, there are none anywhere in the world which have climatic conditions such as those found on this isolated and barren chain of volcanic islands pointing toward Japan.

"C" Battery Fights to the Last Gun

By Lieutenant Conrad M. Fredin, Coast Artillery Corps

The 143d AAA Gun Battalion, assigned to European Theater of Operations, United States Army, had remained in the Communications Zone until 18 December, 1944, when it was attached to the First U. S. Army, and although the Battalion was slated to move forward into Army Area, the plans were changed because on 16 December, the German counteroffensive broke into the Ardennes. The Battalion was ordered to an intermediate position southeast of Aywdille, Belgium, and directed to go into antitank rôle on the evening of 18 December.

The following is the story of Battery C, of the 143d AAA Gun Battalion. It is to be remembered that none of the personnel had previously been in a combat zone. This firsthand account shows that during the initial heat of Von Rundstedt's December drive to form the "Belgian Bulge" officers and men of C Battery demonstrated their toughness and efficiency by knocking out five of the enemy's heaviest tanks, and constructing a vital road block to Spa and Liege.

During the last light of 18 December, Lt. Donald McGuire reconnoitered a suitable antitank position for Gun No. 1. The main road from LaGleize through Stoument runs almost due East-West, and as the road approaches the town it makes a turn to the North, which brings it directly into Stoument. On the turn it dips through a cut for about a quarter of a mile. After an appraisal of this terrain feature, Lt. McGuire ordered his gun into a position north of the road, commanding both the approach and detour of this vulnerable traffic channel.

In proceeding to position, the M-4 tractor and gun became mired in the ditch just above the bend in the road, and to retrieve the gun the M-4 was detached and placed a short distance up the side of the ditch, where the gun could be winched to it. At this time, small-arms fire which had been heard in the distance, began to whistle around the men at work.

They had never been under fire before, and were largely unbriefed on anything but the seriousness of the situation. In the excitement caused by the closeness of their first enemy fire, the crew neglected to disconnect the winch power take-off, and the gun was pulled up so tightly under the tractor that the two could not be separated.

Lieut. McGuire immediately ordered the tractor from Gun No. 2 to the assistance of Gun No. 1, with instructions that regardless of the condition of Gun No. 1, the rescue tractor was to return by 0600 the morning of the 19th of December.

Before the tractor from Gun No. 2 arrived it became clear that Gun No. 1 could not be separated without

Signal Corps

A Panther, taken at Grandmenil.

resorting to cutting or other special tools, and the tractor was returned to its gun, while the personnel of Gun No. 1 took up defensive positions to return enemy fire. Increasingly heavy German fire hit both entangled tractor and Gun No. 1, setting the M-4 tractor on fire. The crew completed the destruction of their gun and set up infantry defense near Gun No. 2, about 400 yards to the West.

At 0700, 19 December, the situation and weather were beclouded. It remained cold and visibility was very poor. It was still dark, and there was some fire to the southeast and west of them. Throughout the night the men had heard the roaring of motors and the movement of vehicles, and comparing these noises with the sounds of American vehicles, they soon learned to identify German vehicles.

"It's easy," Pfc. Seamon said. "The German tank motors —just like the Kraut airplane motors—run slower than ours, and they run kind of in spurts, the motor racing a while and then coasting along. While the tank's coasting you can really tell which is which; the Germans use metal tracks in which the blocks are bigger than they are in ours, big enough so they hit the road individually with a clanking 'boxey' sound. I don't think any of our tanks make this kind of noise."

The early morning darkness and fog was intense, and the crew of Gun No. 2 were almost entirely isolated by it from sight and sounds of near-by occurrences. The main road in the cut had been mined at a point about 300 yards east of where it swing north into Stoument, and Pvt. Geisinger, an AA outpost man near this mined area, heard something coming up the road—in his opinion, a German vehicle. This vehicle struck a mine within twenty-five yards of Pvt. Geisinger, and although it burned with a brilliant glare, the light penetrated the darkness but little, showing through the fog merely as a dull glow at 250 yards, and invisible from Gun No. 2.

At this time, both the infantry and the AA perceived men working in the predawn darkness with flashlights on the main road, ostensibly clearing a lane through the mines. Although small-arms fire continued to come toward them from the direction of the working men, they were allowed to complete their job, as it was known that some of our Sherman tanks were in Stoument, and it was assumed the flashlight workers were American Engineers clearing the way for our own attack.

By 0700 the men of Gun No. 2 realized that a mistake had been made. German tanks drove up the road past the mine field and began moving about the crossroads area at the southern outskirts of Stoument. If these tanks remained on the road, some of them must have come within fifty yards of the gun, undiscovered because of the fog and darkness.

Gun No. 2 was located about fifty yards from the junction of the main road where it swung northward with a subsidiary north-south road. Between this AA gun and th

junction, a towed 3-inch AT gun had been emplaced to cover the junction, and in the triangle where the roads met there was another 3-inch AT gun. At the crossroads the Infantry had made a large square house on the south side of the main road its strong point. Two M-51's of Battery C were scheduled to be emplaced, but had not yet arrived. Some engineers had occupied dug-in positions near the road junction, but during the night they were sent to another area.

In this situation, Gunner Cpl. Humphry organized his crew and prepared to fire Gun No. 2 at 0700 against a tank identified as German by its characteristic boxey, clanking sound, which had left the crossroads and was idling across the fifty-yard stretch toward him. The tank opened fire first, using both its machine gun and artillery pieces. The men in the gun pit were unable to determine the tank's target, and not until daylight did they find it—by the holes in their M-4 tractor.

Lt. McGuire, listening to the sound of the tank's firing, concluded that it was probably a Mark IV or other light tank, for the gun sounded as though it were a 75mm. Then this tank changed its direction to come directly toward the 3-inch gun between Gun No. 2 and the road junction. The 3-incher engaged the tank, which returned fire with all its weapons, driving the crew from their piece.

Only when this heavy action took place did Lt. McGuire and the AA gun crew realize that the enemy was not a light Mark IV, but a Mark VI Tiger, which apparently was undamaged by opposing fire, and came to within fifteen feet of the AT gun to destroy it by point-blank action.

In re-emphasizing the unfavorable conditions for AT action, it must be pointed out that although this vigorous fire took place within thirty yards of Gun No. 2, because of the fog and darkness, exact information had to be relayed to the gun pit from outpost men much closer to the scene.

For some reason still unknown, whether it was in search of time out, breakfast, or just waiting instructions, the German Mark VI Tiger, after its destruction of the AT guns, moved off farther into the fog, and remained stationary for twenty-five to thirty minutes. During this interval, Gun Commander Sgt. Sarnowski and his crew strained their eyes to make out the outlines of the target. Knowing their enemy was a Tiger, they wanted to be reasonably sure of a killing shot before revealing their position to his murderous return fire. However, before visibility improved, the tank moved on, and they had missed their chance.

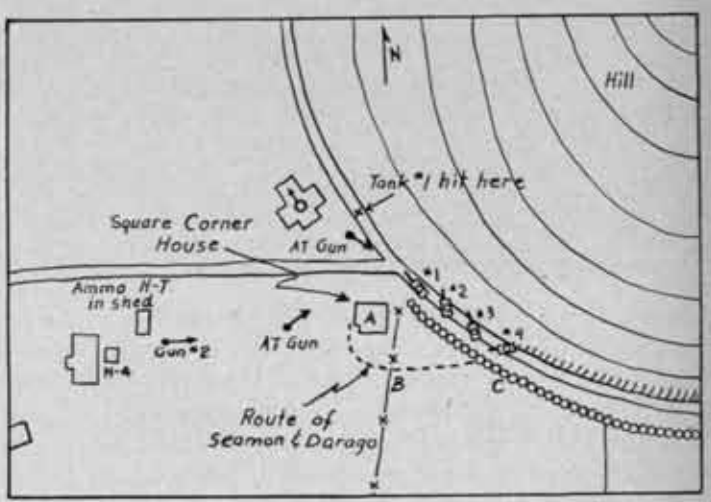
Shortly after the Mark VI had pulled away, an Infantry officer came down to the gun pit, and began talking to Sgt. Sarnowski about a volunteer to knock out a tank. All that Pfc. Roland Seamon heard of the conversation was the word "volunteer." "But" as Seamon said, "it sounded like some action, so I said I'd volunteer to go with him."

It developed that the lieutenant wanted two men as volunteers, and Pvt. Albert Darago put in his bid to go with Seamon. The officer explained to the two that there was a German tank sitting at the road junction just a few yards from the square house which he had made a strong point. He wanted this tank knocked out with bazookas, and although neither of his volunteers had ever even held such a weapon before, they said they were willing to try. They moved under small-arms fire coming their way, and through the fog, safely to the corner stronghold. So far, so good.

Inside the strong point house Seamon and Darago found they were in the company of at least ten infantrymen. Although this discovery was a surprise to the AA men, due to the nature of their mission, the simplest conclusion to reach was that their general antitank assignment peculiarly fitted them, in the mind of the Infantry lieutenant, for this particular knockout job, and he proceeded to explain to them that against a tank such as the Tiger Royal, it would do no good to strike with a bazooka anywhere but in the rear through the engine compartment. Handing the two tubes ready for action to Seamon and Darago, he told them tersely to "Go get the bastard."

With this short orientation, Seamon and Darago left the house to meet with a line of machine-gun fire that zipped and whistled on all sides.

The diagram below helps to explain their position.



They left the house (A), turned left, and crawling, circled under the thin fence (B) and up to the hedgerow. They saw what Darago called, "One helluva sight!"

Confronting them was no single German tank, but four—and all big ones—two Tiger Royals and two Mark V's. The one farthest on the left (No. 1) faced north up the main road. The two tanks immediately to their front, Nos. 2 and 3, Mark V's, faced east directly away from them. The one on their right, No. 4 tank, faced northwest, its 12-foot gun pointing straight toward them. Tanks Nos. 2 and 3 presented their broad rear ends to Seamon and Darago about 15 to 20 *feet* away, with the others lying 15 to 20 yards distant.

Faced with this bulk of armament, Seamon and Darago held a conference. What to do? Go ahead and fire, and draw the return fire of tank No. 4, which they could never knock out with a frontal shot, or go back and get some help? They were afraid their targets would move away while they crawled around gathering support, so they agreed to fire at once and take the consequences.

Darago said he'd take tank No. 2; Seamon took No. 3, so poking the bazooka snouts through the hedgerow, they aimed for the center of the engine compartments, and fired.

"Biggest goddam noise I ever heard," Seamon said. "Fire burst out in the rear of both tanks."

A moment later, tank No. 4 opened fire with its machine gun aimed at the smoke of the rocket propellant, but

Signal Corps

A Tiger Royal, stopped at Sterpigny.

the two men were out of the area and crawling back to the house—fast! Neither was hit, but both could think of a lot of places they had much rather be in. As an added spur to thoughts of other places, mortar shells began falling in the field as they went into the building comprising the Infantry stronghold.

Back inside, and feeling safe for the moment, they were told to reload and return to make sure of the kill. Seamon and Darago took this order with a terrific lack of enthusiasm, but said okay, they would go again . . . both feeling like the man who poked his head in the buzz saw to see how he'd just lost a finger there.

Back at their slots in the hedgerow they found their two victims burning pleasantly, and obediently put another round in each. German fire was directed toward them with doubled intensity the moment they fired, rattling in from straight ahead, and from both flanks. Clearing out hastily again, they managed to get halfway back to starting point without incident, when Seamon caught his pants on the barbed-wire fence. Tearing himself loose, and perforce abandoning the cumbersome bazookas, Seamon crawled with Darago over to the doorway of the "house" and announced two Mark V's definitely destroyed.

The two men continued their crawling along the entirely realistic "infiltration course" back to Gun No. 2, where they were pinned down about halfway across by enemy fire. Their tight pin-down was broken by covering small-arms fire over their heads from their gun section, toward the enemy, and a hand grenade thrown by Darago which silenced fire from the direction of the hedgerow, enabling them to scramble as far as the 3-inch AT gun knocked out at 0700.

Meanwhile things were getting hot around Gun No. While Seamon and Darago were out after what S Sarnowski thought was a single tank, the infantry beg moving back to the rear of their position.

"What are you planning to do?" Lt. McGuire asked a Infantry lieutenant.

"My orders are to hold," the lieutenant said, "but I' damn well going to have to pull back and reorganize order to do it."

Visibility steadily improved as the morning lengthene and there seemed to be a chance of getting a shot at a tan as the road junction was now seen from the gun positio With one man killed, and one wounded up to this tim Lt. McGuire placed his one "gunless crew" around th emplacement of Gun No. 2, intending to hold until h position was wholly untenable.

At about 0735 the outpost near the corner house calle back that a tank was moving out onto the road; this tan probably being the one referred to as the "No. 1 tank" de scribed in Seamon and Darago's assault, which supposedl moved down the road when they fired their second round into tanks Nos. 2 and 3.

While the outpost was still yelling information to th gun pit of the 90mm AA piece, the 3-inch AT gun em placed south of the road junction opened fire, sending in four or five rounds before being silenced by one shot from a Tiger 88. Later inspections showed that the 3-inch shells scooped fist-sized chunks out of the Tiger's frontal armor but failed to penetrate.

Straining to see clearly, Sgt. Sarnowski watched first the muzzle brake, then the gun barrel, and finally the body of a Tiger Royal emerge from behind the corner house. The traverse and elevation men took careful aim. . . . Gun No 2 opened fire.

The first round seemed to hit the tank well forward, in the general area of the left-front sprocket. The second round, a lucky shot, hit the barrel of the Royal's 88 about a yard out along its length from the mantlet. The 90mm shell (AP M-82), sheared the tube at this point and threw the remaining eight to ten feet of the barrel into a ditch. Four more rounds were fired as rapidly as possible.

"The escape hatches on the Royal flew open," Cpl. Humphry said, "and the crew just boiled out of that tank. The first man out, a little guy in black uniform and beret, got away from us and ducked into the brush, but the outpost men around the gun killed the rest as they spilled out."

"While they were jumping out to get shot," continued Humphry, "we fired one more round into the center of the tank. We figured it was already knocked out, but what the hell—one more for good measure." (Later examination showed that while the sprocket was bent, the track broken, and the gun sheared off by 90mm fire, the only hole through the armor of the beaten tank was made in the center by the 7th, the "what the hell," round.)

As soon as Gun No. 2 had disposed of the enemy Tiger Royal, First Sgt. John Davis left the emplacement position and made his way to the "square house," the centrally located structure that figures prominently in these encounters. His intention was to make a general reconnaissance of the area, spotting further hidden tank approaches

Signal Corps

A Mark IV, La Gleize.

possible. This trip he negotiated safely despite small-arms fire.

It seems pertinent to mention here that the numerous apparently casual references to "small-arms fire" in this history must not be minimized. The numbers of AA and infantrymen killed by such fire were such as to make small-arms fire anything but a minor nuisance, but since none of these men played a commanding part in the primary AT action, their names and deeds are omitted.

Special emphasis is placed on the fact that during these AT actions fire from several directions indicated that the Germans were steadily drawing closer in an encircling movement, and yet these untried men continued work in their first ground action, setting an example under harassing fire that any battle-hardened troops would have been proud to emulate.

Before Sgt. Davis completed his trip to the "house," under enemy small-arms fire, he was subjected to fire from U. S. .30 caliber machine guns across the road, manned by Germans. At the same time, further action interrupted his progress when the Tiger Royal tank designated as No. 4 in the sketch, fired one round of artillery into the house, and followed with a long burst of machine-gun fire. Those inside came out on the double, and ran west past Gun No. 2, while the tank turned and cut across an adjacent field.

Inside the battered house Sgt. Davis found a medic beyond help and dying, and an Infantry officer who had been severely wounded in the abdomen. He walked to the door and yelled for T/5 Kenenth Moore, a Battery medic, to come and help him. Moore and T/5 Jerry Harris crawled to him from near the gun position, and as Moore and Davis pulled the wounded man out of the house, Harris stood ready to cover their removal.

Moore sprinkled sulfa powder throughout the wounded area and wrapped a bandage around the officer's waist and hips to keep his intestines from falling out. Almost before Moore's first-aid work was finished, intense fire forced the three men to leave the spot in search of cover. They stopped for a moment en route.

"I don't think we can reach him now," Davis said looking back in the direction of the wounded officer.

Harris arose to try, but drew such a hail of fire he had to flatten immediately.

Moore said nothing, but he looked steadily toward the man he had just aided, and turned over a few estimations in his mind. Now, he noted, they seemed to be drawing fire from three directions, the heaviest from the same hedgerow that Seamon and Darago had used as a screen from which to discharge bazookas.

The officer groaned and tried to roll over. This was too much for Moore. Ignoring both the injunctions of Sgt. Davis and enemy fire, he crawled through a genuine "pin-down" hail to the officer, gave him an injection of morphine, and slipped a new bandage over his stomach wound. Rolling the man over on his side, Moore slipped in beside him so his patient's stomach was against the small of his back. Then, rolling back to a face-down position he was able to crawl with the lieutenant toward a point of safety.

As he painstakingly inched his wounded burden toward Gun No. 2 position, enemy slugs struck the ground directly in front of him, and his position was unenviable at best. However, with the help of a near-by infantryman who switched targets and lined his fire on the Germans trying to get Moore, besides the cover offered by Harris, who threw a hand grenade at the hedgerow, and Davis, who opened up with an M-1 toward the square house, the medic managed to move his man to Gun No. 2. There, Harris found a jeep in which he carried the wounded man out of Stoumont to the north.

Moore and Davis stayed at their gun position, where Lt. McGuire was, as he described it, "in a steadily worsening position." The Infantry was outnumbered and outgunned, and would have to fall back to better defenses. To heighten the "worsening" of events, a U. S. ammo-carrying half-track

parked only twenty feet from the gun pit had received a direct hit from a mortar shell, and the bursting ammo threatened at any minute to blow up his own ammo stored in the pit. Learning that Lt. Kent, Battery Commander of C Battery, had just come into Stoument, Lt. McGuire went out to give him the situation report.

Amidst all this pandemonium, Sgt. Sarnowski and Cpl. Humphry rallied their crew into the gun pit and prepared to fire on German tanks coming up the road. Others tried to extinguish the blazing half-track, which the Germans seemed to be using for an aiming point, but were driven back.

Several rounds of 90mm ammo in the gun pit were ignited, but by some miracle no one was hurt. Sgt. Sarnowski soon decided, however, that it was foolish to attempt a holding action with the added danger of a burning ammo pyre, so he destroyed his gun by rifle grenade and had the crew take up positions with the Infantry. In proof of his good and timely judgment, the ammunition in the gun pit blew up shortly after they had vacated.

Meanwhile Lt. McGuire had located Battery Commander Kent and had given him a report of the situation. Lt. Kent instructed Lt. McGuire to continue his Infantry defense, and he, in turn, left immediately for Halt, six miles up the road, to bring another 90mm gun into Stoument.

With their small-arms ammunition running low, the AA personnel took up positions between K and L companies of the 119th Infantry and delivered fire against the enemy whenever they saw him. The battalion commander of the Infantry in the area cited the fighting example of these men as an inspiration to his own troops.

Shortly after the AA men had taken up their Infantry defense positions, a Tiger Royal tank was observed moving up along their right flank. The tank was firing a round of 88 and a burst of machine-gun fire into each house as it moved up the road.

Lt. McGuire helplessly watched the tank moving up. Even if he had the bazookas left behind near the square house at the road junction, there was no ammunition for them. Receiving news that there was a Sherman tank in the graveyard at the southern end of the town, his investigation of this report in hope of obtaining support fire revealed the supposed Sherman was another Tiger moving against them!

Seeking feverishly for yet another means of heavy assault fire, Lt. McGuire, with the aid of Sgt. Davis, Cpl. Guigar, and Pfc. Fidram, found an abandoned German 76mm gun, which they attempted to man, but before they could get the piece in operation, were driven off by enemy machine-gun fire which splattered off the piece as they worked.

From a safer vantage point the three watched as the Tiger, coming at them from the east, smashed through a cowshed and fired point-blank into a brick farmhouse. Smoke and dust billowed from every room in the building, and Sgt. Davis said he didn't see how anyone in the place could remain alive.

Just prior to this incident, Sgt. Davis had become separated from Moore, the medic, and found out later that he had been in the brick farmhouse shattered by the Tiger Royal.

Moore had heard someone call out that he was wounded from inside the building, and on investigating found a m in the basement who had been wounded in the hip, thig and forearm. The victim was an Infantry officer, and was in severe pain.

"Can you walk?" Moore asked him.

"I'm afraid not," the lieutenant said. "I tried but ju couldn't make it."

"Okay, sir," Moore said, "take it easy and I'll see what can do for you."

He bandaged the wounds and carried the lieutenant u the stairs. When he reached the ground floor, Moore hea a grinding crash from a point just outside the house. A se ond later there came a terrific blast as an 88 shell blew the side of the building.

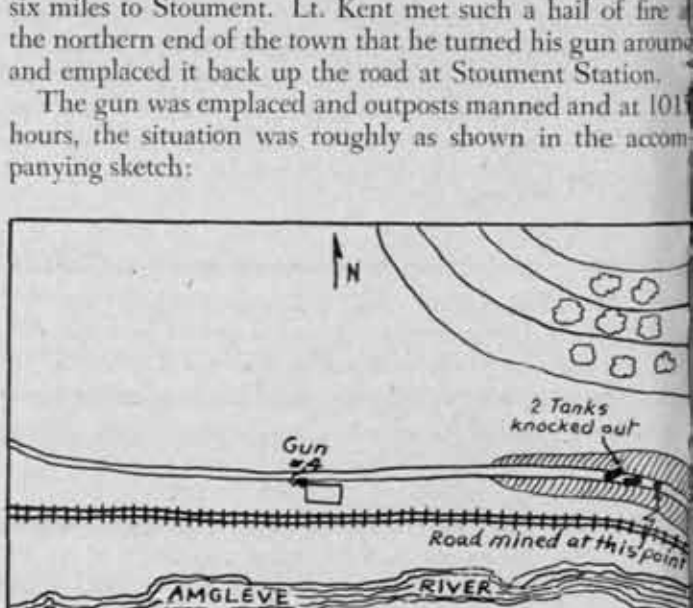
Moore was knocked flat, but recovered in a moment an looked to see if his crippled patient was all right. Th lieutenant had gone.

"Damndest thing ever," Moore said later. "He said h couldn't walk at all, but a second after that shell hit he wa tearing down the street so fast I never did catch him." Moore had tried, too. He chased his charge vigorously fo about a hundred yards, but was clearly outclassed.

By now, the enemy was obviously taking possession o Stoument, and the main road out of town to Stoument Sta tion was under fire. Two men of C Battery were wounde trying to move down this road, so most of the two gu crews, led by Lt. McGuire, and some individually, move north behind a protecting ridge before going on west to ward Stoument Station.

While the men of the destroyed Guns Nos. 1 and were trying to get out of Stoument, Lt. Kent, Battery Com mander, was trying to get into the town with another 90m gun which he had found at Halt, and had march ordere six miles to Stoument. Lt. Kent met such a hail of fire a the northern end of the town that he turned his gun aroun and emplaced it back up the road at Stoument Station.

The gun was emplaced and outposts manned and at 101 hours, the situation was roughly as shown in the accom panying sketch:



Lt. Kent's new gun was placed close to the northwes corner of the railroad station building, so sited as to cove a bend in the road about 450 yards to the east of the station Just around this road bend, someone had hastily laid a strin of mines, of which the gun crew was unaware.

At 1045 an American Sherman tank came up the road, skirted the road corner wide to avoid the mines, and pulled into position, with its gun facing the turn in the road. The new arrival was decidedly unwelcome because the commander chose to park it about twenty feet ahead of Lt. Kent's Gun No. 4, almost obscuring the field of fire.

About 800 yards behind the Sherman in space and two minutes behind it in time, a German Tiger Royal tank came to the fateful road bend. Like the Sherman, this tank swung knowingly wide around the corner to avoid the mines.

Gun No. 4 fired one round just as the tank came around the corner. Almost immediately after this round had left the muzzle of the 90mm, the Sherman parked to its front, pulled out to the left, necessitating the holding of No. 4's fire while the tank turned on the road to get out of the way.

The German, under no such disadvantage, opened fire at once with two rounds directed at Gun No. 4. The first passed within whispering distance close over the heads of the crew. The second hit the corner of the station building about five feet from the gun and threw masonry and dust over both gun and crew.

As soon as the obstacle of the Sherman was removed, Gun No. 4 fired nine more rounds—a total of ten—at this tank. One round (probably the first) missed. One hit the jutting "V" at the exact point where the upper and lower frontal plates joined, and penetrated to the inside. Three rounds hit the upper frontal plate and dug through 3½ or 4 inches of armor, an excellent job of digging, but ineffective since the upper frontal was seven inches thick.

The rounds that hit the lower frontal plate did the job. They went through the armor and splattered throughout the interior compartment, killing all the crew but one, who was later killed by an outpost as he tried to leave his vehicle.

The men servicing Gun No. 4 were so busy with their job of knocking out their German tank that they failed to note two other dangers threatening them. A German half-track was moving up along the railroad tracks toward the station building to outflank them, and on the heights across the Ambleve River, unoccupied by the enemy at 1015, machine guns were now set up, spraying the station area.

Alert outposts spotted the half-track, engaged it with rifle and machine-gun fire, stopped it and killed or dispersed the crew. The machine-gun fire from the heights was a more serious matter, and it was fortunate that this fire was delivered with more fury than accuracy. The M-4 tractor behind the gun was struck several times with little damage, and the station building spouted dust from many places, but gun crew and outposts were unharmed.

The gun crew was about to turn its attention to the hill-top enemy when a second Tiger Royal tank came around the corner in the road where the first had been stopped. It was engaged immediately and had no chance to return fire. Eight rounds were fired, some knocking off the tread, and others penetrating the lower frontal armor. The crew of the tank was killed, some in the tank, and others as they tried to escape.

The destruction of this second German tank occurred at an extremely fortunate spot. The road through the cut at this point was flanked by heavy woods on both sides, forcing any vehicle the size of a Tiger to move straight up the road. The first tank Gun No. 4 had demolished, blocked the right-hand side of the road, and the second was hit just as it maneuvered around the first. The two big tanks lying, knocked out and dormant, side by side, formed a road block as effective as though carefully planned and executed. No other German tanks penetrated beyond this point, blessed for the AA men by a remarkable combination of skill and luck.

During the gun crew's engagement with the German tanks, enemy fire from across the Ambleve River had grown so heavy that Lt. Kent decided to withdraw his men from the gun to better infantry positions. The gun was demolished, the crew evacuating up the road via M-4 tractor and jeep.

C Battery, after his road block action, was reduced to a one-gun outfit, but they had done their job well. In the first ground action of their unit they knocked out five of the enemy's heaviest tanks, and killed many of the enemy. None of the men had shirked his duty, and several had conducted themselves with conspicuous bravery and ingenuity.

Instructed to hold, the men of C Battery had held, using every means and ruse at their disposal, and fighting down to their last gun, had played a vital part in stopping what easily might have been a successful penetration to important communications and supply centers.

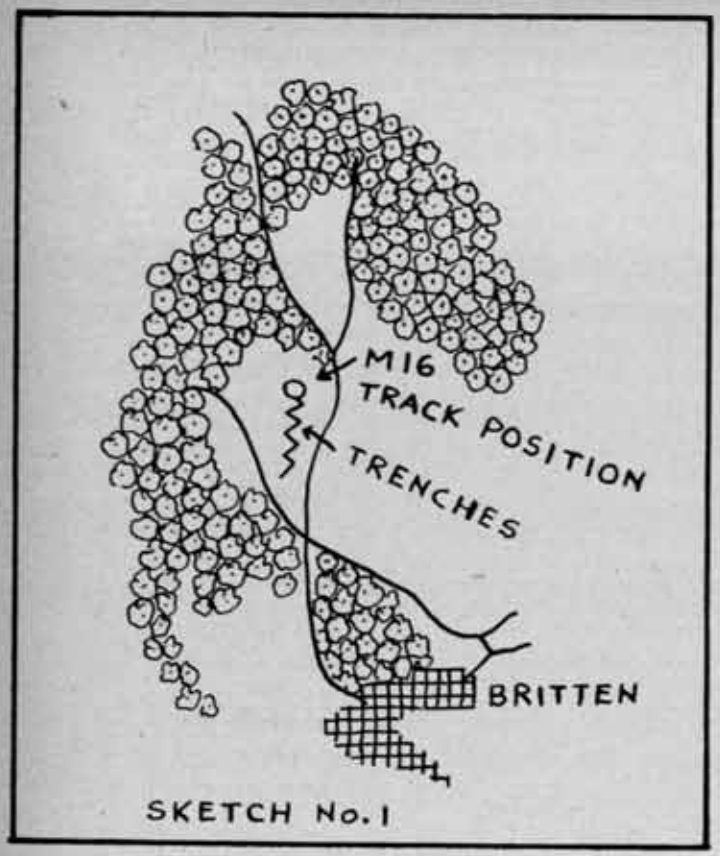
Ground Fire Mission with Task Force "D"*

By Lieutenant Frank E. Solomon, Coast Artillery Corps

Task Force "D" started to roll at dawn 15 March 1945, and had proceeded approximately 2,500 yards south to the edge of a woods where it encountered enemy machine-gun fire from prepared trenches running parallel to the road between Ober-Zerf, Germany. (See Sketch 1.)

The trenches were approximately twenty-five yards from the road. They were dug in a zigzag manner for approximately 100 yards. The platoon commander ordered another

*From an official report to the C.O., 390th AAA AW Bn.



SKETCH No. 1

SKETCH No. 2

M16 half-track that had been in reserve about 100 yards north in the edge of the woods to come into line and begin firing. The first M16 withdrew into the woods as the second M16 began firing. After approximately 800 rounds, cease fire was given and the Germans were ordered to surrender. Approximately fifteen did surrender. The enemy that had not surrendered were seen in the trenches and the platoon commander gave the order to fire again. This time approximately 500 rounds were expended and when the order to surrender was given again, twelve more prisoners came forth.

Upon inspection of the trench it was found that four of the enemy had been killed by our fire, and three were wounded.

The only enemy fire encountered was small-arms fire from the right and to the north.

Ground Firing at 0820, 16 March 1945

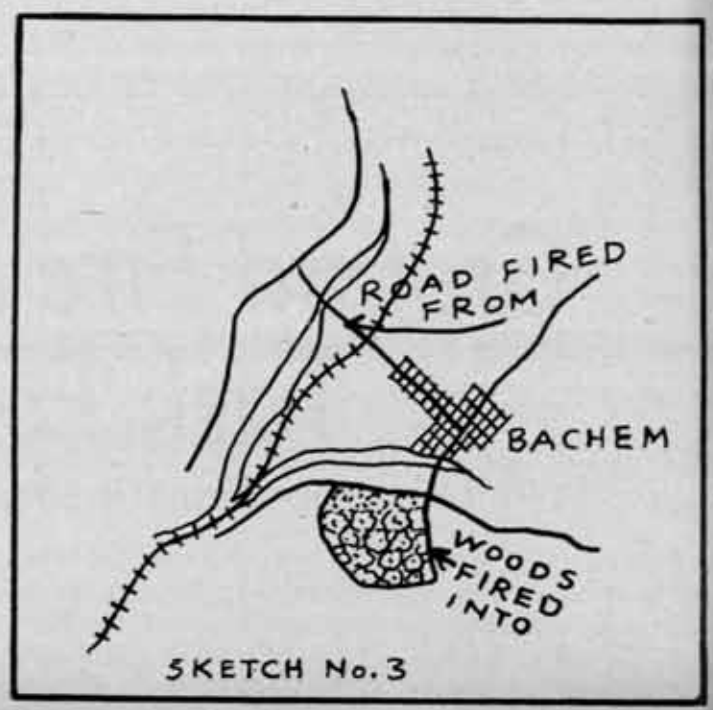
At 0820 hours, 16 March 1945 three sections of AA half-tracks alternately fired into the woods north of Britton, Germany. (See Sketch 2.) The fire was delivered from approximately 1,200 yards range and in preparation of the infantry attack on the town of Britton. One half-track section, consisting of one M15 and one M16, was always in position firing. When a section had fired approximately 1,000 rounds another section was ordered up to the line to relieve that section. In this manner a continuous stream of fire was always going into the woods. Prior to firing, visual and map reconnaissance was made by the platoon leader. The effects of the fire were very good, and the advancing Infantry of the Task Force captured about 300 Germans and approximately 100 were counted dead. It may be noted that the fire of the 37mm guns was almost as effective. Fragments were very deadly as the rounds were bursting approximately head high.

Our Infantry officers reported the automatic weapons fire to be the most demoralizing upon the enemy.

The only enemy fire encountered from these positions was several rounds of AT fire that had no effect. Approximately 3,000 rounds of .50 caliber ammunition and sixty rounds of 37mm was expended in this action.

Ground Firing at 1900, 16 March 1945

At 1800 hours, 16 March 1945 Task Force "D" was



SKETCH No. 3

held up by intensive small-arms and AT fire. (See Sketch 3.) Several enemy prisoners were interrogated and it was learned that several enemy field pieces and machine guns were located in the woods to the south of Bachem, Germany, the Task Force's next objective. With two sections of AA leading, the Task Force made a dash for Bachem. On the highway running southeast into Bachem the two sections of AA opened fire on the woods to the right expending approximately 1,500 rounds of .50 caliber ammunition and twenty rounds of 37mm. All fire was controlled by the platoon commander, in the lead vehicle, an M16 equipped with SCR-528. All firing was delivered while on the move in convoy. No enemy fire was encountered by the Task Force.

Later intelligence proved that the AA fire had killed six of the enemy and approximately the same number were wounded. Also twenty-five prisoners were taken from the area fired upon by the AA half-tracks.

Triple-Threat Troops

By Captain A. E. Martin, Coast Artillery Corps

Adaptable, versatile and useful, partly describe the self-propelled automatic weapons and their steadfast gun crews of the U. S. Third Infantry Division's supporting antiaircraft battalion, the 441st AAA AW Bn. In addition to the primary mission of antiaircraft protection, two new jobs received much of this battalion's attention during the last quarter of 1944. These activities consist of super-light artillery for harassing and interdictory missions and close up direct fire support for the front-line Infantry. Thereby AA troops have developed a three-phase threat to the enemy.

Such a variety of tasks for any single unit has not been heard of frequently and was probably omitted intentionally from the manuals on training and tactics, because it sounds screwy. Yet it works!

Reasons for Broadening the Tactical Field

For several months the *Luftwaffe* had almost failed to put in an appearance anywhere within range of the automatic weapons in the Third Division Sector and the antiaircraft gun crews wearied of continuous alert and watchfulness with no chance to shoot save an occasional few rounds for the test firing of their weapons. The Third Infantry Division Artillery with attached Field Artillery Battalions was getting AA protection and many bridges and other vital points within the Division Area were defended, but mostly against a *Luftwaffe* threat that was not even the least bit interesting.

Now you don't need to be strong in arithmetic to figure out that a weapon such as an M-16 half-track mounting quadruple .50 Cal. M.Gs. has tremendous fire power as well as good mobility. That is also true of the M-15, the half-track that looks like an overgrown coal truck, but carries a 37mm automatic cannon and twin M.Gs. Cal. .50 in its thinly armored turret. Why should 64 such weapons be idle? Why should 500 well trained gunners watch faithfully and hopefully for weeks on end with nothing to fire upon? True enough, the antiaircraft battalion was doing what it was supposed to do, yet these vehicles consumed thousands of gallons of gasoline and these men ate thousands of rations each month with no Kraut losses to balance the ledger.

Deficiencies of AA Half-Track Equipment for Ground Fire Missions

Experience of more than a year of campaigning through Sicily, Italy and Southern France had taught the drivers the limitations of the AA half-tracks. Mud and swampy ground have proved more of a handicap for them than for some of the other Army vehicles. This was due to the weight of the AA half-tracks, nine to eleven tons, without gun crews.

Shell fragments had often penetrated the ¼-inch armor plate and the high silhouette, about 8½ feet, certainly presented difficulties for camouflaging, therefore the AA half-track was recognized as extremely vulnerable.

There had been no sighting device issued as part of the half-track equipment that could be used for measuring of angles of azimuth or elevation.

Adopting the Set-Up to Make the Change

At Remiremont, in the foothills of the Vosges Mountains, in Eastern France, on October 1, 1944, Major General "Snapper Jack" O'Daniel put into effect with his 3d Division RCT's, the plan that had been developed by his AAA battalion. (The 441st has been identified with the boys of the "Blue and White" patch since Salerno.) The system provided for one AA battery to support each RCT and the fourth battery to protect the medium F.A. Bn. and the Division Artillery Airstrip (Cub Field). In each Regimental Combat Team the AA battery C.P. with 10 half-tracks remained in the ack-ack rôle with the 105mm F.A. Bn., and one gun section supported each Infantry Battalion for such ground missions as might be presented by the enemy. An AA Officer in charge of each gun section (one M-15 and one M-16), supporting each Infantry battalion, was given the responsibility for the commitment of the AA weapons on the ground missions.

Infantry Officers immediately recognized the fire power of the M-16 with its four .50 Cal. M.Gs. because on several occasions they had been subjected to similar fire from enemy weapons called "Flak-Wagons." Because of the vulnerability of both M-16's and M-15's, constant caution and careful judgment in their use and movement had to be

exercised in the areas of the Infantry front lines. The AA officers maintained close liaison with all parts of the supported Infantry battalions including the Tank and TD platoons, AT elements, company outposts and patrols. This was important at all times, but especially when ground fire missions were in the offing.

For special missions such as convoying truck marches of the Infantry or when added fire power might be needed to provide cover for a river crossing, or in certain defensive missions, the AA Officer with the Infantry Battalion requested additional half-tracks from his Battery Commander or through AA battalion headquarters when more than one RCT was affected.

Normally the AA battery received rations and gasoline through the F.A. battalion to which it was attached and made distribution to the forward sections with its own transportation. Sometimes, due to tactical circumstances, it was necessary for the forward units to be supplied with these items through the Infantry channels. The AA Battalion ammunition detail stripped the tracer rounds from the .50 cal. belts for weapons firing ground missions. This procedure was necessary for two reasons; 1) tracers disclosed firing positions and; 2) tracer rounds fell short after the burn-out point and endangered friendly troops. The ammo was delivered to the forward units by the AA battery concerned.

How AA Weapons Were Used

During the last three months of 1944 the Infantry-supporting half-tracks fired, on the average, slightly more than one ground mission per day. In addition they reinforced many road blocks, protected the flanks of spearhead companies, or served as strong points in a defensive line when no firing was done. Casualties for this period were few and slight; one M-15 was damaged when an enemy mortar round landed squarely in the cab and one M-16 was salvaged after hitting a ramp mine.

When AA weapons were in the forward Infantry area, their usefulness as AA defense was practically non-existent. Essential concealment and removal of tracer rounds from the ammo belts were important factors. Double security guard and the fact that most all movements as well as indirect fire missions were accomplished during the hours of darkness, made daylight rest for the crews necessary. However, on one occasion the forward crews gave a radio flash warning that helped gunners with the F.A. Bn. bring down an ME-109 in the area between St. Die and Bruyeres, France.

To make a success of close Infantry support the AA officers had to find work for their weapons. Perhaps more crews and vehicles could have been supervised by one officer, but to date experience has indicated little need for more than six half-tracks per regiment. Reconnaissance of roads and firing positions, the concealment of men and equipment, the close liaison with each Infantry battalion and study of the local situation kept these AA Officers plenty busy, with only the two half-tracks for each officer to supervise.

Light Ack-Ack weapons were not equipped with sights that were adaptable for laying guns in either azimuth or elevation. The old method of compass and gunner's quadrant with improvised luminous aiming stakes lined up with the target in daylight, or if a masked target, by map da was put into use. Range tables gave fairly accurate Q and since the best effect with .50 cal. M.G. fire for inte diction or harassing the enemy was obtained by spraying o "hosing" an area, the azimuth angle did not need to b especially accurate. The 37mm H.E. gave good effect i timber or brush covered areas when the range was not i excess of 3,500 yards (the normal range for self-destructio of this ammunition). Armor-piercing 37mm shells wer occasionally mixed in the clips at a ratio of 1 to 3 if it wa learned that enemy vehicles were probably parked in th wooded area that was selected for a target.

The AA Officer with each gun section had a jeep with radio of the same breed as that mounted on each of his half tracks. Frequently it was possible to direct fire by radi from the jeep, on targets that could not be seen from th guns. Bursts of 37mm were easily visible at night. Th .50 cal. incendiary bullets looked like flashlights flicking o at the instant of impact on any hard surface such as trees buildings or rocky ground. Thus fire adjustment of the .5 cal. machine guns was possible in darkness without the us of tracers.

In the crossing of the Meurthe River, just north of St Die, France, on 20 November 1944, six half-tracks of Battery supporting the 7th Infantry with cover fire, ex pended 12,800 rounds of .50 cal. and 160 rounds of 37mm ammunition. This fire helped in the rapid overrunning o the enemy-held positions on the east bank of the river Before the river crossing, the weapons of both C and D Batteries had done an excellent job of helping the troop of their Infantry regiments to clear the Germans from th heavily wooded mountains between Bruyeres and St. Die In this area miles of corduroy roads were constructed b the Engineers and many times an AA half-track, with squad of doughboys, served as a road block on the smal trails where enemy infiltration was possible.

One mission of special interest from the standpoint o super-light artillery was fired early in October 1944, b the gun section of D Battery, supervised by Lt. Loui Wiseman, supporting a battalion of the 30th Inf. Regt The target was a road net around and including the villag of Le Tholy, France. The Germans had made this town a strong point and it also served as a distribution cente for supplies to several of their strongly held road block and near-by defended terrain features. At that time, am munition for artillery and mortars was under strict ration and at a low daily allowance. From a range of 5,800 yard with the advantage of observation at a point less than 2,000 yards from Le Tholy, for five straight nights th .50 cal. M.Gs. sputtered in short bursts to hose the area The firing lasted less than a minute each time and wa scheduled at irregular intervals of three to fifteen minutes With the expenditure of about 30,000 rounds of .50 cal ammo, the enemy was denied full use of his supply roa net during the hours of darkness and the heavier ammu nition was conserved for use against observed targets.

On the drive from the Meurthe River to Strasbourg, th gun section supervised by Lt. Ben Fisler of B Battery, sup porting a battalion of the 7th Inf. Regt., shot it out wit two German flak-wagons. This action took place whi moving forward with a spearhead company into the villa

of Launois on 21 November 1944. Machine-gun and small-arms fire coming from the buildings had stopped our troops approaching from the south, but the enemy's right flank was not well protected. Lt. Fisler's M-15 moved into position near a church wall and after locating what was thought to be an enemy machine-gun position in a house, opened fire with the 37mm gun. A mixture of A.P. and H.E. shell was used and after about fifteen seconds of firing the enemy machine gun was silent. It was later learned that the machine-gun fire had come from a flak-wagon parked close to the house. This enemy vehicle was knocked out by the 37mm gun, expending about 30 rounds of ammunition.

At about the time Lt. Fisler's M-15 was working over the flak-wagon behind the house, the M-16 had moved into the edge of town along with a tank-TD team. All three weapons opened fire on another unfortunate flak-wagon that was attempting to pull out. This flak-wagon was destroyed and none of the enemy personnel escaped.

In a fast-moving situation, ground missions were found for the Ack-Ackers with the F.A. Bns. An example of this occurred at Dampvalley, France, 13 Sept. 1944. Sniper fire from a wooded area had injured two artillerymen as one battery of a 105mm F.A. Bn. was moving into position. Lt. William Canty ordered one of the M-16s of C Battery of the AA Bn. to follow and support him in eliminating the snipers. Proceeding up the draw a short distance; one of the enemy was spotted and killed by rifle fire. Soon a large group of Germans was observed approaching through the woods and when the half-track's machine guns opened up on the enemy, they surrendered without a fight, but eight had been killed and four wounded. This action netted 30 POW's and three light machine guns in addition to the enemy killed and wounded. These enemy troops had been by-passed by our Infantry in their rapid advance, but the Germans did not know their situation.

Enemy air activity is apt to come at any time. This proved true on the rainy afternoon of 7 December 1944 when 10 or 12 single-engine fighter-bombers of the *Luftwaffe* came over Field Artillery positions around Strasbourg in flights of two, three or four planes at very low altitude. Just to prove that the AA gunners had not lost "the touch" in eighteen months overseas, they accounted for one FW 190 and two ME 109's destroyed and three others which probably crashed in Germany, across the Rhine River.

Lessons Learned In Combat

All the training that could have been given AA Troops and officers would not have fully prepared them to meet situations which arose and were surmounted by good co-operation, reasonable caution and sound judgment in the job of close support for the Infantry. After questioning both officers and enlisted men, the following points are listed:

1. Close liaison with all elements of friendly troops, such as patrols, AT squads, Tank and TD platoons *must* be maintained. The local situation and any tactical plans *must* be known and understood by the AA Officer and his gun crews. If a ground fire mission is planned for the AA weapons, all other elements in the vicinity *must* know about it as to time, firing position and target area, to avoid being fired upon by friendly troops.

2. Practice fire over our own troops with automatic weapons in mock operations in both daylight and darkness gives them knowledge of the sound of the AA weapons and confidence in the gun crews.

3. Knowledge of positions and movements of friendly troops, enemy-occupied positions or possible routes of approach of enemy patrols or counterattacks, gives the AA officer an opportunity to plan missions for his weapons. Aggressiveness in developing missions promotes a good working relationship with the supported Infantry unit, and prevents assignments of jobs for which AA weapons are not adapted.

4. Camouflage nets are of no use in forward areas. Natural cover is preferred because it can be left behind when a quick move is necessary and is more adaptable to each location. Use screening brush or limbs when in a wooded area; boards, rubble or dead brush from a fuel pile will break outline when the half-tracks are shielded from enemy observation by buildings.

5. When moving forward use only "swept" roads or trails and follow the armor whenever possible as an extra precaution against mines. Road reconnaissance to new location either on foot or by jeep is important as movement is usually done at night. A road clear of traffic enables the half-tracks to get to their new positions quickly and decreases the time of exposure to enemy interdictory fire. Noise of movement can be concealed if the move is accomplished during either friendly or enemy artillery barrages.

6. Selection and reconnaissance of firing positions is by far the most important and most dangerous single job that AA officers are required to do in Infantry support. Fire usually draws fire, especially from a sensitive enemy and the firing positions should be sufficiently far from friendly troops to avoid drawing enemy fire upon the friendly positions. Usually half-tracks should be backed into firing position so that when the mission is finished a quick withdrawal may be made.

7. In mountainous terrain the firing on enemy position on lower ground may be accomplished if the front wheels of the half-track are run uphill away from the enemy, offsetting the limitation of the M-15 to normal horizontal fire.

8. AA self-propelled weapons are not intended to take the place of armor, but like armor, cannot operate in forward areas without ground protection against infiltration or surprise by the enemy. Usually in road-block position or when fulfilling the mission of a front-line strong point both half-tracks of a gun section work together or in support of heavier weapons and with the protection of doughboys out to the flanks.

9. When supporting the Infantry, only a bedroll for each man on the gun crew can be carried on the half-track. A bi-weekly rotation system between the weapons up forward and those protecting the Field Artillery battalion enables the men to get clean clothing from their barracks bags which are carried in one-ton trailers. This changing of gun sections gives all men of the battery the same experience and when the crews bring their weapons back

the Field Artillery positions they have a better opportunity for necessary maintenance work on their guns and vehicles.

Future Uses

Occasionally, for short duration, the Third Infantry Division has had a garrison or police job in a city of size and importance such as Rome, Italy, or Strasbourg, France. Mobile fire power with some protection for gunners is very desirable in such police duty. It is anticipated that M-16's can be used in conjunction with the Infantry to very good advantage in any such future assignments that the Third Division may get.

In as much as all half-tracks have direct radio communication to their Battery C.P's. which are usually located near the Field Artillery Battalion's Fire Direction Center, auxiliary communication for firing the F.A. guns can be provided by telephone relays. It is also expected that AA Officers and NCO's will be instructed in firing orders and artillery sensings so that adjustment of fire onto targets may be made by AA personnel directly from the half-tracks which are in forward positions. This would be especially helpful in breaking up enemy attacks which might not be observed by the regular artillery Forward Observers.

Conclusion

In summarization, it may be said that ground action has improved an already strong position which the 441st AAA AW Bn. has been able to maintain with the hard fighting Third Division. Infantrymen like to have the added fire power of the half-tracks up forward and the Ack-Ackers gain a feeling that they are contributing more toward winning the victory. The success of this program is largely attributed to the work of the AA officers in finding proper missions and in maintaining liaison with the Infantry.

Certainly it is *not* recommended that such operations be attempted by units that have had *no combat* experience, because noncommissioned officers are often called upon to carry out the duties of a platoon officer and control of a battalion scattered all over a division sector becomes a matter of almost individual gun section control. Such deployment is possible only with tried and tested troops. A full knowledge of the communication nets, for both wire and radio in the division, is essential and familiarity with the channels of supply make this great variety of operations possible for antiaircraft troops.

AAA With the 4th Armored Division

By Lieutenant Paul W. Sheldon, Cavalry

It was late in the afternoon at the little valley carved out of the hillside by the swift-flowing, narrow Werra River. Combat Engineers labored to complete their ponton bridges at Spichra and Creuzburg that were to allow the tanks and infantry of the 4th Armored Division to drive deeper into Germany's vitals.

All was quiet. It seemed rather absurd. This was the deepest penetration onto German soil since Napoleon, and yet it was quiet. Then, with a deafening roar, eight FW 190's and ME 109's roared down out of the fleecy white clouds. Gunners of B Battery of the 489th AAA Battalion immediately picked out the diving, banking planes and tracked them with their sights. The sharp staccato of the 50's and the dull thud of the 37's shattered the calm. The glowing tracers of the 50's searched the air like a man groping in the dark with a flashlight. Then, the 37's bracketed their targets, the 50's no longer searched aimlessly. What had a moment before been a fast-flying German fighter was a mass of flame. To the left another Kraut started smoking. The remaining six planes took one look, banked sharply, and headed for home.

This marked the end of a busy day—probably the busiest any single antiaircraft battalion had ever known—for the smoking guns of B Battery had just destroyed the battalion's thirty-fourth plane that day. From dawn to dusk German planes had frantically tried to destroy these important bridges, for the Werra was the last terrain barrier to the Thuringian Plain and the cities of Gotha, Weimar, and Jena. Time after time they had tried, and time after time they had been sent limping home by the gunners of the 489th on their M-15's and M-16's.

"The Krauts tried everything that day," said First Lieutenant Claude A. Morrison. "They would send two ships from one direction, just to try to throw our gunners off balance, and then a whole slew of them would come in from the other way."

Out of the eighty-five planes the *Luftwaffe* managed to put in the sky that April 2, the 489th sent thirty-four spiralling down in flames. In addition, the gunners probably destroyed six more for a batting average of almost .500%. For this forty-plane penalty paid by Jerry, he punctured four pontons on one bridge and slightly wounded three men of the 489th.

Nor were the gunners the only ones that were busy that day. Captain Levi Day, battalion S-4, was faced with the task of supplying ammunition for these fast-firing gunners. Three thousand seven hundred sixty-five rounds of 37mm ammunition and 94,640 rounds of fifty caliber were expended. The men had to discard personal equipment to make room in their half-tracks for ammunition.

These 489th gunners had also been busy before. On March 17, 1945, the Krauts tried to knock out another bridge. The span was across the Nahe River near the famous spa city of Bad Kreuznach, and the bridge had been captured intact by the swift-moving 4th Armored Division. The Jerries risked thirty-nine planes that day and men of A and B Batteries allowed nineteen to return home intact. Twelve German planes were destroyed and eight probably destroyed. Among them were jet-propelled ME 262's. Two were destroyed and two more were probables. Once again a batting average of .500%. Again on March 20 the *Luftwaffe* attacked in force. This time the multiple-mount gunners kept fourteen after school and sent the remainder of the thirty-odd scurrying for home.

The 489th had come a long way since that first day—July 13, 1944, when they had landed on the Normandy beach and were attached to the 4th Armored Division.

"We've learned a lot," said Lieutenant Colonel Allen M. Murphy, battalion commander. "For example, back in the States we learned to camouflage our vehicles. Over here we never do that. We like to have Jerry come down low and look us over so we can shoot the hell out of him." Murphy, a robust Southerner with sharp, twinkling eyes, and a keen sense of humor also had another combat slant about the employment of antiaircraft. "We were also taught to dig our vehicles in," Colonel Murphy continued, "but we've found that to be impracticable. We move so darn fast that digging in is out of the question. If the Krauts start shelling us, we just pick up and move to another position and go on about our business."

The 489th destroyed their first plane, a ME 109, on July 19, 1944. During the battle for France they swelled their total to 26½ planes destroyed. Since entering Germany, they have more than doubled and redoubled that number. The grand total, as it stood April 20, 1945, was 128½ destroyed and forty-one probably destroyed. Virtually every type of German plane has fallen to the guns of the 489th including: sixty-eight ME 109's destroyed and probably destroyed, seventy-eight FW 190's definites and probables, one ME 410 destroyed, two HE 111's destroyed, one JU 87 destroyed, half credit for the destruction of a JU 52, eleven ME 262's (jet-propelled) destroyed and probably destroyed, four Arado trainers destroyed and probably destroyed, and three observation biplanes destroyed.

Fewer enemy planes attacked the Fourth Armored back in France, but those that came up were plenty tough. As Corporal John S. Kovach put it, "You couldn't scare them then, but now they fly high and scare easily. Just give them a couple of bursts and they break up and head for home."

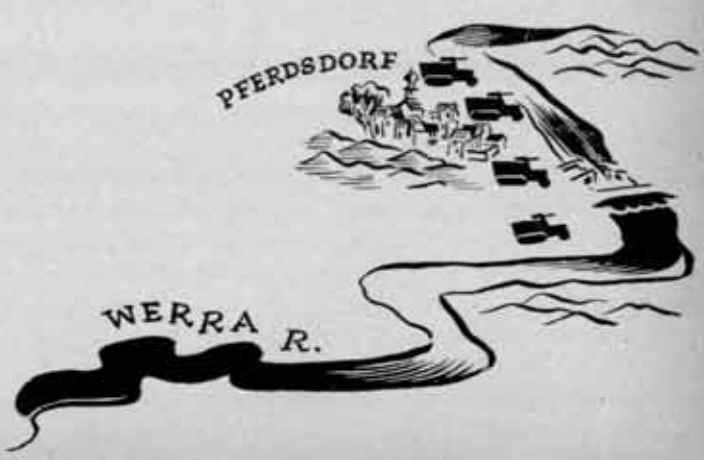
Although shooting airplanes down is really their specialty, this 489th crew is a pretty versatile lot and are proud of capturing more than 1,000 Germans. They have found that the M-16 with the multiple 50's discourages ground troops as much as airplanes. More than once they have had the opportunity to depress their muzzles and blast away at ground targets.

At Avranches, a gun section commanded by Sergeant John Usuka was completely cut off from the rest of their battery. After four hours their battery commander finally contacted the section by radio. He told Usuka that he had been cut off and ordered him to attempt to break through to the Battery CP which was located near the French village of Le Pont Gilbert. Under heavy artillery and small-arms fire, Usuka climbed in his M-16 and with all guns blazing led his second half-track, an M-15 across a bridge onto the road heading north into Avranches. So tremendous was the volume of fire put out by Usuka and his crew that they literally had to push the enemy dead and destroyed vehicles aside with their half-tracks.

After clearing the bridge, Usuka's track tipped over on an enemy road block, so Usuka protected the withdrawal of his squad with an M-1 rifle and a submachine gun. He fired two bandoliers of .30-caliber ammunition and finally, when his ammunition was exhausted, engaged three Germans in hand-to-hand combat and succeeded in taking care of all three of them. As the other track made its way through the wreckage, Usuka and his squad climbed on and made their way back to the Battery CP.

No one will ever know just how much enemy equipment was destroyed in this ground action, but it is known that a bulldozer had to be called to clear the road before it could be used by vehicles. For this action Usuka received the Silver Star Medal and the French Croix de Guerre.

On April 1, 1945, B Battery was in column with the Fourth Armored Division's Combat Command B. The leading elements of the column spotted a Jerry airfield near Eisenach, Germany, where Kraut pilots were frantically trying to get their ships off the ground before the tanks overran their field. Captain John J. Sibert called one of his M-15's to come to the head of the column and pointed



out the lucrative target. The gunner coolly laid his sights on the airdrome and with thirty-eight rounds from his 37mm smashed three FW 190's before they could take off.

The fire power of the antiaircraft has also been used to shield tanks from enemy infantry at close quarters. Two M-16's were sent with light tanks in a task force to clean out two German villages near the city of Limbach. After one light tank was hit, and the 489th platoon leader was killed, Staff Sergeant Delmar Yount reorganized the small force. Under his direction the 37's and 50's levelled the towns.

An attached antiaircraft battalion must be highly mobile and flexible when operating with an armored division. Usually one battery of the 489th moves with each of the two fighting combat commands, while one battery is detailed to protect the vulnerable division trains. One platoon usually goes with division headquarters and another with the division's reserve command. However, this system is always subject to quick change. One combat command may need more antiaircraft protection, so the antiaircraft battalion commander supplies it as he sees fit. Usually that's quite a job when miles separate the combat commands—miles that stretch over "Indian Country" that has never been cleared by American troops.

Colonel Murphy and his men have noted few unusual tactics on the part of the German air force. The *Luftwaffe* has a healthy respect for the men and guns of the 489th and like outfits. German pilots like a low-lying cloud bank from which they can dart in and out. As Colonel Murphy put it, "It's seldom that you'll see one of the so-and-sos on a clear day unless it's at first light or just at dusk." Asked about warning systems, Colonel Murphy snorted and said, "My men don't need to be warned, they're always ready for Jerry. I don't know of a single instance when an advance warning has helped us down a Krautship."

Records in this fast-moving war are difficult to ascertain. For that reason the 489th claims no records, but it is proud of its one-day total of thirty-four planes, and its grand total of 128½ destroyed and forty-one probables. As Corporal Ronald Slack puts it, "So maybe they're not records, but that's a hell of a lot of planes in anybody's war."

The battalion also has its share of decorations. Seven Silver Star Medals, sixty-three Bronze Star Medals, two Soldier's Medals, two Croix de Guerre, seventy Fourth Armored Division Certificates of Merit, and forty-five Purple Heart Medals are displayed by men of the 489th. Every officer and man in the battalion wears on his right breast the blue rectangle with the gold border signifying the coveted Presidential Unit Citation.

The 489th AAA AW Bn (SP) was activated February 10, 1943 at Ft. Bliss under the present CO, Colonel Murphy. In December of '43 they participated in the Louisiana maneuvers and in March of '44 they landed in England. The battalion trained in Wrexham, Wales, and until they joined the Third U. S. Army and the 4th Armored Division on July 13, provided antiaircraft protection for English airfields.

90mm Guns at Balete Pass

By Lieutenant Perry R. McMahon, AUS

Antiaircraft Artillery used for Infantry Battalion support has proved highly successful in some of the toughest fighting on Luzon: the Battle for Balete Pass and the Victory of Villa Verde Trail.

In the Battle for Balete Pass the 90mm AA gun came into its own—praises were sung by the Infantry all the way down the line from the colonels commanding regiments to the doughboys who watched the shells bursting in Jap caves no more than thirty yards in front of them.

On the Villa Verde Trail, where Bofors 40mm and multiple .50 caliber machine guns were used mounted, the Infantry was equally as enthusiastic—but this action will be discussed in a later article.

The battles were fought over the worst terrain possible. During the latter stages the rains came and added to the difficulties, but before the way was cleared a total of 16,100 Jap dead was counted. How many additional hundreds lie dead, sealed to their doom in the vast caves, or how many were wounded and dragged back can only be conjecture—the Jap does not announce his losses.

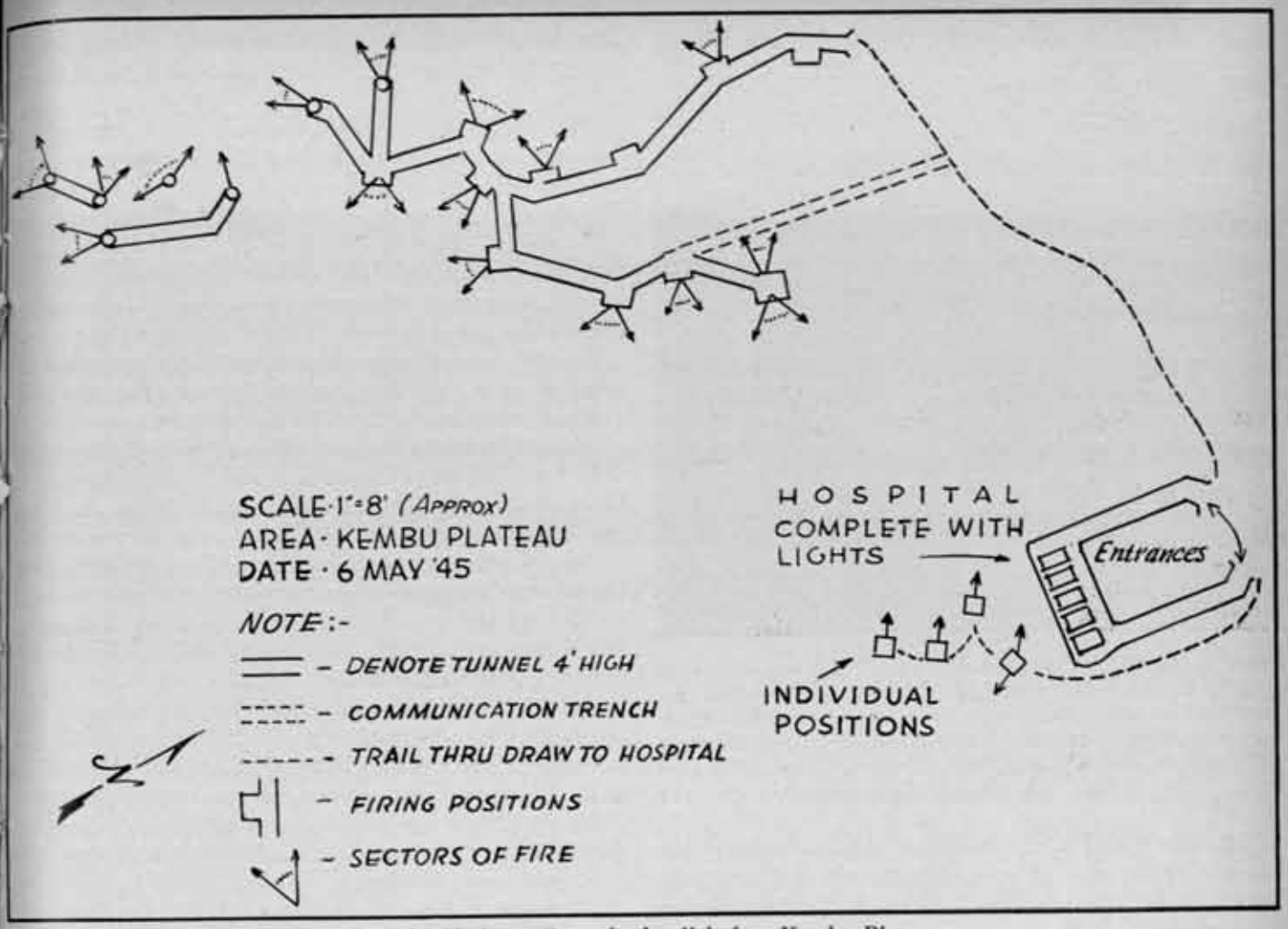
Early intelligence in the Luzon campaign indicated that General Yamashita's final opposition would be in the wilds of the north—unmapped, mountainous, and in the end a possible escape route back to the homeland of Japan.

As in all campaigns, time was the essence on Luzon. Would the Jap be defeated before the long rainy season set in, and would the passes north be cleared before mud on the newly bulldozed roads, which would have to be constructed, make movement practically impossible?

The northern mountains of Luzon rise above the clouds. They are rugged and there are no main all-weather roads except two—National Highway No. 5 which goes through Balete Pass, and National Highway No. 3 which leads to Baguio, both cliff-clinging affairs. Both could easily be defended by the enemy, he thought, until hell froze over.

These roads lead to Aparri, that port in Northern Luzon where the Jap had landed Dec. 12, 1941, just five days after Pearl Harbor.

Probably the most important of these escape routes militarily was Balete Pass, gateway to the Cagayan Valley. This valley has an average width of forty miles and extends for 200 miles. Mounted troop movement would be easy for the Japs on his side of the barrier back and forth from his stronghold at Aparri. Approaches to the valley from the



The "fortified zone" on the knoll before Kembu Plateau.

south are hampered by the surrounding mountain masses on three sides, restricted by the few roads, while air approaches are similiarly impeded by the mountain peaks, which in some cases exceed 8,000 feet.

It is true there are several trails and traces through these mountains, beaten out by the bare feet of the natives in their hundreds of years of peregrinations. Among these are the Villa Verde Trail and the Old Spanish Trail, as well as a Negrita Trail running from Gaziguran Bay on the east to the north of Mt. Anacuac, in Nueva Vizcaya province.

The Japs had also constructed a track from a point ten miles south of Echague to the Casiguran Bay area, which was once the goal of their attempted escape from Central Luzon. It was primitive in nature, and like the others would take no vehicular traffic.

So from the above, it is apparent that the Balete Pass was the Japs' primary escape route, particularly if he were to attempt to salvage some of the matériel he brought with him when his dream of a Greater East Asian Empire was at its zenith. Conversely, it would become the attack route of the Americans when they began the clean-up of Northern Luzon.

Indications are that even before the battle for Luzon was begun the Japs had been building defenses for Balete Pass; certainly by February they had plans drawn for artillery emplacements in the Pass, and continued tunneling their underground redoubts up until the time the Americans had fought their way to the other side.

Every stretch of strategic ground was pock-marked by Jap holes and gun emplacements. They mounted guns in sheer cliff-sides, on the reverse slopes, in the ravines, and all were well camouflaged as only the Jap knows how to use this technique after a dozen years of continuous war.

Battery A of the 161st AAA Gun Battalion came into the Luzon Campaign on S-Day, landing at H-Hour plus 3 and set up antiaircraft gun defenses in the Lingayen Gulf area. The Battalion is commanded by Lt. Col. Harry C. Bailey. As it turned out most of the Jap air arm allotted to the Philippines had been destroyed on Leyte, or caught on the ground in Luzon, and expected air attacks were negligible.

On 6 April, two months later, the battle for the gateway to Northern Luzon was begun. The Pass had to be forced and the Japs were dug in and waiting.

Our artillery did a magnificent job. They stood off in the lowlands and threw 105's and 155's high explosive and white phosphorus. The guns were moved up almost impassable roads—roads bulldozed by our Engineers against mountainsides which had supported only footpaths before. Our heavy 4.2 inch chemical mortars were carried close and sent shells into the Jap positions.

But the Japs withdrew within their mountainside caves pulling their guns in with them during the barrages and then wheeled them out to fire again.

High artillery trajectories necessary to get over the ridges made closing of these underground fortresses difficult.

The Infantry could do the job only by crawling through

Once Kembu Plateau was reduced, the Americans pushed on with the bulldozed Engineer Road. The 90's went forward (see emplacement top center) until the junction of Villa Verde Trail and Balete Pass was open to direct fire. Tojo's Bowling Alley was to the left of Kembu Plateau. Winch Hill (not shown) was on the next ridge.

the Jap mortar and machine-gun fire close enough to blast him out by bazooka or flame thrower—and this at a great loss of life—a practice not condoned in General Walter Krueger's Sixth Army.

Something had to be done. Something else was needed.

At Sixth Army Headquarters there had been discussion of the possibilities of using the 90mm antiaircraft gun in direct fire. Colonels W. L. McNamee and Frank T. Ostenberg of the Army's Antiaircraft Section believed it could be done.

Result was four guns were sent into the approaches of the Pass for trial. Roads were bulldozed for them up the steep mountainsides as far as possible to afford direct fire. The Japs long before had secured all favorable terrain and left only what would seem impossible for the Americans.

They had planned without knowing the potentiality of our Engineers. Through the huge rain forests of the mountainsides the engineers cut their road, flanking Highway 5 to the left and mounting higher and higher.

Some grades were better than 100 per cent. Reaching a point so steep no vehicle could travel, a caterpillar's crew strung cable and the cat was winched up. It in turn raised the necessary material and an emplacement was dug, the gun dragged up and revetted in with sandbags. The position was so high the silhouette could be seen for miles—if the Japs had known where to look—but American ingenuity again was apparent as the mask of trees was not removed until the gun was emplaced and camouflaged with a net and the raw earth screened with vegetation. Then the trees in front of the piece were blasted away and the gun began sending high-velocity shells into Jap caves 4,000 yards distant. Some rounds went directly into the openings.

Major J. Neil Wilcox, Battalion S-3, came up to watch the firing. During his visit thirty Japs tried a suicidal infiltration attack. With 25-pound demolition charges strapped to themselves they climbed to within 100 yards of the position.

The area had been booby-trapped, and a contingent of Infantry was there. It was getting dusk and the fighting continued until long after dark before all Japs were killed or driven off.

Captain Welford A. Sherman, Jr. was commanding officer of the 161st AA Gun Detachment, as the four guns were known when they were pulled out of Ordnance and personnel selected from the 161st AAA Gun Battalion.

Neither he nor any other of the AAA personnel will boast of what they did. They suggested going to the Infantry for the story of the AAA in Balete Pass.

The Division making the drive credited the four guns with knocking out or materially aiding in destroying approximately 300 pillboxes, caves, machine-gun nests and gun emplacements.

No one will ever know how many Japs the guns killed. Before the infantry had cleared the area a total of nearly 8,000 dead Japs was counted. In a wild wooded mountainous terrain such as this it is impossible to estimate how many Japs crawled off to die.

As the 35th Infantry advanced they dug out two caves which had been sealed by the AAA, and in each of these caves were eighteen dead Japs sprawled out about 47mm guns, their favorite mountain weapon, a high-velocity piece. Apparently they had suffocated. Another cave opened by the 161st Infantry resulted in the finding of forty-nine Japs—that is just an example.

"God only knows how many we killed firing direct fire," said Capt. Sherman.

At one point advancing Infantry ran into a heavy concentration of dug-in Japs. They set up a perimeter and called for support. This spot, known as the "Bamboo Concentration," was about 100 by 50 yards in area.

"We started at the far edge of the patch and brought it in," said Major Wilcox. "The Infantry laid low as we fired not more than fifty feet over their heads. The Infantry said bring it closer. We moved it in ten yards, we were hitting not more than thirty yards in front of them. 'You better move it back five yards, we are getting frags and concussion,' radioed the Infantry.

"At first we questioned bringing the fire so close," added the major, "but the Infantry said, 'we have confidence in you.' This was satisfaction, because when we were bringing the gun up the Infantry had kidded us, saying, 'hurry up with the gun so we can take the Pass.' I admit I was skeptical, but results have been far above expectations.

"Each time the Infantry moved up we were called upon to spray the area well. One morning we thought we had cleared an area, but as the Infantry advanced they flushed out three Japs who ran off against the grassy crest of a ridge. By radio the Infantry asked if we could see them. We could.

"They are very close to your own troops, but if you want we will fire," radioed back the OP.

"'We want it,' replied the Infantry commander. So we gave them what they wanted and where they wanted it," the major concluded.

Sgt. Walter J. Bosak was gun commander. "The round landed right where we wanted it," he recalled. "Then we got a call that two machine-gun nests had been spotted. We sent over eight rounds, four in each pillbox opening, and the Infantry radioed back—'it is as exciting as a football game, the boys are jumping up and down in excitement, we have never seen so much machine-gun nest in the air at one time before.'"

"Several times," said Major Wilcox, "the infantry told us after we had sprayed an area, that they had taken their objective without a casualty. It was so exciting firing direct that radio procedure was often forgotten.

"As an example, Col. Stanley R. Larson, commander of the 35th Regiment, was directing fire one afternoon. He shouted into the microphone ,'see that area up there by the crest?' 'Yes,' replied the gun commander.

"'Well, sweep that area up and down with time and point detonator fuses,' and as that was done, he was asked, 'how's that?'

" 'Do it again for good measure,' commanded the colonel."

When the Infantry reached the area the next day, forty-seven dead Japs and eighteen new graves were counted. The AAA knocked out several 47's in this area, no one knows how many and probably never will—when they saw flashes at night, they replied. It was a long drag through Balete Pass, the road was up and up and up, and was often obscured by clouds.

Frequently the Japs would wait until the clouds closed in before opening their barrages on the Americans; having previously prepared firing data on the terrain, they could fire on the Americans with comparative safety, hidden among the clouds.

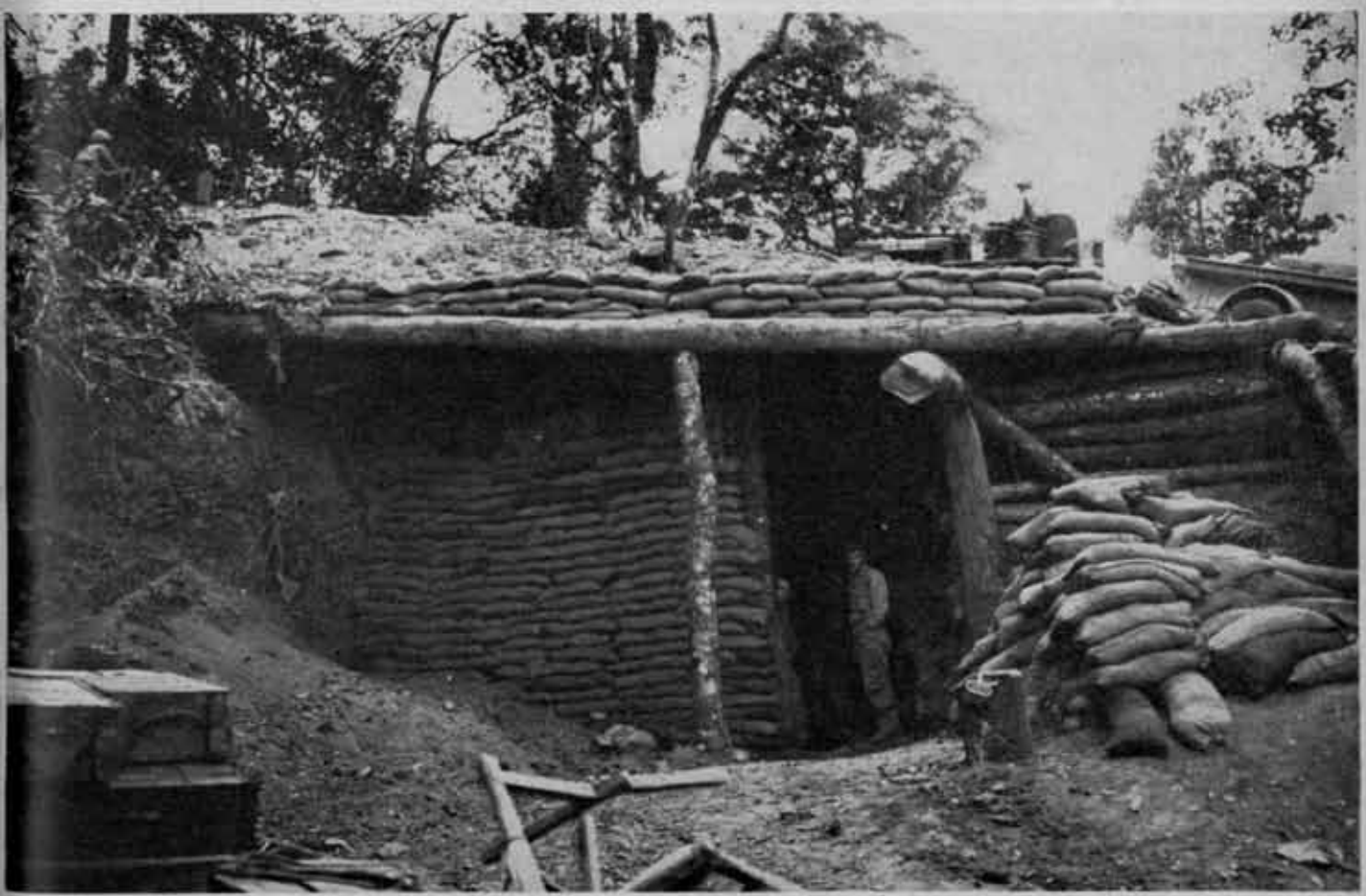
One of the incidents in the Battle for the Pass brought fame to the AAA for accuracy. Firing from "Banzai Ridge" (the soldiers soon had appropriate place names for each area), observers for the 90's could watch Japs traversing a bend in the Highway some 3,000 yards from the guns. The OP from where Sgt. Raymond Obertino and Sgt. Jesse Reynolds were watching was only 200 yards from the Japs.

The Japs were in what the doughboys had named "Tojo's Bowling Alley," because of the thunder-like reverberations firing of artillery caused in the mountains.

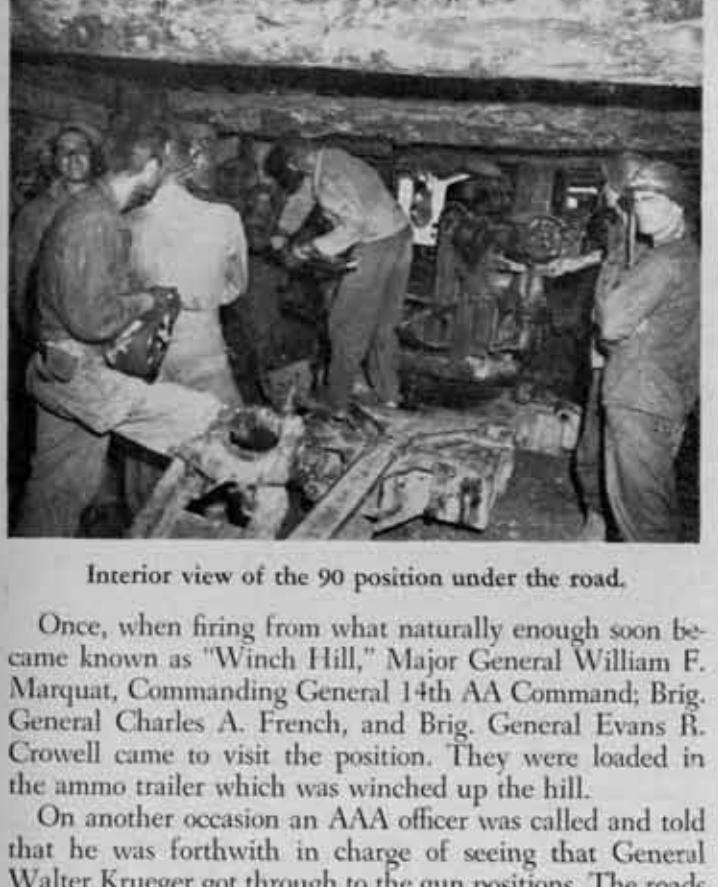
"We picked off a dozen or so Japs," said Sgt. Obertino, "but every evening as regular as clockwork they still came around that bend. We thought they must have a headquarters somewhere below and they were going in for chow. One night as usual three had just come around the bend and we put in a round and they disappeared with the explosion.

"We noticed two more Japs. They had halted where the shoulder of the cliff met the roadway and peeped around the ledge. They pondered and talked to themselves like they were arguing. They looked all around because you can't tell where shots are coming from in the mountains, then they ran for it.

"I yelled, 'they are running down the road!' and Captain Sherman, commander of the Detachment, said, 'give her five mils right and fire.' We put that round right between them, the fifteen-yard lead was just right. I guess they must have been hungry. We were using those 90's like an M-1 rifle."



This 90 position was dug in under the road, the only place where space could be found.



Interior view of the 90 position under the road.

Once, when firing from what naturally enough soon became known as "Winch Hill," Major General William F. Marquat, Commanding General 14th AA Command; Brig. General Charles A. French, and Brig. General Evans R. Crowell came to visit the position. They were loaded in the ammo trailer which was winched up the hill.

On another occasion an AAA officer was called and told that he was forthwith in charge of seeing that General Walter Krueger got through to the gun positions. The roads were rough, in some places impassable; the mud was deep. General Krueger saw the area, but only after much walking.

Once in the action below Banzai Ridge, where the ammo had to be carried to the guns round by round, officers and men of the 161st Infantry's cannon company pitched in and lugged it up to the 90. Later Chinese guerrillas carried ammo, and spread out in a perimeter about the guns at night to guard against Japanese suicide attacks.

Finally after more than a month of fighting, our forces began to see daylight through the other side of the pass.

The Japs had been pressed back. The 90's were carried forward and a new position dug into OP Hill, an eminence rising on the left flank side of Highway 5, affording a close-up view of the highway winding pretzel-like down into the Cagayan Valley which opens northward from Santa Fe. Here from the observation post could be seen the intersection of the Villa Verde Trail. Over on the right the 25th Infantry was cleaning up the slopes down into the Valley, the 161st was on the left, and immediately in front doing the same, and farther to the left, northward, the guns of the 32nd Division, "The Terribles" could be heard booming.

The Jap was being flanked and had to withdraw, and the only road out was under the direct fire of the 90 on OP Hill. The AA 90's had been given orders to move up to the Pass on 5 April. This was 25 May.

Some 2,000 yards down the hill northeastward a long Jap gun had been firing at night. Its flashes had been marked, and Major Wilcox had a crew out cutting mask away so the 90 could be traversed and fire opened with point detonator fuse.

Some 6,000 yards down the valley a few crumpled figures of Jap dead were scattered over the ground where Bale Pass and Villa Verde Trail joined.

"I reckon I can throw some rounds in there in a few seconds if any more Japs pass that point," said Gun Sergeant Walter J. Bosak, "and we figure they will start through about dusk. Last night we fired seventy-one rounds of harassing fire along the road just to let them know we were here."

Lt. Col. Stanley R. McNatt commands the 1st Battalion, 161st Infantry, and is plain-spoken. He endorsed the use of the 90's without reserve. "I know damn well these are good guns," he said. "Before we advanced it afforded excellent preparation. The guns closed or knocked out innumerable pillboxes, machine-gun nests, and heavier gun emplacements.

"In our advance on Chicken's Head Hill, two of the 90's were set up on the 161st's supply road in the rear of Norton's Knoll, and two on Banzai Ridge, and we will never know how many Japs they killed.

"At one point near Kapintalan bridge," the colonel continued, "before we really got into the Pass, the 90's fired at guns the Japs would run out on the road, and the whole section was covered. Once when the Infantry opened a cave sealed by 90 fire—it was a big room dug into rock about ten by ten feet, extending back into the mountainside some forty feet—it was discovered a direct hit had destroyed the gun and crew completely.

"From the very first the guns gave us the closest support," continued Col. McNatt. "As we advanced for Objective No. 1, a hill some 1,000 yards west of Digdig, the guns were sometimes firing not more than fifty feet over our heads. In this instance, to my personal knowledge they knocked out three machine-gun pillboxes and one cave. I don't know how many Japs were neutralized in foxholes besides this.

"When we advanced to the knoll before Kembu Plateau later renamed Devin's Ridge, in honor of one of our dead, the 90's did a magnificent job.

It was a veritable fortified zone (see sketch) and contained the bulk of a battalion, reinforced with a signal outfit and hospital unit.

"We had only one approach—straight up the face of the ridge, which was completely covered by Jap fire. The 90's ranged in and peeled those workings back like a big shovel stripping coal. We spent two days probing through those positions, and on the morning of the third day we sent D Company with its mortars straight ahead, A Company was advanced on the left, and B Company on the right, making an advance of 2,000 yards, with very few casualties."

Lt. Robert W. Wilman, of Jackson, Mich., of the 1st Battalion, also had praise for the 90's.

"Taking of Kembu Plateau was the key to the Pass. It allowed us to flank the Japs' remaining positions, and to establish our own positions commanding the northern entrance to both Balete Pass and the Villa Verde Trail.

"I have seen the effect, I have directed their fire at times, and I saw a 90 pick off a Jap at 3,000 yards range and blow him to bits—that's pretty accurate shooting for my money," Lt. Wilman said.

"In viewing the effect of caves sealed with 90 fire, after seeing the Jap guns destroyed, the dead crews sprawled

bout it, I think it is the ideal support weapon when the ld of fire is direct."

A similar endorsement was given by Col. Victor Johnson, mmanding the 161st Infantry, who said:

"There were positions we couldn't have taken without pport from the 90's. Our artillery fire was 200 and 100 rds in front of us but the 90 was hitting only 30 yards in nt. Once, firing at a single Jap, they moved the fire two rds right and two down and hit him amidships. Why not clude a battery of 90's with every infantry battalion?" Col. hnson asked.

Col. Johnson also wanted to get AA searchlights for his Infantry. "There is a definite need for searchlights in night fighting against the Japanese," he said. "Such lights would prove invaluable aids against the Jap tendency to infiltrate at night, and would be a big morale factor for the boys."

After direct fire from the 90's had made such an impression in Balete Pass, four more guns were brought up for indirect fire. The task was assigned to A Battery of the 161st AAA Gun Battalion, and while not so exciting, the crews shelled at extreme range on the old Spanish Trail some 18,000 yards distance.

Bombardment of Japan

By Colonel Theodore J. Dayharsh, Coast Artillery Corps

Present-day bombardment of coastal objectives presents constantly changing picture as new and improved techique is put into effect. Since Coast Artillerymen are harged with combating enemy bombardment efforts, a escription of a recent bombardment of Japan by our own aval forces may prove of interest and, insofar as security nditions permit, present facts that might influence deployent and employment of our own seacoast weapons to meet milar conditions.

The city of Muroran lies in southwestern Hokkaido. anking as one of the principal commercial ports (1940 opulation 107,628) of Hokkaido, it is the site of one of the rgest steel and iron works in Japan. Prior to the war Muroran handled nearly one-half of the total exports of Hokkaido; it has increased greatly in size and importance ince that date.

When the Commander of the Third Fleet reached the ecision to bombard Muroran to destroy the steel and iron orks there, it was realized that existing (15 July) condiions were far from ideal. Available information of the Northern Honshu-Hokkaido area was mostly prewar and ery sketchy. Photographic coverage had been very limited. Most of the area required for the approach and bombardment was considered mineable, and the existence of coastal defense guns was believed probable, although the caliber and location was unknown. Enemy airfields on northern Honshu and Hokkaido were numerous and presented an impossible problem for neutralization by carrier air strikes because of the prevailing poor weather.

The decision to send a bombardment force in under these conditions would appear foolhardy unless considered in the light of preceding events. Heavy carrier-air attacks on the Tokyo area, 10 July, had aroused no Nipponese reaction and carrier-air strikes against Northern Honshu and Hokkaido, and bombardment of Kamaishi in Northern Honshu, 14 July, likewise failed to meet opposition other than flak. It was necessary to find the amount of punishment the enemy would accept without attempting retaliation, and to reap the rich rewards of his inexplicable passive defense.

The exact composition of the bombardment force cannot be given. It included fast battleships, cruisers and destroyers and was a well balanced force. Commanded by Rear Admiral Badger, it was composed of units drawn from Admiral Halsey's Third Fleet. The Fast Carrier Force, less the bombardment units, scheduled air strikes for 15 July and provided continuous combat air patrols over the bombardment forces to destroy expected enemy air opposition. Airborne spotters were provided over the target—a necessity because of the mask afforded by a rugged, hilly coast line sheltering the targets from direct observation by the bombardment force. Target maps had been prepared based on the best information available, but were sketchy in nature.

The run-in was started in darkness but completed in daylight with initial salvo time of 0936 Item. The coast of Honshu first became visible on the port side; then Hokkaido coast line showed dimly through a light haze to the starboard. Speed considerably in excess of 20 knots was maintained; the initial disposition was one best suited for antiaircraft defense; the whole project seemed unpleasantly akin to closely inspecting a lion's jaws to see if he had sharp teeth.

Almost unbelievably the skies remained free of Japanese planes. At 0936 at a range in excess of 30,000 yards the nine 16-inch guns of the leading battleship belched forth the initial salvo, followed immediately by salvos from the accompanying battleships. Spotting planes in spite of low ceiling over the target area sent in prompt spots—to nearest 200 yards in range and the nearest 100 yards in deflection. Rapid fire was maintained but necessary time taken for spotting and adjustment; a rate of fire of a round per gun every two minutes was averaged. A leisurely bombardment speed of 15 knots was set on a straight course; lack of air or shore artillery opposition made maneuvering, higher speed or counterbattery unnecessary.

One hour later the bombardment had been completed. Over a thousand tons of steel and explosive had been poured into Muroran; plane reports and later photographic coverage confirmed severe damage to the assigned targets.

Retirement was at high speed, with a friendly CAP still providing air coverage, but Japanese reaction remained negative. A daring foray into enemy inner waters had been completed without damage to our forces.

The following points are listed as noteworthy:

a. Mineable waters will not deter a determined force. Extensive mine fields must be established to deny vital water areas.

b. Major caliber seacoast guns must cover vital approaches. The Japanese may have had some coastal defen but the bombardment ships at 30,000 yards were beyo their reach.

c. Bombardment accompanied by air strikes and covere by combat air patrols is very difficult to counter—the enem made no attempt to do so.

d. A passive defense is excellent—for the attacker.

Combating the Universal Enemy – Disease

By Lieutenant Colonel Leonard M. Orman, Coast Artillery Corps

We began our sanitary preventive measures before we left our staging area. First we inaugurated a thorough training schedule on field sanitation measures. We drilled home again and again the danger of the mosquito, the fly and the rat. Every means available was used to make sanitation important to every officer and enlisted man. We used FM's, training films and talks by men who had returned from similar areas. We made certain that mess sergeants were familiar with all methods of waste disposal and actually knew by practical demonstration how to construct grease traps. We were lucky in one respect. A near-by Seabee battalion had the best exhibit that I have ever seen of all types of field latrines, showers, garbage racks, incinerators and methods of water purification, all from improvised materials. We took every officer and EM on a tour through this exhibit and explained in detail the methods of construction. We prefabricated fly traps and latrine seats and had them ready to assemble on debarkation.

On the trip down on a crowded transport we had the usual inconveniences of having to bathe and wash mess kits in salt water. We had the foresight to secure salt-water soap but we found later that the soap included in the 10-in-1 rations was much better for the purpose. On the mess kit washing we had to compromise with Army Regulations. Mess kits washed in salt water have to be dried or else a film is left on them which even dipping in hot salty water before eating does not remove. By daily inspections we managed to keep the crowded living quarters clean and had but a small sick list during the voyage.

Our first camp was on the beach in an area vacated by an Infantry company the day before. As they had done a good job of marking latrines and garbage pits they were a good example to our men. Water had to be hauled. Mosquitoes were bad and flies were worse. Since we were eating C-rations and 10-in-1 the mess was of little problem. We got out our burners and set up hot water for dipping mess gear before eating and the usual three mess washing cans for after eating. We washed in the ocean and here the soap in the 10-in-1 rations proved its worth. All men had brought toilet paper which lasted until we could get at the supply in the 10-in-1 or unpack our own.

Mosquito bars, insect repellent and fly traps were unpacked and put into immediate use. Men were required to be completely clothed during the hours from dusk to dawn. The rainy season was going strong when we landed. Living conditions were not ideal. The filthy water buffaloes wandered around our camp bringing flies with them.

Soon we moved into better camp sites. We picked hills with an unobstructed breeze. This aided materially in cutting down the flies. In one area cutting of the knee-high grass around the area for 100 yards materially decreased the flies.

Now that the rainy season has ended and we have all tents, mess halls and latrines screened and use aerosol bombs daily in mess halls and latrines, flies and mosquitoes are no longer a menace. Still we take the precaution of putting oil on fire barrels, promptly disposing of beer bottles and cans, and of stacking 55-gallon drums on their sides rather than on ends to eliminate all possible breeding places. We put plenty of urinals around the areas so that even the laziest man will not be tempted to contaminate the ground.

Rats were and continue to be a problem but constantly a smaller one. We are carrying out a vigorous method of poisoned-oats baiting stations with as many as a hundred cans in a single battery area. Permanent measures of control that are being taken include the filling in of all of the porous coral rock area and elevation of all tent floors to eliminate all possible breeding places.

Our Sanitary Officer visits even the most distant installation frequently and makes recommendations for improvement in writing to the Commanding Officer weekly. These are vigorously followed up.

Deep-pit latrines are now being used. Frequent applications of PDB make them odorless as well as sanitary. Fifty five-gallon drums, four-high per seat, are used at one battery

here volcanic rock made digging of a conventional pit impossible. Grease traps of this type have been constructed and proven most effective.

Urinals consist of a pipe with a helmet or cone welded on the end. The open end is screened. The pipe is stuck in the ground with a two-foot cube of coral fill. An air pipe outlet keeps it odorless.

The Quartermaster laundry units wash some of our clothes but not enough. These windmill washers help fill the gap. They are easily constructed—some scrap and a breeze are all that is needed. Breezes are usually blowing.

Salt tablets are used by those whose work entails physical labor. The tablets make many ill and these men must resort to a tablespoonful of salt in a canteen cup of water.

This sanitary consciousness has paid dividends. Although we've been bivouacked in unsanitary conditions, have weathered a rainy season and have been near the native villages with all of their endemic diseases our sick list from all causes including accidents and a large percentage of chronic ailments has never exceeded three per cent.

From Connecticut to the Philippines

By Captain Welles Eddy, Coast Artillery Corps

The 211th Antiaircraft Automatic Weapons Battalion, originally the automatic weapons battalion of a Connecticut National Guard Coast Artillery (AA) Regiment, was inducted into Federal service in January 1941. At the time of this writing the battalion has completed three years of overseas service, having participated in the East Indies, Papuan, New Guinea, Bismarck Archipelago and Philippine campaigns. For the part they played at Papua they received the Presidential Unit Citation.

The battalion climaxed its lengthy tour in Australia, New Guinea and the Admiralty Islands by shooting down a record-breaking number of enemy planes upon reaching the Philippines. During the two-month period following the landing on Leyte the total confirmed score was: forty-four planes destroyed, thirteen probably destroyed, twenty-eight damaged. The number of planes engaged totaled 340.

At the outbreak of war the battalion had been given only one towed-target practice, and that with 37mm guns. As the first month of the war came to a close they were assigned the defense of Boston harbor installations, which included the Fore River Ship Yards and Watertown Arsenal. This experience in cold weather operations was short-lived, and has not been repeated since.

New Year's Eve 1941 brought news of our battalion being alerted for foreign service, and by February we were well on our way toward the South Pacific. While the original destination was the East Indies, the rapid Japanese advance there brought the voyage to an end in Australia.

The initial overseas assignment given us was the defense of a Northern Australia fort and airdrome with our twelve water-cooled guns per battery, plus a few 37mm guns. While here we experienced the first of countless high-level bombing attacks in which the men were unable to fire a shot. The battalion's fire power was increased by the arrival of 40mm guns with M6 directors and M3 remote control systems. Since field and technical manuals were not available, training in these new weapons was largely of our own designing. Gun mechanics worked closely with Ordnance companies, which kept one jump ahead of the using arm. This training proved invaluable later at remote jungle strips and ports where replacement parts and ordnance detachments were not available.

In October 1942, two batteries of the battalion moved with their new guns to Port Moresby. Although no low-flying targets presented themselves, the men learned how to live in the tropics, with its poor sanitation and its health problems—to say nothing of maintaining morale under such difficult conditions.

Toward the close of the Papuan campaign, the remainder of the battalion made its way up the jungle-fringed northern shore of New Guinea to the secret unloading point at Oro Bay. Battery "A" was the first AA unit to land at Oro Bay. Battery "B" soon followed, with Battery "D" remaining at Port Moresby. On this fever-ridden coast the men manned their guns and helped unload supplies for the infantry at Buna and Sananda Point.

Jap dive bombers and strafers were engaged with good results. In April 1943, a one-hundred-plane raid was overwhelmed by U. S. fighter planes. Thereafter, daylight targets became less frequent.

Not until February of 1944 were all batteries again brought together under battalion headquarters. In the meantime, Battery "C" had made several airborne missions to hastily constructed jungle air strips in the Markham Valley. They eventually reached the coast at Finschhafen and joined the rest of the battalion. A few enemy planes were shot down by Battery "C" during these movements.

In February 1944, the battalion was alerted for the Admiralty Islands campaign and was attached to the 1st Cavalry Division. Our first experience in landing guns from invasion craft was made in the face of enemy fire. Once again a few low-flying targets came over the defended area.

It was here that Battery "A" helped disperse a moonlight Banzai charge by the Japs along the Monote air strip. The multiple .50 caliber machine gun M51 proved excellent for this type of target. Our 49mm guns engaged with good results enemy field artillery pieces being brought to bear on our positions from across the small harbor.

During the following six months, the battalion, although in tactical position, conducted training. Arrangements were made with the Navy for towed-target practice—our first since leaving the States. Guns fired about ten rounds per course at the rate of one shot per second. Corrections in range were made by sensing and line shots. The employment in combat of this method was tested in the Leyte campaign, where real targets were plentiful, and was found impractical for reasons discussed later. Meanwhile, furloughs to Australia were granted to a few of the men, some having served twenty consecutive months in New Guinea.

The battalion's two and one-half years experience in Australia, New Guinea and the Admiralty Islands well qualified it for the long-projected return to the Philippines. Training and morale were at a peak when loading was begun on AKA's, APA's, LST's and LSM's for the 2,000-mil trip to San Pedro Bay.

After an intense five-hour naval barrage, the 1st Cavalry Division spearheaded the landing, at Leyte, and approximately half of our gun sections were put ashore the same day. The remainder of the battalion was unloaded on A plus 1. All fire units were immediately placed in firing position and moved into permanent positions as the situation developed.

Despite the tremendous number of troops and equipment unloaded on the narrow beach in a few hours, there was little delay or confusion, although barriers, logs and the craters of 16-inch shells hidden under the murky water proved a hindrance to some guns. Barges occasionally were grounded 100 yards offshore in shoulder-deep water. Guns were unloaded with a variety of other equipment and sometimes came ashore more than a mile from the desired location. Some difficulty was encountered in securing bulldozers from engineer units to tow fire units onto the beach. Over half of the Bofors guns were pulled ashore through two to four feet of water, and damage to the electrical systems resulted. In a few instances, Bofors were stranded in deep water for an hour and a half when the towing trucks were drowned out.

The battalion occupied positions on "White" beach, which was one of the beachheads along a twenty-mile front, the newly won Tacloban air strip, and around the docks in Tacloban itself. Due to the complete neutralization of enemy airfields by the naval air arm, few targets appeared for two days. Fighter cover was provided entirely by naval planes operating from carriers offshore. A plus 4, 5 and 6 brought the Second Naval Battle of the Philippines. Several of our carriers were sunk or damaged, and the enemy attempted neutralization of the Tacloban strip by heavy air attacks.

Built on a narrow, swampy peninsula, the strip was only partially completed and provided no dispersal area. Hellcats, Wildcats and torpedo bombers flocked down in emergency landings for repairs and servicing. Many of the men of our battalion performed double duties by helping rearm such planes as were able to return to action.

During these three days, seventy-three enemy planes various types were engaged, with fourteen definitely destroyed, fourteen probably destroyed, and at least fo damaged. Naval aircraft destroyed many planes bef they reached their target.

For the next two weeks targets appeared in a continuo stream. During this period a method of fire control was e ployed which differed from that previously practiced. Due the large number of guns firing on the same target, sensin of line shots from individual guns were impossible to obtai Range estimation became the sole reliance by the direc crews. All firing was done at the normal rate of one rou per second. As sensing could not be obtained from ind vidual rounds it has been concluded that the maximum ra of fire should be employed because of the greater prob bility of hits.

Targets were initially engaged at an estimated 2,50 yards, with range set at 1,500 yards. On an incoming cours when the target was estimated to have passed through th 1,500-yard point, the range setting was reduced three hand wheel turns (to 875 yards). This setting was held until th target passed beyond a range of 875 yards on the recedin leg, at which time the range setting was increased by thre handwheel turns. Cross courses were attacked by the sam method, but range setting was reduced by two handwhee turns (to 1,125 yards) and held there through mid-poin until the target had passed beyond a range of 1,125 yards o the receding leg. The range setting was then increased tw handwheel turns.

Barrage fire was occasionally resorted to at night, with n definite pattern or cone of fire being employed. Estimatio of the target's present position and course was made from it sound, and fire was directed along this course. The converg ing of the tracer streams sometimes assisted the spread-beam searchlights to pick up the target. One float plane was de stroyed by barrage fire, and numerous other planes turned from the target. Often the exhaust of the plane's motor gave away its position. An enemy transport plane, carrying sui cide parachute troops, was destroyed over the strip becaus of the telltale sign.

The citations and awards received by the personnel o our battalion include two Soldier's Medals, fourteen Bronz Stars, three Silver Stars, and one citation for gallantry i action.

The unit has suffered few casualties. Fourteen men an one officer have been killed in action, and sixty-six me and officers have been wounded.

Despite the inroads made by tropical diseases, rotation o personnel and transfers to O.C.S., over half of the member of the original unit are still present. Officer changes ar more apparent, but the most recent arrivals are graduate from our own unit of O.C.S. in Australia, being men wh sailed with us on the original task force. This long associ ation plays a large part in the character and unity of th battalion.

This article is dedicated to 1st Lt. Newell E. Gillette an the fourteen enlisted men who were killed in action.

Secret Phase of the Flying Bomb

By Major E. S. Watkins, British Army

Phase One of the flying bomb attack on London is now history, and well known history at that. It begins with the Royal Air Force raid on Peenemunde on August 17, 1943, an event that set back the menace by some months. The menace revived again in the autumn of 1943, when the Supreme Command knew that an attack was now being mounted but did not know exactly when it would start. There were days of tension as the preparations for Operation Overlord neared their climax. Would the attack precede the invasion? Would it be launched at the same moment as the invasion? Would the Germans fail to complete their preparations in time? Each supposition demanded different deployment of the defenses. Each was answered on June 13, 1944, when the first three bombs fell in London. Now Britain, and the world, would see what, if any, was the answer to V-1.

Then followed three months of concentrated attack. Sometimes a hundred a day were launched, all through the summer weather, and London and Southern England continued to work and wait and listen for that all too familiar roar that mounted so fast, and for that sudden silence as the motor cut out. They listened, too, through that interminable pause of five seconds or so before the crash of the explosion. Then you knew if it had come for you or not, but you did not know, just then, if it had taken your family, your home or friends.

But after two months of this the line in France began to move. The Seine was reached and crossed. Paris fell, and, while Londoners kept an appreciative eye on the advance to the east they followed with even greater personal interest the advance up the Channel coast. Beauvais was taken and the Somme reached. The armies were getting nearer to the launching sites in Pas de Calais now. Would the Germans fight to hold them, just for the sadistic pleasure of killing a few more civilians, or were they really and truly thrashed in France? The tide could not be held and by the end of the first week in September you could no longer look across the Channel from Dover at hostile territory. The Germans had gone. And so, to the layman, did it seem that the menace of the flying bomb had gone, too. Now perhaps you could sleep, and breathe again.

In fact, the position was quite different. London and Southern England had two further trials through which to pass. Phase One of the flying bomb was over. Phase Two about to begin. There was still V-2, the rocket, to come. And, finally, in March, 1945, came Phase Three of the flying bomb attack. It is just as well that we did not know it at the time.

V-2 is a different story and has rather overshadowed that of the flying bomb. Phases Two and Three are worth describing, for it is a success story, a story of ordinary gunners, of the men and women, who manned the antiaircraft guns of Britain under Antiaircraft Command. It is this kind of success story. In the first week of Phase One, in June, 1944, the gunners shot down 17 per cent of the bombs that were possible targets. In the seventh week of the attack from t[illegible] their percentage had mounted to 74 per cent. In the last week of the final attack, in March, 1945, the percentage had mounted to 85 per cent. They were the same guns throughout. Skill, training, mounting experience and new fire control instruments changed those figures.

Preparations to meet Phase Two began some time before the attacks from the Pas de Calais finished. It became known that the Germans were experimenting with the launching of flying bombs from an aircraft already airborne and it was expected that this line of attack would obviously be used, if and when the ground launching sites were overrun and lost. That, in fact, is what happened.

There are certain advantages in launching the flying bomb in the air and certain disadvantages. The first advantage is that your base can be put farther back. The R.A.F. attacks on the sites in Northern France did not knock them all out but they certainly handicapped their use, partly by the damage to the site and apparatus, partly by the dislocation caused to the supply routine. To be in a position where you need not carry your bomb farther forward than a German airfield had big advantages, even at that stage of the defeat of the *Luftwaffe*.

We do not know enough yet to be able to dogmatize on whether a launching from the air is technically easier than a ground launching. It looks as though it should be. For one thing, the bomb has flying speed at the moment of release. Nor are you so dependent on the very complicated mechanism required for the ground launching. Accounts

from the French civilians living in the neighborhood of the launching sites show that quite a high proportion of those launched there failed from the start and crashed within a mile or so of the site.

But the disadvantages are considerable. If a launching site on the ground is vulnerable to air attack, a launching aircraft, by day, is infinitely more so. The German air inferiority by September, 1944, was already such that they were compelled to limit their launchings to the hours of darkness and to the one day when the weather was bad enough to give them cover over the North Sea but not so bad that flying was impossible. Night flying has another adverse effect. It complicates the problem of aiming. The flying bomb is constructed to fly on a constant course for a fixed period of time. Neither can be altered once the bomb is released. Consequently the pilot must know exactly where he is when he releases his bomb. His machine must be a definite distance from the target and the nose of his aircraft must be sighted on the target, allowing for any drift caused by meteorological conditions. That requires very good navigation indeed, for all these launchings were to be made over the North Sea, where there would be no possibility of a ground fix on the position of the aircraft.

Still, if the target was to be London, there was one important benefit to be gained by the air launch. Look at the map of northwest Europe and compare the area of what was then German-occupied land with the area of water over which German aircraft could, with some degree of safety, still fly by night. The greater the number of alternative positions for your launching instrument the more you compel the ground defenses to disperse themselves.

The first objective of the defense was to shoot the bomb down as soon after its flight had started as possible, particularly as this would almost certainly mean that the bomb would then be over the sea. So the outer defense consisted of aircraft. Next, position your guns as close to the sea as possible. Then those targets they hit as soon as they open fire will also fall into the sea. Those hit later will fall on the relatively thinly populated areas of the coastal belt.

The next lesson, an old one, was that it is advisable to concentrate your guns. To do so simplifies control and shortens the communications on which control must depend. Control is important. The bombs had usually been discharged in salvoes and if ten cross the one section of coast line at the same moment it is important to insure that each one is engaged by at least one gun. Without control, and a good system of drill, all your guns might concentrate on one or two of the salvo, with the result that the other eight or nine streak past unengaged.

Finally, leave the country behind the guns to the fighters again. Give them as much distance as possible in which to overhaul and shoot down the bomb. They will need it.

It is in this area that you position your searchlights. By night it is difficult for the defending aircraft to make contact with either the flying bomb or its carrier aircraft over the sea. But, once either is over land, a good searchlight crew at once can pick up and illuminate the target and so enormously ease the task of the aircraft pilot. Consequently, while your guns must be concentrated, your lights should be spaced out, so that one light can pass on an illuminated target to the next light farther inland until the night fighter can bring off a kill.

In short, at the end of August, as the French launching sites were being overrun A.A. Command had already begun to work out the countermeasures necessary to defeat any resumed attack from any other quarter farther to the east and they had begun already to deploy their resources to meet it.

Look at the map of the southern half of the North Sea. The first thing that strikes you is the gulf made by the Thames Estuary. It is like a dagger pointed at London. A well-aimed flying bomb could get to within 30 miles of the fringes of London before it came within range of a land gun and a flying bomb travelling at 400 m.p.h. would do that 30 miles in just over four minutes. That does not give very much chance to a gun. The Thames Estuary is an area in which you need considerable concentration of guns.

A.A. Command were compelled to provide such a concentration. When Phase Two began they had already deployed 136 3.7" mm guns (Heavy Antiaircraft guns) in that area. Some of these guns were part of the normal defenses, the remainder were mobile guns sent in to thicken the defenses. In addition there were 210 Bofors 40mm guns and an even greater number of 20mm guns, mainly supplied by the R.A.F. Regiment (normally used for the close defense of airfields) and by the Royal Navy. The Thames Estuary was known as the "Box."

The defenses were not all on shore. They included the guns of the Maunsell forts* in the Thames. The Maunsell fort is a wartime innovation. It consists of seven steel towers sunk in shallow water and mounting four heavy antiaircraft guns, one light antiaircraft gun for close defense, and a searchlight. In short it is a composite antiaircraft site at sea. These forts were established to meet the menace of the mine-laying aircraft. In the heyday of the *Luftwaffe*, in 1940 and 1941, mine laying in the Thames Estuary was a common and remunerative occupation for them. The Maunsell fort was one of the answers to that type of attack. Now it had a second phase of usefulness, in meeting the flying bomb on what can only, if paradoxically, be described as the most suitable ground—namely water.

The second step taken before the start of the attack was to put in hand the work of converting the sites used by the mobile guns in the Box to static sites, suitable for taking static guns.

British heavy antiaircraft defense has been built around the 3.7" gun. It is a gun that corresponds roughly to the well-known German 88mm gun, but, while heavier, has a rather better performance. By 1944 it was usually found in one of two different types of mounting. For use in the field it was mounted on a four-wheeled trailer platform capable of being towed by any heavy truck and so fully mobile. In that state it is used with its own portable instruments and is manually operated. When used as a static gun it is equipped with an improved counterbalance, and an automatic fuse-setting machine is mounted on a solid base and can be power-operated from the instruments direct. This increases the accuracy of the laying of the gun and the rate of fire, and a battery of static guns can give a more accurate and

*See "Secrets of the Sea Forts," COAST ARTILLERY JOURNAL, March-April, 1945.

a much greater volume of fire than can a mobile battery.

Further, the static batteries are what are known as mixed batteries; that is, they are manned by teams of men and women—gunners and members of the Auxiliary Territorial Service. The men load and operate the gun in the gunpit. The women lay and operate the instruments that put the guns on the target. A good mixed battery is a combination of fast and accurate work by both men and women in their respective jobs, and by quite a high percentage of professional gunners it is considered to be better than an all-male battery using the same equipment.

Until the flying bomb attacks began, a static gun was very static indeed. It implied the building of a concrete emplacement and base for the gun and the provision of hutted accommodation for the personnel of the battery. The flying bomb changed all that. The personnel went into tents and the gun went on to a new design in platforms. This, known as a "mattress," consisted of two sets of railway lines bolted to sleepers and laid in the form of a cross. A steel frame was bolted on to the central intersection of the lines and this served as a base plate for the gun. The mattress could be laid on any sort of ground capable of being levelled. The two sets of rails and the base plate travelled separately, and the whole was finished by bedding the sleepers, when laid down, with hard core. "Static" in A.A. Command became a relative term.

Early in September, 1944, ten flying bombs crossed the East Coast of England flying west toward London. That was the start of Phase Two of the operation.

It was immediately decided to retain the Box and to push on with the plans for manning it with static guns. All A.A. Batteries along the South Coast were warned that they must be prepared for a move northward. Then followed an 11-day lull.

On the night of September 14 there was a further attack. This time the flying bombs crossed the coast to the north of the Box. As a result of the attack the Box was supplemented by the Strip, and the Strip was nothing less than a line of guns extending along the East Coast from the existing defenses in the Box, on the north of the Thames Estuary, to the existing defenses around Lowestoft and Yarmouth.

The establishment of the Strip was a considerable task. The over-all plan was for a belt of guns 5,000 yards deep with guns spaced 2,000 yards apart and as near the sea as possible. It meant the immediate move of 34 heavy batteries and 36 light, with all their arms and equipment. Of the heavy batteries 12 were static, which meant the provision of transportation for their mattresses and guns. Ninety-six gun-towing vehicles and their transporters were required at once.

Further, sites for all these gun positions had to be found. But that part of the English coast is flat, marshy and in many places accessible only by rough cart tracks. Roads had to be made, bridges built or strengthened. This is what the Strip involved in the end.

Accommodation was built for some 50,000 men and 10,000 women, in the winter months and on land liable to flooding and in some cases below sea level.

That meant the provision of 3,500 huts (the majority dismantled from unused sites all over Britain and shipped to the East Coast), 150,000 concrete blocks, 373,000 concrete slabs, 30,000 tons of hard core and the construction of road.

That in its turn required the employment of 1,500 skilled men and 3,500 unskilled. No civil labor could be spared, so A.A. Command had to find them all.

These men themselves needed tents and cookhouses, fourteen railheads for the stores and material (at which 300 freight cars were cleared daily) and an average of 900 3-ton trucks each day for a month.

So much for the basic requirements. The men and women of the batteries had to be fed and the guns had to be supplied with ammunition (in four months just over 50,000 rounds of 3.7" ammunition were fired). Nor could the men and women there be left with nothing but the site and ordinary rations. The ration scale was augmented, to provide an additional hot supper at night (the batteries were normally in action at night only) and for hot drinks throughout the day and night.

By way of amenities, 20,000 woollen garments were sent, 5,000 books, 1,000 upholstered chairs, 1,000 canvas chairs. Fifteen 16mm and one 35mm mobile movie projectors were sent on tour in the area. Rest hostels were opened in the nearest towns and transport for short periods of leave provided.

That was one problem. The next was the coördination of ground and air defenses.

The fundamental difficulty was that that area of Britain lies along the fringe of the biggest concentration of bomber airfields in the world. Before dawn the heavy bombers of the U.S.A.A.F. would leave, to return by midday or early afternoon. In the dusk they would be followed by the heavy bombers of the R.A.F., which would return during the early hours of the following morning. And, since the Germans knew everything about those bombing fleets by the time they were on their homeward way, what would be simpler than to mix up flying bombs with the returning aircraft?

It is no easy problem to solve. There is nothing an R.A.F. Controller hates more than the chance that ground gunners will fire into his fleets of returning aircraft, many possibly damaged and in difficulties and all with tired crews. And yet if a bomb slips by with those aircraft it may be the families of those very crews who are killed by that bomb because the guns have been interdicted from firing at the moment when it passes.

That complication was solved, largely by regulating the height at which friendly aircraft would fly and by close liaison between the R.A.F. Controllers and the gunners who manned the operation rooms of the Strip.

The final problem was peculiar to A.A. Command at that particular time. It was the problem of manpower and the comb-out.

Manpower is a question with which Britain has wrestled since 1940. It has a thousand ingredients, from the decision to build the present fleet of heavy bombers to the hope that if we put everything we had into the force that invaded Normandy the war could be finished in the autumn of 1944. The war did not finish that year and the armies in the field still needed reinforcements. A.A. Command had to be combed again, as it had been on various occasions before, to find men for overseas. This time every A1 man of 35 and under had to be drafted away. In all there were 5,203

of them, of whom 15% were N.C.O's. That comb-out had been deferred during Phase One of the flying bomb attack. Now A.A. Command agreed that they would not be justified in asking for any further retention. They would have to get along without these men and train others to replace them.

The defense against the flying bomb was a partnership between guns and searchlights, Army units under A.A. Command, and night fighter aircraft of the R.A.F. Fighter Command. The major work fell to the guns, because the attacks were night attacks and the hours of darkness were long, but the searchlights and the aircraft developed a remarkable combination. One point of difficulty was that the bombs were coming in much lower than they had when ground-launched. The average height was 1,000 feet instead of 3,000 feet.

This not only increases the difficulty of both the gunnery and the searchlight problem in that the time during which the target can be engaged is shortened; so far as the attacking aircraft is concerned, it also increases the risk of a crash. If an aircraft dives to overtake a fast-moving low target, at night, with the ground invisible, the risk of diving too far and of crashing is very real. This is particularly so when a searchlight is operating as, if the pilot flies into or near the beam, he will be momentarily blinded.

The R.A.F. Squadron assigned to this task engaged 136 out of the 177 targets through their area and shot down, by night, just under 51%. Throughout the winter they were grounded by weather on only four nights. With experiment and experience a drill was found for exposing and extinguishing the searchlights with which they worked that very much reduced the risk of dazzle for the pilot.

Phase Two of the flying bomb attack was the period during which the bombs were air-launched. It lasted from the beginning of September, 1944 until the middle of the following January. It was far from successful from the German point of view. The launching air force was estimated never to have exceeded 100 at any one time, and of the 495 bombs that could be considered as possible targets for A.A. gunners, the gunners shot down no less than 320. No substantial damage was inflicted on London, of the kind that had resulted from the summer attack.

Not that London escaped. Seven killed at Hackney in October when an ambulance station was hit, 15 killed at a Surrey hotel in the same month, 13 killed in North London in December and 14 at Lambert in January, these are specimens of typical incidents; not very serious in totals, but still enough to keep death in the forefront of the Londoner's mind.

For A.A. Command it was a period of intense activity, in the completion of permanent hutting on the isolated sites, in the training of further batteries in the technique of defeating this type of attack and in the replacement of the trained men withdrawn. There were attacks on 60 of the nights in this period. Shooting improved so much that for every 156 rounds of 3.7" ammunition a flying bomb was shot down.

Nor did the tactical situation remain unchanged. There was the curious and isolated attack on the northern Midlands on a night in December.

The attack cannot possibly have been aimed at any military objective. It was on a moderate scale and yet so dispersed that flying bombs dropped as far apart as Durham and Shropshire, over 100 miles distant from each other. The majority fell in open country and the damage they did, even to property, was superficial. The worst incident was at Oldham, in Lancashire, where a bomb fell in a crowded area, demolished 30 houses completely and seriously damaged another 39. It killed 21 people, seriously wounded another 37, slightly wounded 27 and there were 8 missing in addition.

But as a threat it was much more formidable. If the Germans were to abandon London as the main target and begin haphazard attacks over the length of England and Scotland then the problem would become infinitely more serious. The Strip, or line of guns, would have to be extended from 100 miles to at least four times as long. Preliminary steps were taken. The permanent defenses outside the ambit of the Strip were regrouped and plans were made for further deployments if the threat became an actual menace. Fortunately it did not. The attack was something of a last kick by that section of the *Luftwaffe* engaged on this job.

Phase Three of the attack was the second period of land-launched flying bombs, this time originating in Holland. The Germans had wasted no time in setting up sites in Holland after their loss of Northern France, but, at first, had used them solely for shorter ranged attacks on Antwerp, Liége and Brussels, all in Belgium. The delay in the attack on London was almost certainly imposed by the need to redesign the bomb to give it sufficient range to reach London from the sites in Holland. The German war machine was already hard-pressed. There was not time enough to improve the major components of the bomb. All that could be done was to increase its fuel tanks within the limits of the existing fuselage and to lighten the whole assembly, where possible, to increase its range by reducing fuel consumption. Incidentally, a higher speed was also obtained, another handicap to both air and ground defense.

The attack opened on the early morning of March 3, between 2:30 a.m. and 5 a.m. Twelve bombs were recorded, of which seven were possible targets for the guns, and of these seven, six were shot down. The attack continued on the following night and on 19 other days in that month. In the month 108 bombs reached the English coast. Eighty-seven were shot down by gunfire and only 13 reached London.

By the end of March the German strength was beginning to fail, for the simple reason that the Allied Armies in France had crossed the Rhine and were working their way steadily across the lines of supply into Holland. The flying bomb attack was being strangled before it could be born.

The final score for the attack is impressive. During the period from September, 1944 to the end of March, 1945, 1,170 flying bombs were launched, over 90% directed against the London area. Six hundred of them came within range of the guns and the gunners destroyed 407½ (the half being a victory shared with the R.A.F.). In addition 76½ were destroyed by the R.A.F. and 13 by fire from ships of the Navy. Only 79 reached London.

But those that could not be engaged, or which escaped all attack, killed nearly 550 people and seriously injured another 800.

AAA vs. Luftwaffe*

1 January 1945

Considerable publicity has been given to the ground rôle played by AAA in the Ardennes break-through. And that part of the story of the Battle of the Bulge is indeed studded with gallant exploits. AA units fought as Tank Destroyers, as Field Artillery, as Infantry. However, no less noteworthy is the job done by AAA in the normal rôle, in plain straightforward antiaircraft firing.

For the German counterattack launched on the Western Front, beginning 17 December 1944, was accompanied by the greatest show of air power by the *Luftwaffe* subsequent to the Allied punch out of the Normandy peninsula and the hot contest over the Avranches bottleneck. To get the full picture, let's go back to that chapter of *Luftwaffe* history.

The GAF took a beating at Avranches. Then, when General Patton started driving west and north around Paris, it was faced with the prospect of having its forward air bases overrun. A move to the rear was begun which continued until it was established on a series of air bases east of the Rhine. At the same time, foreseeing the character of the fighting to come, the Germans swung the emphasis in production of aircraft and crew build-up training entirely to fighter and fighter-bomber types, including jet-propelled, to the exclusion of heavy bombers. The *Luftwaffe* was pursuing a policy whereby it could, at some early date, challenge our own air force over the Western Front and, in addition, serve its part in an over-all ground operation.

The German High Command evidently decided that all factors, ground and air, were ready about the middle of December. Accordingly, the Battle of the Bulge began. The *Luftwaffe*, after months of comparative inactivity, came to life and operated in strength whenever flying conditions permitted. The effort initially was devoted to troop and supply dropping, to close ground support of the advancing enemy spearheads, and to an attempt to disrupt Allied supply routes feeding the fighting zone. The Allied tactical air forces were countered if they met in the air.

However, after the first few days the *Luftwaffe* began to include, in ground objectives, airfields basing our tactical aircraft. It had become apparent to the Germans that Allied air power could and would seriously impede their ground effort if not stopped. At the same time *Luftwaffe* losses, both to our AAA and air, were considerable. Before the German air strength should ebb lower, it was decided to employ it against our tactical air force in one smashing, powerful blow that would wipe opposition out. This was attempted on 1 January 1945.

According to an analysis by the AAA Section, Ninth Army, the enormous *Luftwaffe* effort of New Year's Day was brilliantly planned—if not so brilliantly executed. It is estimated that at least 600 aircraft took part in the raids on American sectors. The plan was worked out to minute details; routes of approach were selected to take advantage of terrain features. Navigation was by dead reckoning, with special pathfinder Ju 88's leading some formations, and some smoke bombs were used to mark changes in direction of flight. Planes flew on the deck, and strict radio silence was observed prior to the attack. Radio discipline was so good that approximately 100 planes were able to form in the half-light of early morning and approach our lines undetected until they were picked up by visual observation posts.

Two factors prevented the attack from being successful: the inability of the pilots to fly straight to the airfields they were to attack, and the accurate fire of AAA units. Either because they had insufficient training, or because the GAF conservation policy had kept their best pilots on the ground too long, many of the planes lost their way and were forced to attack targets of opportunity. In doing so, they ran into a hornet's nest of AA guns. Another indication of poor flying ability was the poor type of evasive action taken by pilots in the face of AA fire. Some pilots, in turning away from one gun, flew into the fire of another.

The main attack of the morning was preceded by harassing raids on New Year's Eve. These raids, apparently designed to decrease the efficiency of ground units against the big raid to come, continued most of the night and consisted mostly of bombing and strafing by single planes.

The first elements of the morning raid appeared about 0900 hours. From then until 1030 the air was full of small formations of German planes, operating at very low altitudes. Many of our fighter aircraft were on missions in the area of the German ground offensive. These planes returned in time to chase the fleeing Germans back to their lines, but the brunt of the defense fell on the antiaircraft artillery.

Lack of space and definite data prevents our telling the full story, but AAA units all up and down the Western Front had the shooting of a lifetime. We will select a few incidents for illustrative purposes. One of the most notable of the morning's actions occurred in the Metz-Bouzonville sector of the Third U. S. Army.

The AAA defense of the Metz area comprised two batteries of 90mm guns, the four batteries of a self-propelled AW battalion and one battery of another, and a semi-mobile battalion of 40mm guns. The area included an important airfield.

The AAA defense of the Bouzonville area consisted of one mobile battalion of 40mm guns, with one battery of another battalion attached. The entire battalion was employed in defense of the Corps artillery.

The first extended engagement came at Bouzonville when a battery of 40's engaged eight planes out of a flight of twenty. The flight consisted of Ju 88's, Me 109's and Me 110's and approached at 200 feet altitude, not in formation but strung out to cover the general area. The planes strafed Field Artillery and AAA positions, with the apparent mission of working everything over. Due to the low alt

*Extracted from *AAA Notes*, Hq ETOUSA, in Overseas Information Division, AA Command.*

tude of approach, no early warning had been received. In the action a personal duel developed between one of the Me 109's and the gun section engaging it. After the first strafing run the plane circled and came back for the second, but was promptly brought down 200 yards from the gun position. Out of this scrap, the battery claimed four Cat. I's and three Cat. II's.

The next attack, one of the most savage, occurred over the Metz Airfield and installations within the town. Without warning, twenty-five Me 109's came hedgehopping over the crest of the thickly wooded hills that defiladed the airfield from the northeast. From 0920 to 0940 hours, the German aircraft made four distinct strafing runs on the airfield and the gun positions of four automatic weapons batteries defending it. The planes attacked from all directions with a suicidal fanaticism and an utter disregard of the tremendous volume of AA fire directed at them. Altitudes varied from near ground level to 1,500 feet, the range of engagements from point-blank to 5,000 yards, and the speed of the aircraft varied from 250 to 300 miles per hour. The main objectives of the attack were closely packed P-47's in the dispersal areas that surrounded the field. The attacks upon the gun positions were incidental to the attack on the grounded Allied planes.

As a result of this action, which lasted only twenty minutes, AAA claimed fourteen Cat. I's and four Cat. II's. Of these claims, the carcasses of ten German planes were found in the immediate vicinity of the airfield shortly after the fight. Two 40mm batteries, using forward area sights, were credited with eight of the Cat. I claims.

The third engagement, comparable to the Metz action in intensity, occurred in the Bouzonville area. This time another battery bore the brunt of it, fighting off approximately twenty-five FW 190's and Me 109's from 0930 to 0950. The planes flew in no definite formation, but attacked Field Artillery and AA positions from all directions with rockets and 20mm cannon. No material damage was caused, but three members of an M51 crew (trailer-mounted quadruple MG turret) were wounded when their section was attacked from the rear while they were engaging another plane in the opposite field of fire. One Me 109 was forced to crash-land after its motor was hit by caliber .50 fire. The pilot was unhurt and attempted to escape to some near-by woods, when a gun section near the crash scene fired two rounds of 40mm ammunition just ahead of him. At sight of the tracers the pilot promptly stopped and sat down to await his captors. Two more Me 109's came down to investigate his crash landing and were shot down as they buzzed the area. The crashed plane suffered little damage, and upon investigation it was found that its guns had not been fired. The battery claimed ten Cat. I's, of which seven were found on the ground shortly after the engagement.

In addition to this last action, the battalion at Bouzonville had sporadic engagements throughout the morning. Total claims for the morning by this battalion amounted to 7 Cat. I's and five Cat. II's. On-carriage sight fire control was used exclusively.

The *Luftwaffe* played no favorites on New Year's Day. Few AAA units along the attacked front had any better hunting than those of the XIX Corps operating in the Ninth U.S. Army. These units, deployed in an area defense under control of the 12th AAA Group, numbered one 90mm battalion, two mobile 40mm battalions and one self-propelled AW battalion attached to Corps, three mobile 40mm battalions attached to Infantry divisions, and one platoon of AA searchlights.

The action commenced early, when shortly after the old year had been rung out (or, more appropriately, shot out) several of the searchlights employed in an AA illumination rôle picked up a He 111. The 90mm guns promptly engaged it and brought it down in flames.

New Year's Day dawned bright, clear and cold. At about 0900, hostile planes began to appear over the Corps area at altitudes varying from 200 to 2,000 feet. The attacking planes consisted primarily of long-nosed FW 190 D-9's and Me 109's which strafed and bombed ground installations. During the ensuing thirty minutes practically every AAA automatic weapon in the Corps went into action, causing the attackers to take violent evasive action.

Planes were crashing left and right. At one time five columns of smoke, indicating crashed aircraft, were observed in the vicinity of Hürtgen Forest from a high point near the Corps CP. Most of the day's action took place during this intense half-hour, though engagements with smaller numbers of aircraft continued throughout the afternoon.

Perhaps the most phenomenal piece of shooting was achieved by a 40mm gun located in a small clearing of the Hürtgen Forest. Because of tree masks, the gun was able to fire only one round at a FW 190, but the round burst squarely under the fuselage, setting the plane on fire and causing it to crash in flames less than a mile away.

A strip map, taken from the pilot of a crash-landed FW 190, showed the courses which the German planes were to have taken to American and British airports in Belgium. The map indicated that the aircraft which came over the Corps zone were well off course, resulting in disaster to a majority of the attackers.

After filtering and careful examination of claims, AAA units of XIX Corps were officially credited with destroying thirty-two of the sixty-four planes over the area, and probably destroying an additional thirteen planes. Except for seven crashes which fell in the Hürtgen Forest or across the enemy lines, every crash was visited and identified on the ground by officers from 12th AAA Group headquarters. It was impossible to reach the scene of these seven crashes because of extensive mine fields in the dense forest or proximity to the front lines, though numerous witnesses testified to the pillars of black smoke from the crash sites.

The commanding officer of the 12th AAA Group attributes the day's successes to three factors: the good fortune in having so many planes over the area during daylight at a low altitude; excellent gunnery on the part of gun crews, most of whom had had considerable battle experience; and the area defense disposition of weapons, by means of which a uniform volume of fire was brought to bear on all the enemy aircraft, regardless of the evasive action taken.

It was certainly a sad day for the *Luftwaffe*.

On another sector of the front an action occurred which was equally grim for the Germans and furnishes an instance of practically perfect coördination between AAA and Air Forces. This was at an American fighter base defended by two batteries of 40mm guns.

At 0900 on 1 January 1945 a flash was received from the Tactical Air Command early warning broadcast that a large group of enemy planes was heading in the direction of the area in which the airfield was located. From the plot it was seen that the hostiles were about five minutes flying time away.

The next warning was flashed by the antiaircraft OP's situated in a ring around the field from three to five miles out. A single Ju 88 was approaching with a large number of FW 190's and Me 109's some distance behind.

At this particular time the airfield had two of its squadrons airborne in the area, returning from missions. These flights were notified of the hostiles and directed to intercept. The field commander directed that the planes on the ground be scrambled as soon as posible. Some additional aircraft were warmed up and succeeded in taking off shortly after the enemy reached the field.

The friendly flights already in the air attacked the Germans several miles from the field and succeeded in breaking up their formations. Some of the enemy turned north to attack another field, but the bulk of them proceeded to come down in groups of two and three to altitudes of 100-200 feet from the approach altitude of 2,000 feet. They came over the field very low and fast, and strafed AA positions on the first pass. But from this time on for the next thirty minutes there were no more concerted attacks on the field, as every attempt by the enemy to bunch up was immediately broken up by our fighters.

Most of the dogfighting took place away from the field proper, so the air above the field was clear of large groups of aircraft much of the time. Enemy planes breaking away from our fighters and making strafing attempts at the field were engaged and driven off by the waiting AAA. At least four of the enemy were destroyed in this way.

As the action continued our fighters began to run out of ammunition and gasoline and had to land to rearm and refuel. On several such occasions, as a fighter came in for a landing, several enemy would dive down to pounce on it. The 40mm guns promptly engaged the attackers directly behind the helpless fighter and either drove them off or shot them down. One of our pilots, landing safely after having had a FW 190 driven off his tail by AA fire, leaped out of his plane and came over to the gun responsible and personally thanked the section chief.

In some cases AA fire was able to break up formations of enemy fighters attacking our planes, while in other cases the AA tracers pointed out low-flying enemy aircraft so that our fighters could pick them off.

When the action was over and all the enemy who could still fly had left the area, an inventory was taken of damage inflicted on us and damage by us to them. The airfield had one C-47 strafed on the ground and badly shot up, and one P-47 hit twice in the motor while parked in a dispersal bay. No damage was reported by our AA units as a result of the enemy strafing. Several gun revetments were struck by 13mm and 20mm projectiles, but no one was hurt.

The GAF, however, suffered the loss of a good part of the attacking force. The Air Force units of the field claimed thirty-five enemy shot down, two probables and seven damaged. Our AA units claimed seven Cat. I's and four Cat. II's. This out of a total attacking force of fifty-plus!

A careful check revealed that in no case did our AA engage a friendly fighter during the attack. "Cease fire" was ordered several times by section chiefs at guns because friendly fighters were approaching hostiles being engaged by AA. At no time did the Air Force commander order a "Hold fire." After the action he was asked if he considered a "Hold fire" would have given greater freedom to his planes. He replied that it was not necessary as he had complete faith in the ability and skill of the AA defending his field, so that his planes would not be fired on mistakenly.

To cite an example of the coöperation existing at this field, when AA machine guns are in action against attacking enemy aircraft, selected Air Force ordnance personnel go to designated machine-gun sites and augment the AA crews by acting as ammunition men. It is certain that mutual understanding of each other's problems was a large factor in the efficient defense of the field on New Year's Day.

The final figures on this greatest antiaircraft field day of the war are now in. It has been estimated by the Air Defense Division of SHAEF that between 790 and 870 German aircraft took part in eight major raids over the Western Front, in both American and British sectors.

Total confirmed claims of aircraft destroyed by American AA fire are 320 Cat. I's and 102 Cat. II's. At this juncture, it may be well to remember that while Category II claims are not aircraft actually seen to crash, they must be so badly damaged that they cannot reach base.

From what data we have available the score of enemy planes shot down in the air by American fighters reached a total of 160. British fighters and antiaircraft were active also, and raised the score still more.

But in any case, 582 kills out of a possible 870 is, to our mind, not at all bad. Would it be too immodest to state that we sort of dished it out and the *Luftwaffe* took it on the chin —on 1 January 1945?

The 105th AAA Battalion

The 105th AAA Battalion was dug in in deep slush and mud along a high Apennine slope in Northern Italy when it celebrated its 700th day of combat.

These veteran ack-ack men can look back on one of the outstanding service records among antiaircraft units in this war. They have supported eleven different divisions through five major campaigns, including three amphibious assaults. They have fought off over 1,000 Junkers and Messerschmidts, shooting down 75, almost certainly destroying 46 others and hitting and damaging several hundred more. They have received 55 special awards, including 37 Silver Stars for gallantry, and 139 men in the battalion wear the Purple Heart for wounds received in action—nearly all of them as a result of bombing and strafing attacks on their positions.

Their first 700 days at the guns may or may not prove to be the hardest, but they're pretty sure they'll never learn so much so fast again. Landing in Algeria with the invasion forces in November, 1942, the battalion was immediately strung out in detachments at vital points, a strategic pattern followed throughout the African campaign. First assignments included the beaches at Arzew, port installations at Oran, and neighboring airfields, all important enemy targets. In a few weeks the entire unit moved to the Tunisian front, two machine gun platoons being rushed by air to take up positions at Faid Pass and Thelepte airport, at that time the foremost airfield in Tunisia, while other units furnished antiaircraft protection for airports and dock areas along the coast to Philippeville.

On 6 December, they bagged their first German plane, a Junkers 87—"and that's when our history really began." By the middle of January, it looked as though practice had made perfect. Ten JU-88s raided Thelepte field. The "105s" went into action; several P-40s joined in to help with the cripples and between them they got every Jerry plane. In the Tunisian campaign, 105th gunners set up an unusual record for other ack-ack outfits to shoot at: they knocked out just over 12% of all enemy aircraft engaged with an average of only 111 rounds of ammo per plane.

On two different occasions back in Tunisia, 105th ack-ack men turned infantrymen. At Kasserine Pass in late February and again in March, forward sections of the battalion were overrun in German counterattacks. In the first, six machine gun crews and additional antiaircraft men with M1s converted their gun pits into foxholes and fought it out until three of their men were captured by the numerically superior German infantry. At one point, the Krauts were throwing hand grenades into the gun emplacements—a little maneuver the fellows were never told about back at Indio, California!

In March, a German Panzer attack in their region sent seven Mark VIs and 50 light tanks within 800 yards of the battalion's advanced sections. First Lieutenant Carl J. Witkop of Lansing, Michigan, and Corporal Vincent Marcarello of Warren, Ohio, won Silver Stars as they held one pit against infantry elements 400 yards away while covering the withdrawal of other sections. In the preceding five days, men of the battalion had shot down 14 enemy aircraft, scored 9 "probables." For the week's work they were commended in a special order by General George S. Patton, then their corps commander.

Through the weeks that followed, the battalion moved forward in support of infantry troops and was on duty at Bizerte at the end of the Tunisian campaign. Later the unit trekked 900 miles back to Oran, where it acquired new, self-propelled, antiaircraft guns and began preparations for the invasion of Sicily.

For that operation, sections of the battalion were set up on the decks of assault LSTs carrying elements of the 1st Infantry Division. Coming in at Gela on D-day, they quickly set up defenses over the beaches and from early morning threw flak at raiding planes in almost hourly attacks. On D-3, the Jerries struck back with a vengence, bombing a platoon of the 105th just coming onto the beach and causing 27 casualties. As the 1st Division moved forward, the battalion took up the rôle of protection for the division's artillery, and supported their batteries in all phases of that strenuous 38-day campaign.

When the Fifth Army invaded Italy, the 105th participated in the landings at Paestum and in the first stages of the campaign supported four infantry divisions—the 45th, 36th, 3d and 34th. With the 34th, the battalion began the long, bitter drive up the Apennines. For ack-ack men it means months of deadly monotony—frequent moves from one lonely muddy hill range to another, "digging in," day after day of 24-hour gun guard out in all kinds of weather, pulling out and starting all over again. Yet round the clock, the gun sections must be on the alert, ready to fire at a second's notice as coördinated teams.

The 105th continued with the 34th across the Volturno and up Italy to the Venafro and Cassino sectors, where the battalion suffered 21 casualties in one attack by the Luftwaffe. After a brief rest, the battalion returned to the front again for the Fifth Army's spring offensive, supporting the newly arrived 85th Infantry Division during the remainder of the campaign through Rome. Since that time it has worked with the 88th, 91st and 34th Divisions in the long push across the Arno river and through the Gothic defenses into northern Italy.

Activated as an antiaircraft unit at Camp Hulen, Texas, in January, 1941, the 105th trained at Camp Young, California, before sailing for Scotland and England, in August of 1942. There it received intensive amphibious training which it was to use three times in the next year. Originally, the entire battalion came from National Guard cavalry units in the vicinity of New Orleans, Louisiana, but now includes ack-ack men from nearly every state in the union. It is commanded by Lieutenant Colonel John Barkley of New Orleans.

AAA Planning for Waterborne Invasion

By Colonel M. R. Thompson, Coast Artillery Corps

The third time I was fortunate enough to get in on a full-scale waterborne invasion I determined to keep notes on all the steps taken in the AA planning, hoping such notes might serve as a guide for someone else. But as the planning, which started about 6 January, did not culminate in a D Day until 15 August, the chronological record is more confusing than instructive and I have reorganized the material into what I hope is a more intelligible sequence.

Early in the war there seemed to be a tendency in the U. S. to accept as gospel the words written back or brought back by officers overseas, without the realization that any one officer's conclusions are colored, indeed created by his particular and limited experiences. These experiences are certain to include items of climate, terrain, tactics, and even matériel peculiar to the theater he was in or the enemy he fought. That I recognize this does not mean that I am immune to the same influences. All that follows, therefore, bears the stamp of such special circumstances as obtained in the invasions of Sicily and Southern France, in the planning of which I had a hand, as well as the invasion of French Morocco, where I was in on the execution only.

One more word of caution: Watch out for rules. The use of specific rules as a guide is excellent. Any attempts to substitute them blindly for judgment may be fatal. I have some confidence in my judgment in the AAA planning of an amphibious operation. I take a dim view of rules, including my own.

Preliminaries

The planning of a full-scale waterborne invasion of hostile shores is always listed as one of the most difficult tasks that can confront a Staff. Repetition improves the performance but multiplies the details, because more is learned at each repetition. For a major operation involving two or more corps, considerable time must be available. Once the planning commences, time will pass with increasing rapidity, and the things that must be done pile higher and higher. From the date the major forces for the invasion are determined, not less than 90 days should elapse before the Force sails for its destination. During that period the assault elements must receive amphibious training and special training based on the climate, terrain and defenses to be encountered; they must be checked as to equipment and personnel, must be moved to embarkation points and mounted. All follow-ups must be trained and equipped where necessary, and phased to move to points of embarkation. Simultaneously, all plans for the operation must be perfected, alternate plans devised, Naval and Air action coördinated, and an increasingly large number of officers made cognizant of portions or all of the details. Security of the plans necessitates this number being kept to the minimum at all stages; the necessity for information and planning requires that more and more individuals be brought into the picture.

The first step in an amphibious operation as in any operation is the determination and assignment of a mission by higher authority. On the Army level, the mission will be in general terms, somewhat as follows: "Effect a landing in the general area 'A,' establish a beachhead and secure a firm base for future operations."

Frequently the nature of the future operations will be indicated, but this will not always be the case, since those operations may depend, not only on the success of the beachhead but also on unpredictable circumstances obtaining elsewhere at the time.

In general the War Department or the Theater Commander will indicate the approximate size (in Divisions) of the forces to be available or a decision on this matter will be made after preliminary studies.

At this point or earlier, the Force Commander should assemble a complete staff, including planning sections of the Navy and Air Force, in an appropriate area, preferably under one roof or in adjacent buildings, under appropriate conditions of secrecy. The process of planning consists thenceforth of a series of trial and error planning, by each section, based on the information currently available.

Organization of the Antiaircraft Artillery

The organization of AAA with an Army, Corps or Division has not been fully determined. For a Task Force the question must be determined by the organization of the Task Force, the mission, the probable amount of AAA involved in each echelon, and such considerations of experience of units, width of the assault area, and subsequent operations as will affect the subject.

The set-up should satisfy the following requirements:

a. Flexibility. Since, in the initial phases, action will be under sub-Task Force Commanders, usually Divisions, responsibility for AA Defense must be vested in the sub-Task Force Commanders, and they must be given adequate AAA Headquarters for control. Subsequently, with the arrival of Corps Headquarters and the joining of the separate assaults, Corps will take over control of at least the AA defense in rear of division boundaries, and of airfields, and Corps Artillery positions within Division areas. Corps may take control of all AAA, placing certain units in direct support of each Division. Later, with the arrival of Army Headquarters, the latter will take over all AA defense of vulnerable points in rear of Corps boundaries and of certain points as Airfields and Army installations within Corps areas. Finally, with the advance of the forces from the shoreline, the defense of areas in rear of the Army and of some, as airfields, within Army boundaries will be taken over by an Air De-

fense Command, a theater or communications zone command or other rear area headquarters. The organization of the AAA must permit these changes to take place with a minimum of movement, messages and changes.

b. Unity of Command. It is a recognized principle with the Navy and the Ground Forces, that the officer responsible for an operation should command all elements that are required for its success. At each phase this requires the AAA to be under the command of the senior commander in the area concerned.

c. Supply and Administration. Until AAA Groups and/or Brigade Hq are given personnel to perform administrative and supply functions these must receive special thought since supply agencies will rarely deal with Divisions on one hand and Battalions on the other. It is usually preferable to require the AAA Group and Brigade Hq to perform a large part of these functions. This reduces somewhat the number of battalions each can handle efficiently.

d. Antiaircraft Intelligence Service (AAAIS). In the combat zone, coördination of the AAAIS and contact with AWS are extremely difficult problems. They are further complicated in an amphibious assault. Only Brigades are provided (in this Theater) with the AA Operations Detachments, who have adequate personnel and equipment for such coördination.

Whatever organization is evolved must then,

(1) Provide flexibility in Operation,
(2) Observe unity of Command,
(3) Handle Administrative and Supply problems, and
(4) Insure adequate warning of approach of hostile aircraft.

e. Following is a solution:

For the assault phase:

(1) An AA Section is formed for the Task Force of about nine officers and 18 to 20 EM.
(2) All antiaircraft is *assigned* to the Army.
(3) It is then *attached* to subordinate units as follows for the assault:
  (a) To Divisions. So much AAA as is needed for defense of the Division, plus that for its assault beaches, or small ports and any airfields that will be captured and placed in operation prior to arrival of Corps AAA. One Group Hq per Division is included, and should be with the Division for all planning.
  (b) To Corps. So much AAA as, when added to that with Divisions, will cover all requirements until arrival of Army AAA. One Brigade Hq and, perhaps, one Group Hq per Corps is included. The Brigade Hq should join the Corps when Corps planning begins.

Subsequent to assault phase:

(1) With arrival of Corps Hq, with its AAA Brigade and probably additional AAA, the Corps Brigade takes over all AAA, placing, normally, one AW or SP Bn in direct support of each Division. One Group Hq will normally command this Divisional AAA for all the Divisions, the remainder of the Corps AAA being divided as dictated by circumstances.
(2) With the arrival of the Army Hq, with an Army AAA Brigade and probably some additional AAA, the normal forward area situation will be brought into operation. The Beach and small port defenses will be generally taken over more or less intact by the Army Brigade, as will the defenses of airfields and, probably, bridges and defiles behind or near Corps rear boundaries.

Final Phase: When it becomes possible to draw a rear boundary behind the Army, the Army should be relieved of AA responsibilities behind that boundary. The minimum shifting of units at this phase, as at each of the other phases, is desirable. Most of the necessary shifts should have been made gradually and prior to the date of changing the responsibility. This involves, in general, replacing mobile and experienced units in rear areas with semimobile and less experienced ones.

While the Task Force has been indicated as an Army, because of my experience with that particular size of unit, similar principles will apply to any size invasion Force.

Determination of AAA Requirements

The final determination of AAA forces required for an operation cannot be made until the plans for the operation are firm and nearly complete. But it will be essential to have an estimate of these requirements at the earliest possible date, both for the sections concerned with supply and for higher authority to plan for making such units available. The following method will give an approximate answer, taking final fractions as unity.

a. For Gun Bns—Multiply the number of Divisions by two. (60% mobile.)

b. For AW Bns—Multiply the number of Divisions by three. (75% mobile.)

c. For S/L Bns—This involves several considerations, all of which depend on the Air Force or Navy. Normally lift will not be available for S/L's in the early stages. Two gun Bns with SCR-584's can be brought in the same vehicle lift as one S/L Bn with -268's. But if Airfields are to have AW/SL defense, figure 12 S/L's per field. If ports are to have S/L's the size of the ports will determine the number of Bns, but take not less than one Bn per port if used at all. If Fighter-Searchlight teams are to be formed each will require about four Battalions of S/L's (and 1,500 miles of wire).

d. Barrage Balloons. Multiply the number of RCT beaches, if known, by 15. If not known, provide one VLA Bln Bar Btry per Division. Check that Navy will supply balloons for all Naval ships and craft to include LST's, and that the War Shipping Board will equip all merchant ships with balloons.

e. Brigade Headquarters and AAOD's—One per Corps plus one per Army plus one for Ports and rear areas.

f. Group Headquarters—Two per Corps plus two per Army plus two (or more) for rear areas.

g. Ordnance Maintenance Companies (AA)—One per AAA Brigade.

h. Signal Radar Maintenance Units—One per three Gun Bns plus one per S/L Bn.

i. Renshaw Teams—One or two per Army if Brigades do not have teams.

All the above will be influenced by so many factors, principally the expected enemy air effort in the target area, that it should be used with caution. It was a sound basis in the Mediterranean Theater in early 1944.

The final requirements must be found by more detailed investigation. The operation must be projected ahead and the peak requirement for AAA determined. This analysis of the probable progress of the operation is also essential to determine proper phasing of AAA into the target area. The following are the items that must be considered, more or less in order of priority.

(a) Ports, anchorages, and assault and supply beaches.
(b) Divisions.
(c) Field Artillery (nondivisional).
(d) Bulk gasoline unloading point.
(e) Airfields.
(f) Bridges and other defiles.
(g) Beach and other supply dumps.
(h) Railheads.
(i) Communications centers.
(j) Critical power plants and dams.
(k) Certain manufacturing centers.
(l) Higher command posts.

One peak requirement will come after the capture of the first port or ports, when there will be shipping lying off the beaches as well as in the ports. It is desirable that the heaviest possible defense be present in the port for the first enemy raid. Other peak requirements will occur when airfield construction permits bringing in medium bombers, and subsequently, perhaps, heavy bombers. Other peaks may be discovered as the operation is projected forward. An experienced officer must supervise carefully this projection of the operation and consultation with G-3 and Air as to probable eventualities must be continuous.

The final requirements having been determined, close liaison with the next higher headquarters AA Section must be maintained to obtain the best units available and to arrange for their being made available in time to permit necessary training, and, if necessary, their employment in concentration and embarkation areas, prior to their own embarkation.

Training

For the assault elements.

The Divisions making the assault will undergo certain special training. For any part of this training that involves AAA, the latter should participate. This is especially true of amphibious training. The planning at each echelon will be going on at the same time as the training, especially near the end, and the Corps Brigade Hq and the Division Group Hq should be with their respective Corps and Divisions during the training and planning phase. Since more AAA will be attached initially to each assault Division and probably to the assault Corps than they normally employ, not all of it can usually be attached during the entire training period. For preliminary training for RCT's in a Division a battery of AW or SP per RCT will suffice. For Division training the SP or AW Bn and the Gun Bn should be available per Division. For the rehearsals, all AAA involved in the phase being rehearsed should take part.

All AAA that will be required to land over beaches must be given amphibious training to include waterproofing of equipment, loading on appropriate craft (do not confine this to one type), unloading under various conditions, firing from craft (AA and shoreward), Field Artillery and assault firings, emergency expedients for every probable emergency, and as much AA firing practice at aerial targets as circumstances permit. The firing, although listed last, must not be neglected.

A successful assault consists of fitting together thousands of details, none of which should be neglected, not because the details will all click as planned, but to have so many that enough will click to insure success.

While the assault AAA will, in general, train with units it will support in the attack, none of the appropriate items of training listed for subsequent AAA should be neglected by the assault units.

AAA subsequent to the assault. Much of the AAA coming into the target area subsequent to the assault may land over the beaches and will require waterproofing training. Some of it will come in with follow-up divisions and corps and should train with those units. The following items of training should be covered for all follow-up AAA to the extent considered necessary and permissible by time and facilities.

(1) Recognition of Aircraft.
(2) Recognition of tanks, SP artillery, enemy ships and craft.
(3) Firing: AA, AT, FA, Waterborne.
(4) Maintenance, and Field expedients.
(5) Supply, as handled by Army and Base.
(6) Administration, as laid down by Army.
(7) AWS-AAAIS and communications as planned in SOI and AWS-AAAIS instructions.
(8) Field problems to include night preparation and occupation of positions.
(9) Mines and booby traps; mine detectors.

Emphasis must be placed on different phases of training for different units, based on their previous experience and contemplated employment. Careful analysis is necessary in each case, but if time permits, flexibility in employment is gained by uniformity of training. This training should be intensive, vigorous and as practical as possible.

The Planning

Continuous contact must be maintained, by the AA Section, with the Air Forces, the Navy, the G-2, and G-3 Sections of the Force, and with the AA Section of the next higher Headquarters in particular, as well as with the other staff sections in the Force Headquarters.

The G-2 will obtain information on the following items of particular interest to the AA: Terrain and climate; beaches; ports; airfields and enemy air dispositions; and enemy capabilities. G-2 also coördinates map and air photograph requirements, and obtains interpreters, if necessary.

The G-3 Section will work out various plans with various schemes of maneuver, and with various forces in the assault and separate follow-ups. Of these, all must be analyzed for AA defense but of those under consideration, the one requiring the most AA defense will be used as a planning

basis for determining AAA requirements until the final decision is made and one of the plans is finally selected by the Force Commander. This decision may not be made for two to four weeks. With the G-3 Section also must be worked out AAA rate of build-up. All orders and reports of a tactical or training nature and details of training, moving and mounting the Force are cleared through G-3.

The AA Section of higher Headquarters will provide information on available AAA for the operation, on its status as to organization, employment, equipment, training, and possible dates it can be released. From that section will come information on current enemy air tactics and AAA tactics. With this section, also, must be worked out the details of AAA troop movements, of responsibility and coördination of AAA defenses of training, concentration and mounting areas, and of special training and equipment.

From the Air Force must be obtained more detailed information on enemy air capabilities, on air support for the operation, on airfields to be used in the captured area, on rate of build-up, on the establishment of areas restricted to flying and precise rules of AAA fire for all areas. By coördination with the Air Force, details of aircraft recognition signals, Air Warning Service plans and coördination of Controllers with AADC's, provision of liaison officers in operations rooms, and elimination of interference by Air Force GCI sets and AAA Radars must be worked out. The possibility of setting up fighter S/L belts must be examined. SOP on air warnings to civilian communities must be settled.

The Navy will provide information on their Air Warning which must be coördinated with the Air Force AWS, on such naval air support as they expect to provide, on their requirements for protection of roadsteads adjacent to beaches and ports, on whether they have available or will require from the Army balloons for all ships in the operation, on enemy naval capabilities for attacks on shore installations and probable requirements for Coast Defense, on any Naval shore installations requiring AAA or Coast Defense. Arrange also with the Navy for balloon servicing of their ships in ports and of Army balloons in assault area.

Contacts being maintained with the other sections of the Army Hq are essential for the following details, among others.

a. CWS.
   (1) Amount of smoke equipment.
   (2) Type of smoke equipment at various phases.
   (3) Control of smoke units.
   (4) Coördination of instructions to subordinate units on use of smoke on beaches, in ports, and for river crossings.

b. G-1.
   (1) Personnel replacements.
   (2) Policies during planning and operations phases as to promotion, transfers, reorganizations.

c. G-4.
   (1) General policies on Supply.
   (2) Approval of equipment in excess of TBA.
   (3) Details of supply will be worked out with Special Staff Sections, Ord, Sig, CWS, Engr, etc.

d. G-5 (Civil Affairs) and Passive Air Defense Section.
   (1) Plans for SOP on air alerts in cities.
   (2) Passive air defense measures for troops.

e. Artillery Section.
   (1) Amount of Field Arty in Div., Corps and Force, by type and number of Bns.
   (2) Organization of all Field Arty in the assault and for subsequent operations.
   (3) Coördination of maps to be used for ground fires.
   (4) Arrangements for land firing techniques by AAA, both antitank and fixed target fires.

f. Adjutant General.
   Arrangements for publication of all orders, plans, instructions, etc.

g. Ordnance.
   (1) Checking size and number of units of fire provided. (Normal and for assault.)
   (2) Priorities on re-equipping units.
   (3) Provision of matériel replacements, for all types of Ordnance matériel.
   (4) Provision for Ordnance equipment over T/BA.
   (5) Provision of adequate Ordnance (AA) maintenance companies.
   (6) Determining amounts and proportions of each type of ammunition for each type weapon.

h. Signal Corps.
   (1) Priorities on re-equipping units.
   (2) Provision of civilian and Signal Corps lines for AAAIS and for sending AWS from Controllers (SOR) to AAOR's.
   (3) Radar and Radio spare parts, radar maintenance units, and replacements.
   (4) Allotment of adequate radio frequencies as required. These must fit available radios.
   (5) Signal Corps equipment in excess of T/BA.

i. Engineer.
   (1) Map scales.
   (2) S/L repair detachments.
   (3) Spare parts and replacements for S/L's and balloons.
   (4) Special arrangements for movements of hydrogen generators.

The Plan

The AAA plan does not and cannot spring full blown from the typewriter but must be evolved slowly and laboriously by assembling all the innumerable details that go to make it up, checking each detail with all other sections, Arms and Services concerned, until it can be labeled "firm" and then keeping a check on subsequent changes that might affect it.

Outlines of plans given in the annexes to various field manuals are valuable guides. But they do not normally contemplate the detail that must be included in an amphibious plan, nor does the standard form lend itself readily to their inclusion. A plan for an amphibious operation covers more time and more contingencies than are usually found in a five-paragraph order. The form can, by proper modifications, be made to include them if that form must be followed. Certain paragraphs, as the friendly and enemy air situation, can best be covered by references to other parts of the combined plan. Some such items must be covered in summary, at least, since the AAA plan may receive inde-

pendent circulation. Certain paragraphs will be long and detailed to insure coördination; the extent of this detail will appear later.

The form that follows is patterned on the five-paragraph form. In all honesty I must admit that I have never used it for various reasons, but I am not convinced that I used a better one. It should be remembered throughout that only the AAA will give careful study to this plan. Other elements will have voluminous instructions of their own to read, therefore be sure to have points of interest to them included in other plans where they will be seen by those involved. This applies especially to Navy and Air Forces. It is difficult to include in this form the successive phases of the operation, yet it is desirable that as complete a picture as possible be given since subordinate units can then plan more intelligently.

"1. a. (1) Enemy Ground Forces—Refer to G-2 Estimate and current G-2 reports. Give brief summary.
(2) Enemy Naval Forces—Refer to N-2 Estimate and current G-2 and N-2 reports. Give brief summary.
(3) Enemy Air Forces—Refer to A-2 estimate of supporting Tactical Air Command. Summarize essential information under enemy air capabilities, probable reaction to the operation and probable maximum and sustained efforts.
b. (1) Brief statement of support by any adjacent Ground or Naval Forces not in the operation (or give reference). Special detail on AAA if it affects this operation.
(2) Plan of support by Air Forces other than by that directly supporting the operation. Give all available useful details.

2. a. Mission of this Force.
b. Organization of the Force to include Divisions and any smaller units making separate landings as Rangers, Airborne Troops and Raiding Parties. Show all AAA as organized for the assault.
c. Rate of build-up of Divisions, AAA, and smoke units.
d. Scheme of maneuver of Task Force. Give details on Airborne elements.
e. Air Support Plan. Refer to plan of Air Commander and summarize principal points. Show rate of build-up including airfields and dates. Give details on AWS.
f. Naval Plan. Give reference and essential details, as Ship Signals for alerts, responsibilities for coast defense, balloon servicing, etc.
g. Smoke Plan. Refer to Chemical Warfare Plan. Give details on smoke.

3. a. Assign responsibilities for AA defense to each subordinate unit, *i.e.*, Corps, separate Divisions, airborne forces and the Force AAA units. Indicate on whose order these will change, under what conditions, and what changes are contemplated. Subheadings for each successive phase may be used.
b. Scales of defense at each phase, in detail for the assault, in general for subsequent phases.
c. Passive Air Defense. Refer to PAD plan, or if this is an AA responsibility in your Hq, include instructions to all units, or preferably, publish separately.
d. Rules for AA fire and restrictions to aircraft (agreed, of course with Air, Navy and G-3). Refer to separate publication or, if short or not separately issued, include here.
e. Instruction on employment of AAA weapons in Seacoast, Antitank and Field Artillery rôles.

4. Refer to Administrative Orders. Give summary of essential items as ammunition and rations to be carried, etc. Show breakdown of battalions into assault and follow-up echelons.

5. Refer to Signal Annex and SOI. Give details of AAAIS and AWS coördination and operation. Show frequencies allotted where these are not part of lower echelon block. Show proposed CP locations afloat and, if known, ashore."

Instructions

With the plan form used above it is not convenient to include all the detailed instructions that are necessary to insure complete coördination. Accordingly, Operations or other memoranda will be issued on at least the following subjects:

a. Rules for AA fire.
(1) Restrictions on Aircraft, Army and Navy.
(2) Restrictions on AAA, Army and Navy.
(3) Special rules for ports, airfields, etc.
b. Preinvasion Training.
c. Consolidated list of excess equipment authorized to AAA units.
d. Reports required on AAA Activity.

The Aftermath

After all the hectic planning you will climb on a boat one fine day, and find your work is mostly finished. You'll think of a dozen details that might go wrong. It is unlikely you'll be able to do anything about them en route. But it is well to devote a lot of thought to the subject, not worry, but constructive thinking. Because some things will go wrong and they can each be improved if not remedied after landing if forethought has been devoted to them. Try to arrange to have a jeep with you when you debark or you'll have trouble getting around. You'll get little information initially unless you go after it. Keep your thinking fluid and avoid ruts. And may you have successful if not happy landings.

AAA Planning for the Invasion of Southern France

By Lieutenant Colonel S. S. Gregory, Jr., Coast Artillery Corps

Organization of the Seventh Army AAA Section

On 2 January 1944 the Commanding General Seventh Army assembled his staff in the advance CP at Palermo, Sicily and said, "We are gonna start killing those SOB's again. Colonel Hawkins, Deputy Chief of Staff, will give you additional instructions."

The Army executive planning staff was selected and we were told to pack and be at the local airfield by 0800 hours 3 January. The following morning we left Palermo by air and arrived at Algiers, Algeria, North Africa that afternoon and then proceeded to Allied Force Hqs. There we were instructed to establish a planning CP along with the US Navy and Air Force, French Army, Navy and Air Force and British Navy and Air Force in an old college building located about five miles from town.

Several days later Seventh Army was designated as Force 163 by AFHQ and given the mission of planning and executing operation Dragoon.

I *Army Plan*

1. Operation DRAGOON—to establish a beachhead in Southern France to use as a base for capturing the ports of Toulon and Marseilles and subsequently to exploit north towards Lyon and Vichy.

2. The Seventh U.S. Army, to be supported by Med. Allied Air Forces (MAAF) and Allied Navies and composed of the following units was assigned the mission of planning and executing Operation "DRAGOON" subsequent to Operation "OVERLORD" (Northern France):

a. VI US Corps composed of:
3d US Inf Division; 36th US Inf Division; 45th US Inf Division; 1st US Special Service Force; French Groupe de Commandos (2 Bns); Combat Command, 1st French Armored Division; Supporting Troops.

b. French Armee "B" composed of:
Two French Corps; Five French Inf Divisions; Two French Armored Divisions; Supporting Troops.

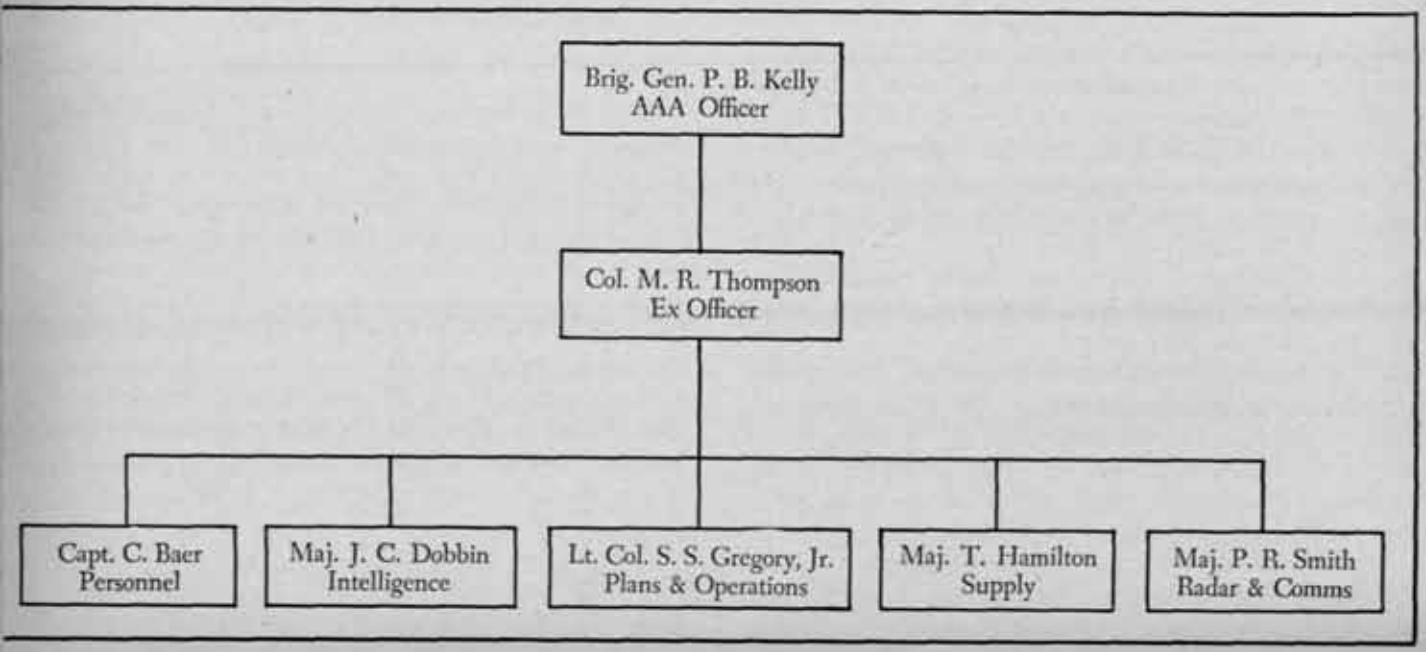
c. 1st Airborne Task Forces composed of:
One British Parachute Brigade; One French Parachute Regt; One US Parachute Regt; Two US Parachute Bns; One US Glider Bn.

2. The main assault was assigned to the VI US Corps as shown in paragraph I, 2 *a* above, supported by Air and Navy.

II *Army Antiaircraft Plan*

1. After a careful study of the Army plan, Air plan, Navy plan, and enemy air capabilities, the following scales of AA defense were selected:

	Gun Bns	*AW Bns*	*SP Bns*	*S/L Bns*	*BB Btry*
Minor Ports	1	1			1/3
Major Ports	3	2		1	1
Airfields	1/2	1/2			
Bridges		1/4			1/6
Divisions			1		
Corps	2	2			



Based on the above scales, the total AA requirements were:

	US	FRENCH	TOTAL
Brigade Hq & AAAOR	4	0	4
Group Hq	12	0	12
Gun Bns	17	7	24
AW Bns	20	20	40
SP Bns	3	0	3
S/L Bns	2	0	2
BB Btries	3	0	3

Brigades—

a. One with VI US Corps.
b. One with French Armee "B."
c. Two with Seventh Army to command all AAA in rear of the rear boundaries of VI Corps and Armee "B."

SP & AW Bns—Each US Inf Division has one SP Bn and each French Division has one Organic AW Bn.

French—The French do not have any Brigades or Groups but each Division and Corps does have an AA Special Staff Section which commands all AA assigned or attached to that formation.

2. After many conferences with the AA Officer of AFHQ, the following American AAA units were assigned to Seventh Army for Operation "DRAGOON";

Brigades	*CG*
31	Brig Gen Chapin
34	Brig Gen Robinson
35	Brig Gen Townsend
44	Brig Gen Tobin

Groups	*CO*
1	Colonel Williamson
5	Colonel Henegan
9	Colonel Lavery
68	Colonel French
74	Colonel Bender
80	Colonel Cole
91	Colonel Hafer
105	Colonel Turnbull
106	Colonel Hartman
209	Colonel Townson
213	Colonel Goodman
505	Colonel Roy

Gun Bns (Mobile)	*CO*
62	Lt Col Buynoski
67	Lt Col Earle
68	Lt Col Bates
72	Lt Col Dowd
108	Lt Col Anderson
214	Lt Col Kietzman
216	Lt Col Hammond
403	Lt Col Campbell

Gun Bns (SM)	*CO*
73	Lt Col Rinker
74	Lt Col Dicter
87	Lt Col Orrick
112	Lt Col Eubank
167	Lt Col Murrin
215	Lt Col Moody
406	Lt Col Baruhan
409	Lt Col Batson
410	Lt Col Watson

SP Bns	*CO*
106	Lt Col Arnold
441	Lt Col Leary
443	Lt Col Larson

AW Bns (Mobile)	*CO*
107	Lt Col Pope
431	Lt Col Davis
433	Lt Col Thompson
436	Lt Col Schultz
437	Lt Col Mayden
439	Lt Col Bowers
451	Lt Col Synder
533	Lt Col Dance
534	Lt Col Donigan
536	Lt Col Brubaker
893	Lt Col Utke
894	Lt Col Chandler
895	Lt Col Wolf
898	Lt Col Kress

AW Bns (SM)	*CO*
201	Lt Col Sherfesse
400	Lt Col Hempstead
454	Lt Col Shaver
638	Lt Col Hocker
896	Lt Col Anderson
899	Lt Col Smith

S/L Bns	*CO*
331	Lt Col Armstrong
353	Lt Col Courtenay

BB Btrys (VLA)	*CO*
102	Major Flente
103	Major Jones
104	Major Kohler

AAAOR	*CO*
31	Major Witt
34	Major Higginbotham
35	Major Jakobowsky
44	Major Brown

III *Preparation and Organization of Assault AAA*

1. All the AA units selected to accompany the assault forces and initial follow-up were relieved of operational missions in Italy and Sicily and moved to the Salerno Invasion Training Center for a short period of intensive amphibious training with divisions and re-equipping prior to actual embarkation from Naples and Taranto.

The organization of AA for the assault was:

VI Corps — D Day

35 AAA Brigade	433 AAA AW Bn
108 AAA Gun Bn	451 AAA AW Bn

3d Inf Division D-Day	*36th Inf Division D-Day*
5 AAA Group	68 AAA Group
441 AAA AW Bn (SP)	443 AAA AW Bn (SP)
72 AAA Gun Bn	68 AAA Gun Bn
534 AAA AW Bn	895 AAA AW Bn
104 AAA BB Btry	102 AAA BB Btry

45th Inf Division D-Day

105 AAA Group	216 AAA Gun Bn
106 AAA AW Bn (SP)	107 AAA AW Bn
103 AAA BB Btry	

2. Due to limited shipping, two Corps AW Batteries and the AW Bn with the 45th Division were not loaded on the assault convoy.

3. In order to provide Armee "B" with command echelons and to supplement their AA, the following US units were attached and arrived in the target area over secured beaches on D + 1:

34 AAA Brigade	62 AAA Gun Bn
80 AAA Group	893 AAA AW Bn

4. All AA follow-ups to the assault area other than that listed in Paragraphs 2 and 4 above were mounted from Italy, Africa, Corsica and Sardinia.

IV *Assault Phase*

1. The AA with each division went ashore in the following order of priority: (H-Hour was 0800 15 August 1944)

a. SP Bn—one battery with each RCT and one with Div Reserve. All SP's initially went into position on the beaches.

b. BB Btry—one platoon (15 balloons) with each RCT. The inflated balloons with hand winches were walked ashore from LCT's by three men each.

c. Group Hqs—Coördination of all AA in the Division Sector.

d. Gun Bn—Each battery proceeded to pre-selected positions based on study of maps, aerial photographs and models, thus giving a coördinated gun defense coverage of the entire Corps assault area.

e. AW Bns—General beach defense in order to relieve the SP's to move forward with Division artillery and Infantry elements.

2. The Gun Bn and two AW Bns operating directly under VI Corps were divided over the entire Corps sector in order to thicken the initial defense and also add to the depth.

3. By the night of D Day the following AA was in position and operational:

12 SP Batteries	14 AW Batteries
14 Gun Batteries	90 Barrage Balloons

4. On D + 1 French Armee "B" began unloading the following AA over newly secured beaches west of the assault area:

34 AAA Brigade
80 AAA Group
62 AAA Gun Bn
893 AAA AW Bn
21 AAA AW Bn (French Div Organic)
37 AAA AW Bn (French Div Organic)

V *Build-up of AA to D + 10*

1. After the assault lift the build-up was as follows:

213 AAA Group	D + 8
31 AAA Brigade	D + 10
112 AAA Gun Bn	D + 10
36 AAA AW Bn (French)	D + 10
11 AAA Gun Bn (French)	D + 10

By D + 10 the following AA had landed:

	U.S.	*French*	*Total*
Brigade Hqs	3	0	3
Group Hqs	5	0	5
Gun Bns	6	1	7
AW Bns	5	3	8
Sp Bns	3	0	3
BB Btries	3	0	3

VI *Change in Responsibilities*

Due to the rapid advance inland it was necessary to relieve the CG VI Corps from AA defense of the beaches, minor ports and airfields on D + 5. The 68 and 105 AAA Groups with the required units were relieved from attached to VI Corps on D + 5, placed directly under Army for operational control and assigned the mission of AA defense of all vulnerable points in rear of the rear boundary of VI Corps and Armee "B." On D + 10 the 31st AAA Brigade arrived and was assigned the AA defense responsibility of all beaches and ports and bridges in rear areas and of all airfields vice the 68 and 105 AAA Groups relieved.

VII *Radar*

1. Planning Stage:

a. Because of the excellent state of training and combat efficiency of Radar personnel in Gun Bns considered for the assault, efforts of the planning section were directed largely towards equipping all units with the fifth SCR-584 and a full complement of RC-184's, attachment and supply of Signal Radar Maintenance Teams, and providing Battalions with at least a thirty-day supply of all maintenance items. Radar operational plans were left to the discretion of AAA Brigades because of their past experience, but all plans were carefully coördinated.

2. Remarks:

a. SCR-584's and -545's landed during the assault phase again proved their value as easily handled, dependable equipment. They were moved into position; and, have since D + 1, operated continuously without unforeseen maintenance difficulties. No critical items of supply have developed due to the completeness of the Battalion Maintenance Kit, ME-104, carried in the assault by all Gun Bns. The fifth SCR-584, authorized for Hq Btrys of AAA Gun Bns, proved of great value as an early warning set when units became widely separated. Signal Radar Maintenance Teams were attached

to Brigade Headquarters and functioned under the Brigade Radar Officer, they were, in general, landed with the first echelon of the AAOD. Changes in priority caused some teams to be lifted with follow-up echelons. The use of IIF became confusing as the operation progressed due to many elements of the AAF removing Transponders from various types of A/C.

VIII *Early Warning*

1. Planning Stage:
   a. The Early Warning System planned for the assault phase of operation "DRAGOON" was divided roughly into three parts: the time immediately before and during the assault, D Day to D + 2 and D + 2 onward.
   b. For the assault period, a fighter director ship, and one alternate, was organized to act as an SOR afloat. AA Liaison Officers were to pass Early Warning direct to gun and AW Batteries and S.P. sites in "CHATTER" broadcast form (i.e. Target locations w/reference to known points, broadcast in the clear in very much the same way that football play by play broadcasts are made).
   c. For the D to D + 2 phase the F.D. ship was to switch to MAFOG (Mediterranean Fighter Operations Grid) coördinates and pass Early Warning to AAOR's expected to be in operation by dusk of D-Day.
   d. For the last period, the F.D. ships were to be replaced by SOR's ashore which would carry on the normal Early Warning functions. SOR's were to be operational by D + 2.
2. Remarks:
   a. The "CHATTER" broadcast system of Early Warning was found to be very satisfactory and was kept in use after AAOR's were operational because not all units could join AAOR nets due to the distances involved.
   b. The SOR's afloat were kept in operation longer than was expected because of technical difficulties involved in setting up the SOR ashore. SOR ashore did not become operational until D + 8.
   c. Brigade and Group radio equipment was found to be inadequate for the large areas involved.

IX *Former lessons learned in this Theater which proved sound and paid dividends in Operation "DRAGOON"*

1. Except when there is an acute shortage of LST's and LCT's, 90mm guns, SCR-584's and prime movers participating in the assault should not be loaded in Liberty or cargo ships due to the time required and extreme difficulty in unloading.

2. In view of terrain and atmospheric conditions which might possibly be encountered that will interfere with normal radio communications, Groups and Gun Battalion Headquarters Batteries should be prepared to establish and operate improvised GOR's during the initial stage of the assault.

3. In case of the tactical situation becoming highly fluid, thus necessitating frequent moves, it is very desirable that GOR's be mounted in vans (One Brigade has found a very satisfactory solution by converting a former civilian bus to a mobile GOR).

4. Each AAA Brigade should have a permanently attached Ordnance Maintenance Company and a small detachment should accompany the Brigade on the initial lift.

5. All radio equipment must be accurately calibrated prior to embarkation.

6. Personnel and matériel should be loaded together in order to reduce the time required for the unit to become operational upon unloading.

7. Briefing of AA personnel should include missions of adjacent and supporting units.

8. Rubber mat terrain models are invaluable during the planning phase and should be made available for study down to and including battery commanders.

9. The maximum number of AWs should be deck-loaded and in firing position to supplement the AA fire of crafts and ships.

10. 90mm guns and 584's should be operational by night of D Day since attacks can nearly always be expected at dark of the first day.

11. AA units must be distributed over a number of craft to insure AA defense in case of shipping losses or change in plans.

12. 90mm Gun Bns should be prepared to assume a FA rôle in case of unexpected ground opposition and heavy counterattacks.

13. Inflated balloons with hand winches can be walked ashore from LCT's by three men, thus saving carrying hydrogen cylinders to the beach and also reducing the time normally required to establish a barrage.

14. Radios must be depended upon for complete communication, both tactical and administrative, during the early phase of an amphibious operation.

15. Each battalion and battery should appoint one officer to act as TQM and placed in complete charge of loading both personnel and equipment.

X *Lessons learned in Operation "DRAGOON"*

1. Dewaterproofing of AA units should be done at the AA position if they are within a reasonable distance of the beach and not in general dewaterproofing assembly areas.

2. Brigade and Group Headquarters should be shipped intact and not divided into an assault echelon and a follow-up echelon. In order to make this possible, these units must be made completely mobile for waterborne invasions.

XI *Summary*

In conclusion the Seventh Army AAA, which had learned the hard way in Africa, Sicily, and Italy, is without doubt the world's finest. More need not be said, the record speaks for itself.

AAA Notes No. 22, ETO

EDITOR'S NOTE: *These extracts from Antiaircraft Notes Number 22, Headquarters, European Theater of Operations, were written in March, 1945. More extracts from AAA Notes, ETO, will be published in the* JOURNAL *in a form as complete as possible, consistent with the dictates of military security, space requirements in the* JOURNAL *and timeliness.*

* * *

3. Subject: Résumé of Activity for Period 8-15 March, 1945.

Source: AA Section, Headquarters, Twelfth Army Group.

a. The emphasis of enemy activity during the week ending 150600 March was directed against the Remagen bridge and bridgehead. Of the total of 447 enemy planes over our area, 380 were over the vital bridgehead. Two other areas receiving considerable enemy attention were the area north of the Moselle River where Third U.S. Army armored units were pushing rapidly forward to the Rhine and the area in the vicinity of Krefeld. A very few isolated planes operated over other scattered areas, presumably on reconnaissance. Enemy aircraft operated during every day of the week, in numbers from nineteen to a high 112 on one day. Single planes or groups up to four were again the common sighting. AAA units enjoyed a highly successful week claiming 139 enemy aircraft destroyed and 54 probably destroyed.

b. FW 190's and Me 109's constituted 81% of the aircraft recognized, with Ju 87's contributing 15% more. Only six Me 262's were sighted during the first six days of the week but on the last day 80% of the ninety-four aircraft over the Remagen bridgehead were jets. Other planes, in small numbers were He 111's, AR 234's, and Me 110's.

c. The bulk of the enemy activity occurred during the afternoon hours. Attacks were mainly during these hours but one group of eight aircraft attacked the bridgehead in the hours 2000-0130.

d. Enemy tactics were about as expected. Full advantage was taken of cloud cover and almost all operations were at 3,000 feet or under. Enemy aircraft continued to operate singly or in small groups. In the Third U.S. Army area strafing and bombing attacks were made against spearhead columns moving forward while planes on reconnaissance operated over the areas of advance, notably the triangle northwest of Coblenz. At the Remagen bridge the first enemy aircraft to attack were a group of three Stukas and one Me 109. These came in to bomb singly from a height of 3,000 feet and all four were shot down by AAA. The next eight planes to attack were Stukas and they approached the bridge from the south along the river. The planes came into attack from a height of 3,000 feet. AAA fire destroyed all eight of these planes. In these first two raids on the bridge, the enemy aircraft attempted to press the attacks and accordingly took no evasive action on the bomb run. However, after the disastrous results of the first attempts which failed to hit the bridge, following attacks were not pressed so determinedly and evasive action was taken both on the approach and on the bomb run. Thereafter, planes continued to operate over the bridgehead and to make attacks singly or in groups up to five, with attempts at high-level bombing, low-level bombing and dive-bombing. Eight aircraft attacked the bridge at night at heights varying from 5,000 to 8,500 feet but no damage resulted.

e. Jet aircraft are appearing in sufficient numbers as to lose their novelty, but without appreciable improvement in the efficiency or success of enemy attacks.

* * *

4. Subject: Merits of Trial Fire:

Source: SHAEF, Air Defense Division; office of Theatre AAAO, Hq., ETO.

A. Extract from *Air Defense Review* No. 5, SHAEF, 22 December 1944:

a. The flying bomb has much to answer for, but on the other hand it has caused certain beneficial results. Not the least of these was the closer understanding it promoted between the British and American AA Gunners. This was made possible by virtue of the fact that during the flying bomb deployment in the United Kingdoms, British and American units often occupied adjacent sites. The problems of one were the problems of the other, and as a result, there ensued an exchange of ideas which contributed not a little toward the success which was eventually achieved.

b. The nature of the flying bomb target is such that only a kill will prevent the robot from completing its mission; deterrent fire can achieve no useful purpose. Fire must be accurate, especially in view of the small vulnerable area presented by the target. It was natural, therefore, during the Diver deployment in the United Kingdom, that the attention of British AA gunners should be once again drawn to the American practice of conducting trial fire, of which the express purpose is the improvement of accuracy and eradication of any errors due to false meteorological information or undiscovered matériel deficiencies.

c. The British practice has been to prepare for action by orienting their instruments, synchronizing their data transmission systems, and applying corrections for nonstandard or nonrange table conditions. Beyond this they have not gone, providing, of course, the equipment fulfills certain silent tests to which it is subjected. On the other hand, the American system incorporated Trial Fire on top of all the other procedures which have been mentioned above. Whereas the British have been satisfied with dial readings the Americans have required corroboration of their preparations from the positions of bursts in the sky. It will be appreciated that any such check as this must be of considerable value in ensuring the accuracy of fire, providing any errors revealed by the check can be easily eradicated.

d. Now the absence of Trial Fire from the British procedure has not been due to ignorance of it, but for very definite reasons. The first of these was the nature of the deployment of heavy AA guns in the United Kingdom prior to the period of Diver activity. They were sited to defend certain large towns and ports, and the layout was

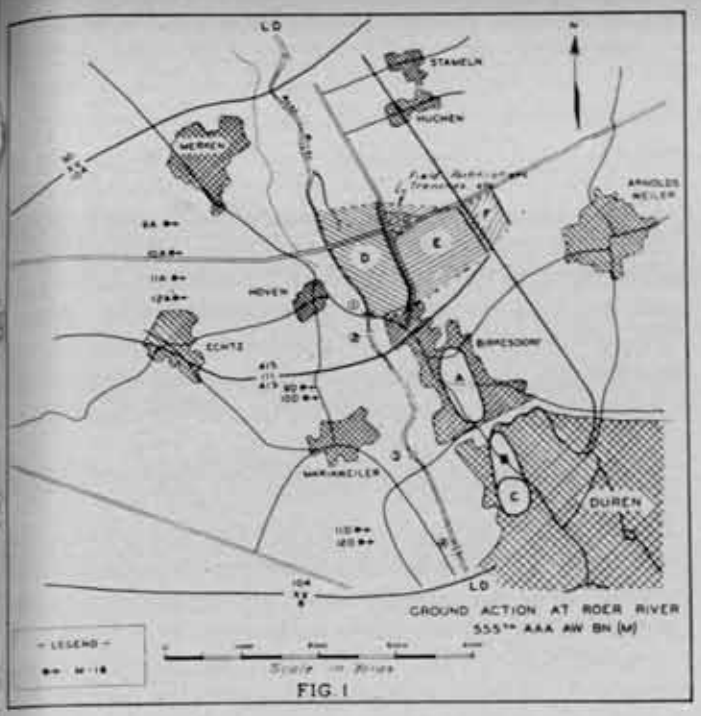


FIG. 1

such that it was impossible for the guns to fire over anything but relatively densely populated areas. England is a small country with a large population. It has a negligible amount of open country in the American sense of the term. Naturally, during a raid the danger to the civilian population from falling shell splinters was acceptable, but it was quite another matter to fire trial rounds when no raid was in progress and when, by virtue of the density of population, lives might be endangered, whatever the line of fire. The second contributory factor to the nonadoption of Trial Fire by the British, was their contention that the use of a flank spotting station to observe errors of trial rounds in range would be impracticable under combat conditions. Finally visibility is often very poor in the United Kingdom, and this proved a further argument against the adoption of a system which relied on good weather conditions for recording results.

e. During the flying bomb deployment on the south coast of England, the British were firing their guns over other than densely populated areas. This, coupled with the alternative method of measuring range to burst which had been developed wiped out the two main objections to Trial Fire which the British had previously entertained. It was natural, therefore, that the possibilities of its use should be reinvestigated.

f. Today heavy Antiaircraft gunnery is an exact science. Nothing must be left to chance, and least of all the preparations made before "fire for effect" is opened. In future, trial fire will have a place in the British as well as American procedures, or, at least, the means of conducting it and correcting as a result of it made available. This demands the inclusion of "spot controls" in any future development of fire control equipment.

B. Comments of Theater Antiaircraft Officer:

g. It has been observed that Trial Fire has not been utilized to the maximum extent possible by U.S. AAA units now engaged in operations. Unit commanders must be continually alert to use the advantages afforded by Trial Fire.

h. From National Defense Research Committee, Applied Mathematics Panel Report 22–IR "Analysis of Trial Fire Methods" dated November 1944, the following recommendations as to a lower and an upper limit for the deviation of the center of burst (CB) from the trial shot point (TSP) within which Trial Fire might be expected to improve accuracy is given for information:

(1) The premise is made that the lower limit is based on the consideration that Trial Fire is not warranted if accidental errors are likely to be large enough to overshadow those caused by faulty ballistic data. The upper limit is an estimate for the greatest deviation which could be reasonably expected from faulty ballistic data, gun dispersion, etc., so that any larger error observed should probably be attributed to faulty setting of the gun and orientation.

(2) The recommended limits based on firing four shots at a single TSP are as follows:

(*a*) No trial fire corrections are warranted if the observed CB differs from the TSP by less than 60 yards, in slant range, 2 mils in elevation, and 1 mil in azimuth.

(*b*) If the observed CB differs from the TSP by more than 275 yards, in slant range, 7 mils in elevation, or 10 mils in azimuth, the set up of the gun and fire control equipment should be checked for serious errors before attempting to make Trial Fire corrections.

5. Subject: 90mm Batteries in a Dual Rôle

Source: Headquarters, Seventh Army Antiaircraft Artillery

a. Ninety millimeter batteries firing on ground targets has become SOP in all battalions in forward areas, but sometimes the nature of the action is such that it is of a peculiar interest. Such was the case of the 62d AAA Gun Bn commanded by Lt. Colonel Adam S. Buynoski, in the tactical positions occupied along the Rhine River when the Germans crossed the Rhine and established the Gambsheim Bridgehead north of Strasbourg. The front along the Rhine was very lightly held at the time and the prompt and effective fire of the 90mm guns was largely instrumental in the bridgehead being contained.

b. Following is the battalion commander's narrative report of the action: "At about 1030A hours on 5 January 1945, Battalion Headquarters of this unit was advised by the 59th Armored FA Battalion that a 40-man German patrol had penetrated into the Gambsheim area and was then somewhere on the road to Weyersheim, where Battery A of this battalion was sited. Later reports, however, located the Germans as still in the vicinity of Gambsheim, but in considerably more strength than was originally reported.

"This unit, which had been maintaining wire communication with the FA, notified the 33d FA Brigade that we had two AA batteries so sited that the entire bridgehead area was within their fire possibility area.

"'At about 1300A hours the FA notified this battalion that a cub plane would be made available to us for adjustment of fire on a woods NW of Gambsheim where a considerable number of Germans had been reported. The FA requested that 100 rounds be placed in the woods.

"Battery B was assigned the mission. Range was about 13,000 yards. The battery was instructed to fire all rounds

with PD fuze set at superquick. This was done because it was believed that the resulting tree bursts would cause the most destructive fire against the personnel who had not, it was believed, had time to dig themselves into the frozen ground.

"The observer (Air OP) called for one battery volley. Battery B complied and placed all four rounds in the woods. The observer then, with a succession of battery volleys, proceeded to sweep the entire woods with fire by moving the bursts methodically back and forth over the target area. When 50 rounds had been thus fired the observer directed that the remaining 50 rounds allotted for the mission be fired at maximum rate at the center of the woods.

"The observer when he saw the bursts was under the impression the Battery was placing 'Time' fire in the woods. He reported that the bursts were occurring at treetop level, and made involuntary exclamations such as 'That sure looks wicked down there,' during the course of the shooting.

"The following day this unit received a report from the 59th AFA Bn which confirmed the destructiveness of the fire on the woods. It was reported that as a result of this shoot (Battery B's fire was the only fire placed in the woods up to this time) the Infantry was able to move into the woods unopposed. It was further reported that about 25 German dead were found there by the Infantry who felt there were that many more not immediately in evidence. These casualties were later confirmed by a member of the Infantry unit which moved into the woods.

"During the succeeding three days Batteries A and B were assigned missions in all parts of the bridgehead area and on the roads and concentration areas on the German side of the Rhine. During a period of 41 hours Batteries A and B expended 2,093 rounds; Battery B in one stretch of one hour fired 200 rounds.

"During the latter part of the period they were in action, Batteries A and B were subjected to counterbattery fire by the Germans. Battery B received only heavy long-range shells at first (BC reports everyone had time enough to grab a helmet, light a cigarette, and sit down below ground level between the time the Heightfinder observer saw the gunflash, reported 'Round on the way' and the arrival of the shell), but just prior to the time it was ordered to withdraw it received high-velocity shells in the battery area."

6. Subject: Ground action of Battery A, 195th AAA AW Bn (SP)

Source: AA Section, Headquarters, Twelfth Army Group

a. The recent rapid advance to the Rhine by the XIX Corps of the Ninth U.S. Army was spearheaded by the 2d U.S. Armored Division. The 195th AAA AW Bn (SP) attached to this division, had occasion to utilize its fire power in stopping a local enemy infantry counterattack. Battery A of this battalion was protecting the 65th Armored Field Artillery Battalion during the advance. On 2 March, the 65th Field Artillery, together with its attached AAA, found itself well forward of the Infantry in an area between Schiefbahn and Willich. At 1245 hours the Field Artillery Battalion was alerted for a possible German counter attack and requested that AAA unit to dispose its weapons to provide a ground defense for possible infantry attacks from the north, east and south. Positions were rapidly selected and the weapons moved into them. Darkness and unfamiliarity of the area made the initial disposition extremely difficult.

b. At daybreak Corporal Peruchena, commanding half-track No. 232 (M-16 Quad Mount), observed some enemy infantry approaching from the southwest. He immediately ordered his half-track, manned by T/5 Robert E. Lee, forward to a position where the Germans could be engaged without endangering friendly personnel. At the same time he instructed the balance of his crew to take up positions as infantry and be prepared to deliver small-arms fire at the approaching German infantry.

c. Simultaneous with Corporal Peruchena's discovery of the Germans, Corporal Ladner, commanding track No. 242 (M-15 Mount) sighted another German infantry column approaching his position from the west. Track No. 242 was in a favorable position for engagement of the enemy, and Corporal Ladner instructed T/5 Teddy W. Martin and T/5 Cleo R. Allen to man the weapon and fire only the dual-mounted machine guns. He then ordered the balance of the crew to deploy as infantry.

d. Both German columns were of company strength of approximately 70-75 men. As the enemy came into range, both half-tracks opened fire, supported by the small-arms fire from the other crew members. The actions took place simultaneously less than 200 yards apart. The engagement lasted less than five minutes and when completed, the area immediately in front of the half-tracks was littered with enemy dead. Corporal Ladner's track, No. 242, took forty

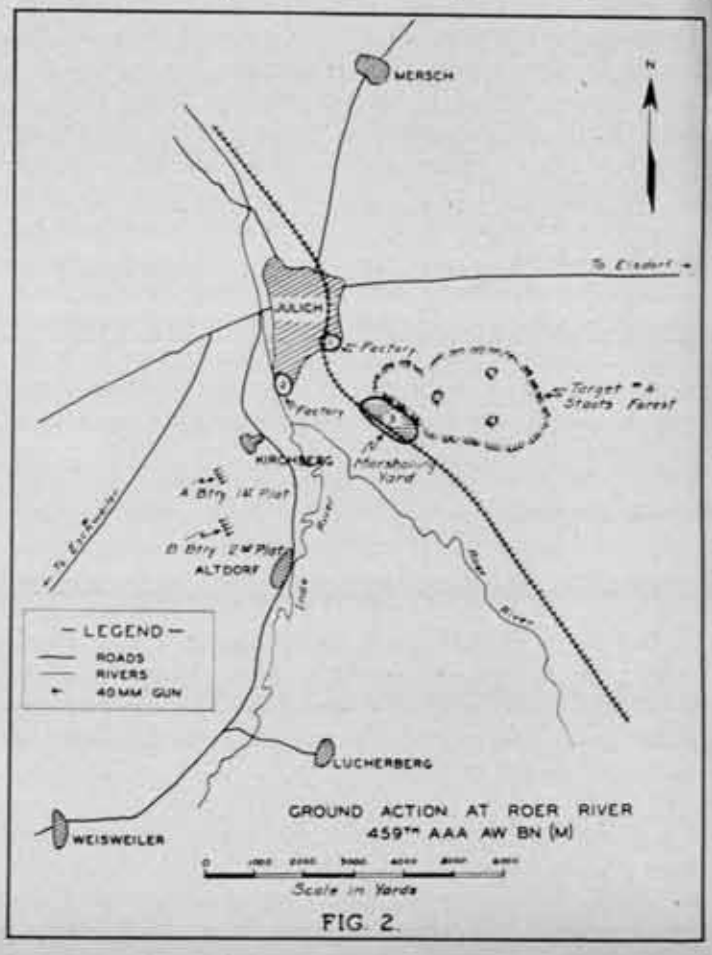


FIG. 2.

prisoners and Corporal Peruchena's track, No. 232, took thirty prisoners. The rest of the Germans were killed, a total of about seventy, and none were believed to have escaped. No casualties were sustained by the AAA Personnel.

c. During the action, half-track No. 242 (M-15) fired approximately 1,600 rounds of .50 cal. ammunition and half-track No. 232 (M-16) fired approximately 1,800 rounds. The battalion commander of the 65th Armored Field Artillery Battalion credited the two AAA units with having saved his battalion from being overrun.

7. Subject: AAA Ground Support of the Roer River Crossings.

Source: AAA Section, Headquarters, Twelfth Army Group.

a. The crossings of the Roer River by the First and Ninth U. S. Armies were effectively supported by AAA units, some of which rendered a dual support in both the ground rôle and the normal antiaircraft rôle. Two interesting ground support missions were performed: the 555th AAA AW Bn (M) in support of the 104th Infantry Division of VII Corps, First U. S. Army, and the 459th AAA AW Bn (M) in support of the 29th and 30th Infantry Divisions and XIX Corps, Ninth U. S. Army. The 555th Bn executed its mission under the cover of darkness, using eight M-16 half-tracks; the 459th Bn executed its mission during daylight hours using eight 40mm Bofors guns.

b. The action of each battalion is given separately, accompanied by a sketch and comments by the two battalion commanders on their respective actions.

The 555th AAA AW Bn (M) Action:

The mission given to the 555th Bn by the 104th Infantry Division was

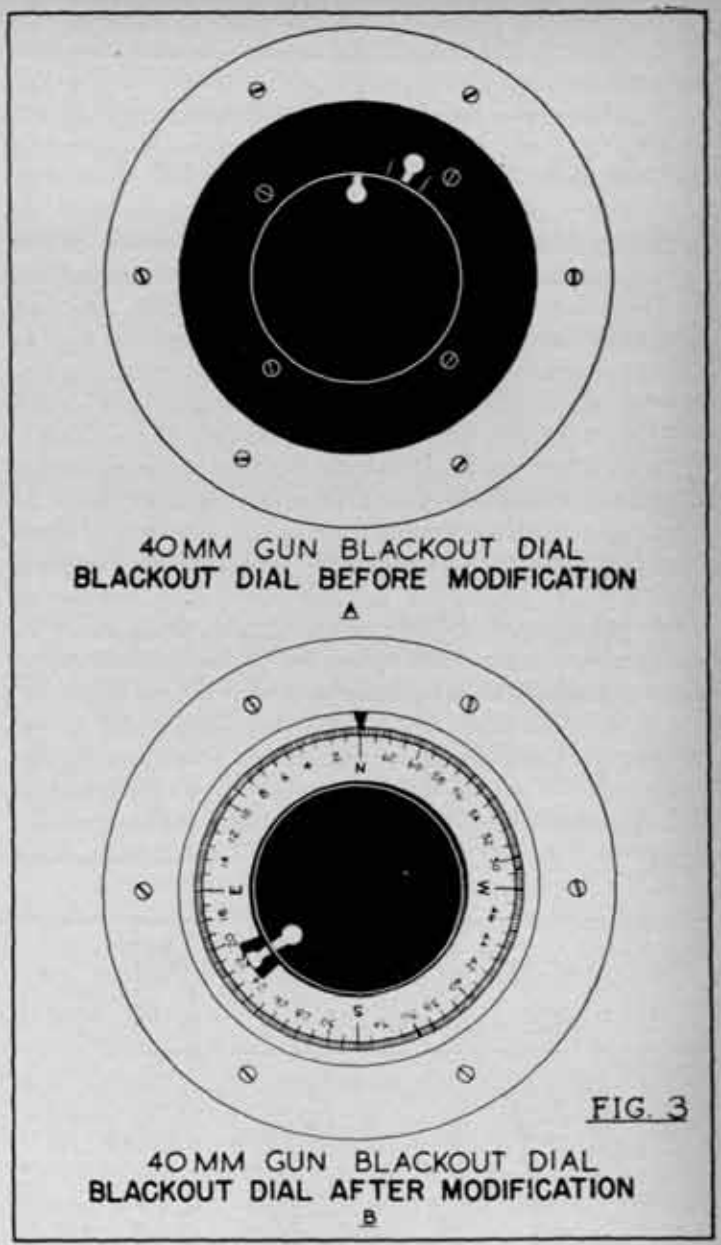
(1) to provide AAA protection for bridge sites 1, 2, 3, and 4 (see figure 1), division trains, and artillery; and

(2) to render ground support to the 413th and 415th Infantry Regiments prior to daylight on "D" day.

Based on the above instructions, the battalion decided to place the four M-16's of Battery A in positions to give ground support to the 415th Infantry, with four alternate positions selected for AAA defense of Bridge sites 1 and 2. Likewise Battery D was given the mission of protecting bridge site 3 (4 was not to be used), with the four M-16's of this battery available to the 413th Infantry for supporting fire prior to H-hour.

The 555th Battalion had previously drawn up an SOP for ground employment of AAA which was disseminated to all elements of the 104th Division. This SOP calls for thorough preparations before commitment to any ground mission.

In accordance with the SOP, the commanding officers of the 415th and 413th Infantry were contacted by the commanders of Battery A and Battery D respectively in order to determine the target areas and possible sites for the AAA weapons. At the same time the fire plans, which included time of firing, rate of fire, communications, and liaison were worked out. The battalion commander and the battery commanders involved made a sand table study of the area in which the mission was to be performed. One battery commander made a personal survey from an artillery observation plane of the target areas assigned to his battery; the other battery commander made a similar survey of his target area from a high church steeple.



In selecting the sites for the half-tracks, the alternate AAA positions mentioned above were selected for Battery A and completely prepared for occupation, together with the positions from which the ground firing was to be conducted (See Figure 1).

As both supported combat teams desired fire to be brought on different target areas, the AAA batteries worked independently of each other directly through the Infantry Battalions making the main effort. Each battery commander controlled the fire of his own weapons from the CP of the infantry battalion which he was supporting.

Battery A fired on a schedule from H to H plus 30 minutes, giving 10 minutes of fire to each target area "D," "E," and "F," shown in Figure 1. Immediately upon completion of this firing, the tracks took up their AAA positions at bridges, sites 1 and 2. Battery D fired from H minus 15 to H plus 15 minutes, keeping short bursts of intermittent fire on areas "A" and "B" and continual fire on area "C." This

battery was requested to bring fire upon the area in rear of A and B at 0400 hours, and the mission was effectively accomplished.

Both batteries brought cross fire to bear on their respective target areas. The guns of each battery were connected by hot loop to the fire control officer, and to the cannon company of the regiment. The rate of fire used by both batteries was as follows: each mount fired three-second bursts from all four barrels separated by ten-second intervals for a period of one minute, the cycle being repeated by each successive mount in turn. A large volume of fire can be continually maintained by this method, and by alternating mounts, the danger of burning out barrels is eliminated. No counterbattery fire was received during this operation.

Approximately 43,000 rounds of caliber .50 ammunition were fired during this ground support mission in the 2-2-1 ratio (armor piercing, incendiary, tracer). The assault waves of the Infantry met very little opposition from the far shore. After the area fired upon had been cleared of the enemy, much evidence of the effectivenes of the firing could be seen. Although the tracer bullets probably contributed least to the actual destruction, statements of prisoners of war indicate that they made the greatest contribution due to the resultant "buttoning up" attitude it caused among the enemy. In the words of several prisoners of war taken by the 104th Infantry Division, "Every tracer bullet from the automatic weapons seemed as though it was coming right at me, and I just stayed right in my hole even though knew your Infantry was closing in."

As a result of this and a number of previous ground actions performed by the 555th AAA AW Bn, the battalion commander, Lt. Colonel Farnum, submits the following comments:

"The battalion SOP on ground employment, which was drawn up from the experience gained in seventeen previous ground missions, has proven highly beneficial.

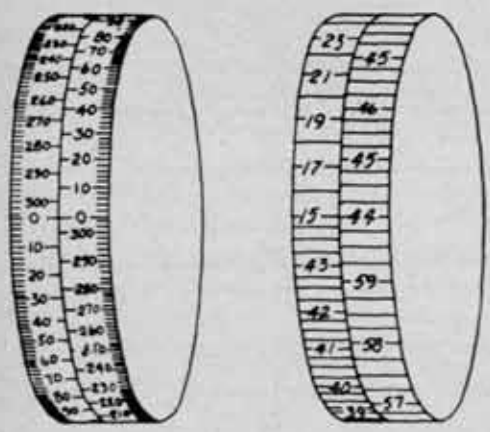
"On most of our previous ground support missions, the Bofors gun was employed in addition to the quadruple mount. Where the objective is a known pin-point on which explosive charges are needed, the Bofors can be used to great advantage.

"In our experience, however, the majority of the ground support missions do not encompass specific inhabited targets. Our assignments have been area targets, and the effort on our part has been to keep the enemy 'buttoned up' during the push-off. Accordingly, we have felt as though our biggest contribution to the friendly effort has been to harass the enemy. We have therefore always designed our fire plan to 'worry the Hell out of many Jerries, rather than stick to a few buildings and injure or kill only a few.'

"Nevertheless, if we find that, in addition to the primary harassing goal, we can knock out a few of the enemy in a specific occupied point (as we did by killing approximately thirty in a factory at Lucherberg) we do bring the Bofors

AZIMUTH & RANGE DRUM

635th AAA (AW) Bn.



AZIMUTH DRUM RANGE DRUM

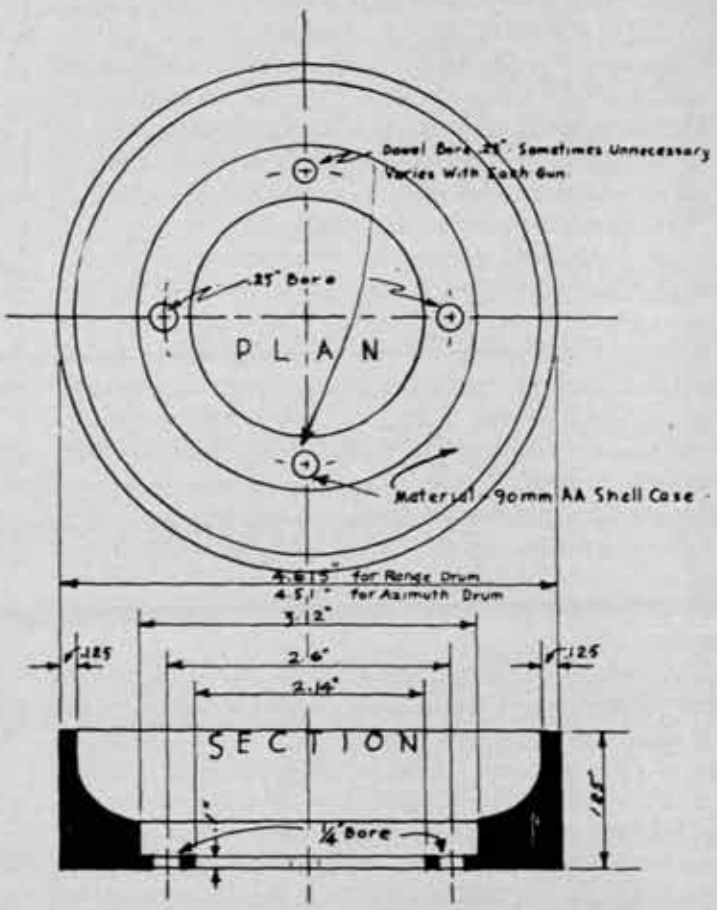
DESCRIPTION OF SCALES

RANGE DRUM -

Range drum graduated in yards of range. From initial graduation (1500yds) to 4000yd mark, the least graduation is 100yds. From 4000yd mark to the 6000yd mark, the graduations are for 25yds. Left side of drum face graduated from 1500yds to 4400yds. Right side contains the graduations from 4400yds to 6000yds.

AZIMUTH DRUM

Azimuth drum graduated from 0 to 306 mils. Least graduation 2mils. Right half of drum face read up and left half reads down.



SCALE: APPROX F S.

FIG. 4.

play. We have always used the twelve-second burn-out mm shell, having brought it over with us from England, nd find it most satisfactory.

"We are convinced that inasmuch as most of our assignents are for harassing missions, the firing should take place darkness. The demoralizing effect of the tracers at night far greater than in daylight. Usually our missions support a night attack (the 104th Division being noted as a ight-fighting division) and our 'buttoning up' efforts are ordinated with our division artillery. Nevertheless, even ith this help, digging in is a must, and has saved us many asualties.

"In spite of every research that we have made, precision iring by the M-16 has been found to be next to impossible. ven if careful previous adjustment is made with new barels, excellent stops are employed, and ingenious barrel ooling devices are used, accurate impact cannot be achieved nce the barrels have become hot. Tests have been made y this battalion on firing ranges, and the results show that he advancing friendly troops must always be led by a inimum of 300-500 yards. To 'sweep' the ground in ront of the infantry as close as 100-250 yards will most ertainly bring grief, for the present firing tables are approximations only, and cannot give a guarantee for accuracy n multiple-mount precision work.

"The SOP that has been set up for the battalion and the issions that we have performed have always been accomlished with the previous knowledge (through the medium f careful analysis of aerial photographs and of G-2 knowldge of enemy artillery capabilities) that the enemy artilery would be relatively light. If heavy enemy artillery opposition was expected, different tactics would be used; in act, I would discourage the use of AAA in a ground rôle nder these conditions unless a real exigency existed, and he need of our weapons was critical. I wish to emphasize hat our experience in ground rôles has, on the whole, been nder conditions of moderate enemy artillery fire.

"The particular ground mission described above was an deal dual-purpose rôle, for immediately upon release from he ground assignment, the two groups of four half-tracks ere moved under cover of darkness to the near-by bridges, hich they defended against an intense attack by German lanes during the following hours of the bridge crossings.

"We always make it a policy to rotate our 'assault plaoons' on these forward front-line rôles. In this manner, very 'assault platoon' has had an equal share in this type f aggressive work. Not only, therefore, are all the platoons apable, through actual experience, but none feel that they re being continually 'stuck' with having to face unusual azards. As a result the 'assault platoon' morale is high."

The 459th AAA AW Bn (M) Actions:

Considerable time and effort has been spent by this organization in trying to find a suitable and effective method y which the fire power of the Bofors gun could be utilized n support of Infantry troops. Previous ground support missions performed by this battalion have been direct fire, with he guns having to be emplaced on the crest of ridges in rder for the trackers to lay on the assigned targets. It is the attalion commander's opinion that these missions were ighly unsatisfactory because damage to the enemy appeared only minor, whereas casualties in the battalion ran as high as sixteen per cent of the personnel engaged in the mission. On 18 November 1944, the battalion commander observed the British 40mm Bofors in a ground mission as part of the artillery fire plan supporting the British and American attack on the German strong point of Geilenkirchen. The British were observed to lay their guns in azimuth and elevation by means of graduated azimuth and range drums installed on the gun, and their fire was directed by a forward OP. As a result of these observations, the commanding officer of the 459th AAA AW Battalion procured some of this equipment from British sources and had it installed on the guns of two of his batteries. (See the accompanying article in these Notes entitled *Azimuth and Elevation Indicators for 40mm Gun* for a detailed description of this equipment. The 459th AAA AW Battalion used the same principle as explained in the article referred to except their equipment has the azimuth drum graduated in degrees instead of mils, with the least reading equal to ¼ degree.)

The missions assigned to the 459th AAA AW Battalion by the 29th and 30th Infantry Divisions were:

1. Harassing fire on sugar factory in Julich for the 29th Infantry Division;
2. Harassing fire on thread factory in Julich for the 29th Infantry Division;
3. Neutralizing fire on marshalling yards in Julich for the 30th Infantry Division; and
4. Harassing fire on Staats Forest near Julich for the 30th Infantry Division. (See Figure 2 for target areas and gun dispositions.)

The gun sites were selected behind a ridge running between Kirchburg and Altdorf. Two OP's were selected to direct fire, one in Kirchburg on the left flank for Battery A, and one in the woods near the river on the right flank for Battery B.

The guns were surveyed in by a survey party from the 30th Division Artillery, and aiming stakes were set for the base gun in each platoon. All missions were to be fired on call, with fire being shifted from one target to another; consequently it was necessary to lay wire lines to the 175th Infantry Regiment, 29th Infantry Division, and to the 30th Infantry Division Artillery.

At 0725 hours, 23 February 1945, 2d Platoon, Battery B, was directed to fire on the thread factory (Target No. 2). One adjusting round was fired from the base piece with predetermined data, and fell on the target. This platoon then fired one round from each of the other three guns. Of the first four rounds fired, two hit the factory smokestack. The platoon then fired twenty-five rounds per gun on this target. A heavy concentration of bursts was noted on the factory.

The 1st Platoon of Battery A then adjusted on the marshalling yards (Target No. 3) and placed 100 rounds in this area.

Battery B fired 200 rounds on the sugar factory. The 175th Infantry Regiment then notified the OP's that the infantry was nearing the target and fire was discontinued.

On the request of the 30th Infantry Division, 700 additional rounds were fired on the marshalling yards.

Nine hundred rounds were placed on points from which our OP's observed German Nebelwerfer rockets being fired, and the rocket fire ceased.

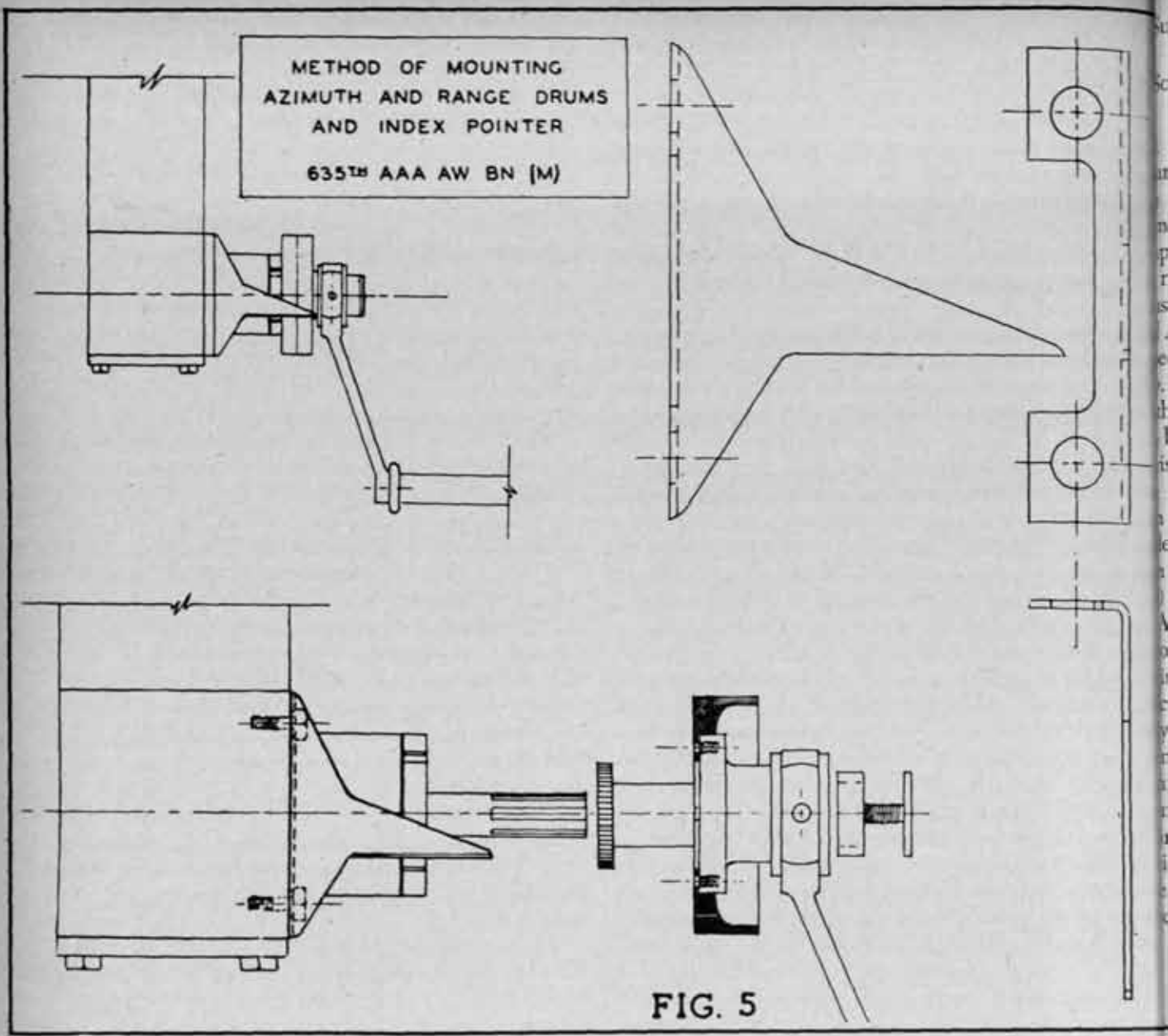


FIG. 5

The above firing consumed the allotted ammunition for the mission, and the units were preparing to move to their AAA positions when they received a special request from the 30th Division for more fire on the Staats Forest and the marshalling yards. (See Figure 2, Target Nos. 3 and 4.) An additional 2,000 rounds of ammunition were obtained and expended on these two targets with excellent results.

All firing was adjusted from the OP's by means of an improvised range fan.

As a result of this action Lt. Col. Parrish, commanding the 459th AAA AW Battalion has submitted the following comments:

"That 40mm AAA Automatic Weapons can be used effectively in a ground support mission by indirect fire.

"That very accurate fire can be delivered on target by indirect methods (evidenced by the fact that a factory smokestack, 20 feet in diameter at 4,350 yards could be hit at will, directed by an OP).

"That with careful reconnaissance (terrain permitting) ground missions can be fired with a minimum of losses.

"It is felt that the following considerations must be taken into account for a successful ground firing missi

a. Because of the tracer element of the 40mm ammu tion, it would be easily spotted by the enemy if the 40 guns fired independent of the other artillery.

b. Assurance that our fire is coördinated with the vance of the Infantry.

c. That missions must be fired during daylight hours

d. Tracers must be observed by the OP.

"Definite targets should be assigned in advance, wh permits selection of positions that will provide a sm amount of defilade suitable for emplacing the guns. D to the extreme flatness of the trajectory of the Bofors for first 1,500 yards, the defilade for this portion of the jectory could not be more than three degrees and still all for ground bursts. (In this mission the target was thi meters lower than the guns.) Care must be taken not build the portion of the revetment toward the target high; the remainder can be built high enough to give gun and crew maximum protection.

"During ground support missions the Bofors should be expected to carry out a normal AAA rôle."

3. Subject: Azimuth and Elevation Indicators for 40mm Gun.

Source: AA Section, Headquarters, Twelfth Army Group.

a. In order to utilize the 40mm gun for unseen fire in ground rôles, AAA barrage fire, or to anticipate the direction of approach of enemy aircraft as reported by early warning, it is necessary to have some means of laying the weapon in true azimuth and elevation. Since directors are not normally used by AAA AW units with corps and divisions, other methods must be used to accomplish this. Several AAA units of Twelfth Army Group have devised field expedients for this purpose.

b. (1) Blackout Dial Azimuth Indicator: (a) A simple method of setting the 40mm gun in azimuth by converting the blackout dial into an azimuth indicating dial has been devised by Lt. Col. James D. Caulk, Executive Officer of the 11th AAA Group. The blackout dial remains in position on the gun even though directors are stored, and the added conversion feature does not interfere with the operation of the instrument if required later for use with director.

(b) Since the outside movable disc in the dial (See Figure 3, A) makes one complete revolution as the gun is traversed through 360°, true azimuth can be measured by attaching a circular scale, graduated either in mils or degrees, to this disc. Due to the direction of rotation of the disc, it is necessary to graduate the scale counterclockwise to read azimuth from the north. The circular scale can be made of cardboard or heavy paper cut to a diameter of approximately four inches, with the graduations inked on the outer edge. Principal compass directions may be added to the scale to assist in setting OP early warning reports. The center of the scale should be cut out the size of the inner selsyn disc of the blackout dial so as not to interfere with matching pointers when using director control. (See Figure 3, B.) By making one master scale and photostating, a complete battalion can be supplied with the necessary materials with only a few hours work.

(c) To mount the scale, first remove the glass cover and rim of the blackout dial, being careful not to damage the waterproofing jacket. Next, attach the circular scale to the outer dial with rubber mounting cement. Cut a small reference pointer from a piece of light metal, painted black, and attach to one of the setscrews holding the glass in the underneath side of the lens and rim; the pointer is to remain stationary in the 12 o'clock position.

(d) In order to orient, boresight the gun on a true north stake, push in the clutch on the instrument, rotate the dial until the reference pointer reads zero, then release the clutch.

(e) The blackout dial azimuth scale will indicate azimuth accurately to the nearest 20 mils, or approximately one degree. This is sufficiently accurate for AAA barrage firing and early warning purposes, but unsuitable for unseen fire at ground targets, which requires greater accuracy. The principal advantages of this type scale are simplicity of construction and noninterference with normal operation of gun. When necessary to set an elevation in conjunction with an azimuth, a gunner's quadrant can be used.

(2) Range and Azimuth Drums:

(a) A more precise method of setting azimuth and elevation by means of azimuth and range drums mounted on the hand operating mechanism sleeves has been devised by the 635th AAA AW Bn (M), commanded by Lt. Col. A. J. Wangoman. This method was designed primarily for use of the 40mm gun in unseen firing at ground targets. The drums are constructed from 90mm shell cases, and are attached by two screws to the inner face of the hand operating mechanism sleeve, with the base of the drum facing toward the gun. (See Figures 4 and 5.) Two holes are drilled in the base of the drum to admit two dowels on the inner face of the hand operating mechanism sleeve. A hole 2.14 inches in diameter is drilled in the center of the drum base to allow the drum to pass over the driving pinion when mounting. Indices are mounted on the gear housing. (See Figure 5.)

(b) For a 40mm gun equipped with high speed traversing gears, one revolution of the azimuth hand crank causes the gun to turn through 305 mils. By machining the azimuth drum to a diameter of 4.51 inches, the distance between 2-mil graduations on the perimeter of the drum measure 3/32". The azimuth drum is provided with two scales: (See Figure 4), one for measuring angles up to 305 mils to the left, the other for angles 305 mils to the right of normal; angles turned in a clockwise direction are read on the right, or outer scale, and angles turned in a counterclockwise direction are read on the left, or inner scale. To orient and engage the drum, the gun is laid on the desired azimuth, and the traversing handwheel is engaged with the zero reading opposite the indicator. By enlarging the hole used to attach the indicator, it is possible to make final adjustments for aligning the indicator exactly on the zero setting.

(c) The elevation drum is graduated to read directly

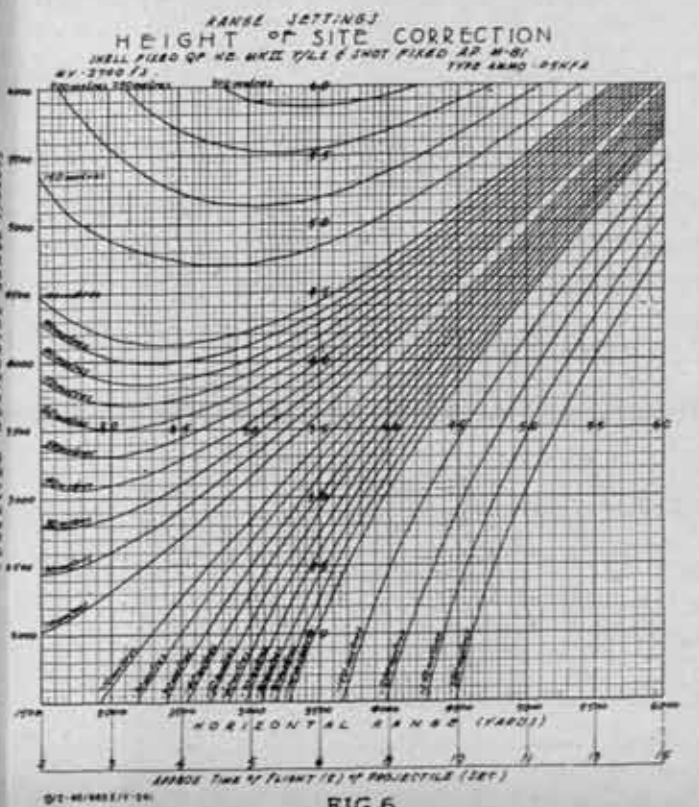


FIG. 6

yards of range, based on firing table data for shell HE-T (SE M3A1) Mk II w/fuze, PD M64 A1 (muzzle velocity 2,700 f/s). An appropriate correction can be made in opening range when ammunition of different muzzle velocity is used. Two scales are etched on the perimeter of the range drum, graduated from 1,400 to 4,400 yards on the outer scale, and 4,400 to 5,975 yards on the inner scale (See Figure 4). Subdivisions of 50-yard intervals are used from 1,700 to 4,000 yards range, and 25-yard subdivision from 4,000 to 5,975 yards range. Calibration of the range drum was accomplished in the following manner: using FT 40-AA-A-2, the quadrant elevation for ground ranges from 1,500 to 6,000 yards was determined, corrected for type of ammunition. Setting the gun by gunner's quadrant to an elevation corresponding to 1,500 yards range, the 1,500-yard graduation was marked on the drum opposite the indicator. The process was repeated for each 100 yards up to 6,000 yards range, taking care not to overtravel and thereby introduce a backlash error. Subdivisions were interpolated onto the scale. Approximately two complete turns of the elevation hand crank were required, which necessitated graduating both edges of the drum.

(d) Orient and engage the range drum, the gun is carefully levelled and average range selected, and the gun elevated to the correct range by means of a gunner's quadrant. The handwheel is then disengaged, the correct range rea ing set opposite the indicator, and the handwheel ree gaged. A collar can be placed on the handwheel to insu its remaining engaged, thereby maintaining proper orienta tion. In order to prevent an incorrect range setting due t being one or more turns off, a reference mark should b made on the body elevation plate, indicating the upper an lower range settings on the drum.

(e) A height-of-site graph has been developed to facili tate accurate laying of the gun in elevation for the initia round (See Figure 6).

(f) Errors due to backlash in the elevation and azimuth gears are very small, and can be virtually eliminated b "coming into the target" from the same direction each time

(g) By use of the azimuth and range drums, it is pos sible to conduct accurate unseen fire by 40mm guns. The initial firing data is determined by map study, and the gun is laid on target by means of compass, aiming circle, or other standard field artillery methods. After the initial round corrections in range can be set directly by turning the ele vation hand crank; deviations in azimuth are translated int mils, and set directly on the gun by traversing with the azi muth hand crank, right or left, the required amount. Fir may be quickly transferred from one target to another within the limitations of the range and azimuth drums.

U. S. Navy Photo

American POWs in the compound at Yokohama shout and wave at a carrier-based plane.

Combined Correction Chart

By Lieutenant Colonel Leonard M. Orman, Coast Artillery Corps

Emplacing our 155's in the positions assigned to us gave us a new problem and this is the novel way that it was solved. The problem was created by the fact that number four gun was 146 yards from the DP of the battery, number two gun. In addition it was forty feet below on the hill. This necessitated a height of site correction and an elevation difference correction. The guns were G.P.F.'s equipped with M8 sights.

An ordinary elevation difference chart was constructed (as shown in FM 4-15). In our case the data used was an azimuth of 96° from DP to number four gun and a distance of 146 yards. From this chart the data appearing in Table I was tabulated. The elevation difference was computed for each 1,000 yards of range for each ten degrees of the field of fire. Obviously only 90° of the field of fire need actually be tabulated as corrections in all other fields are of the same magnitude differing only from each other in sign.

Secondly, a height of site table was computed using firing table 155-u-1, Fuze M51, supercharge for a negative height

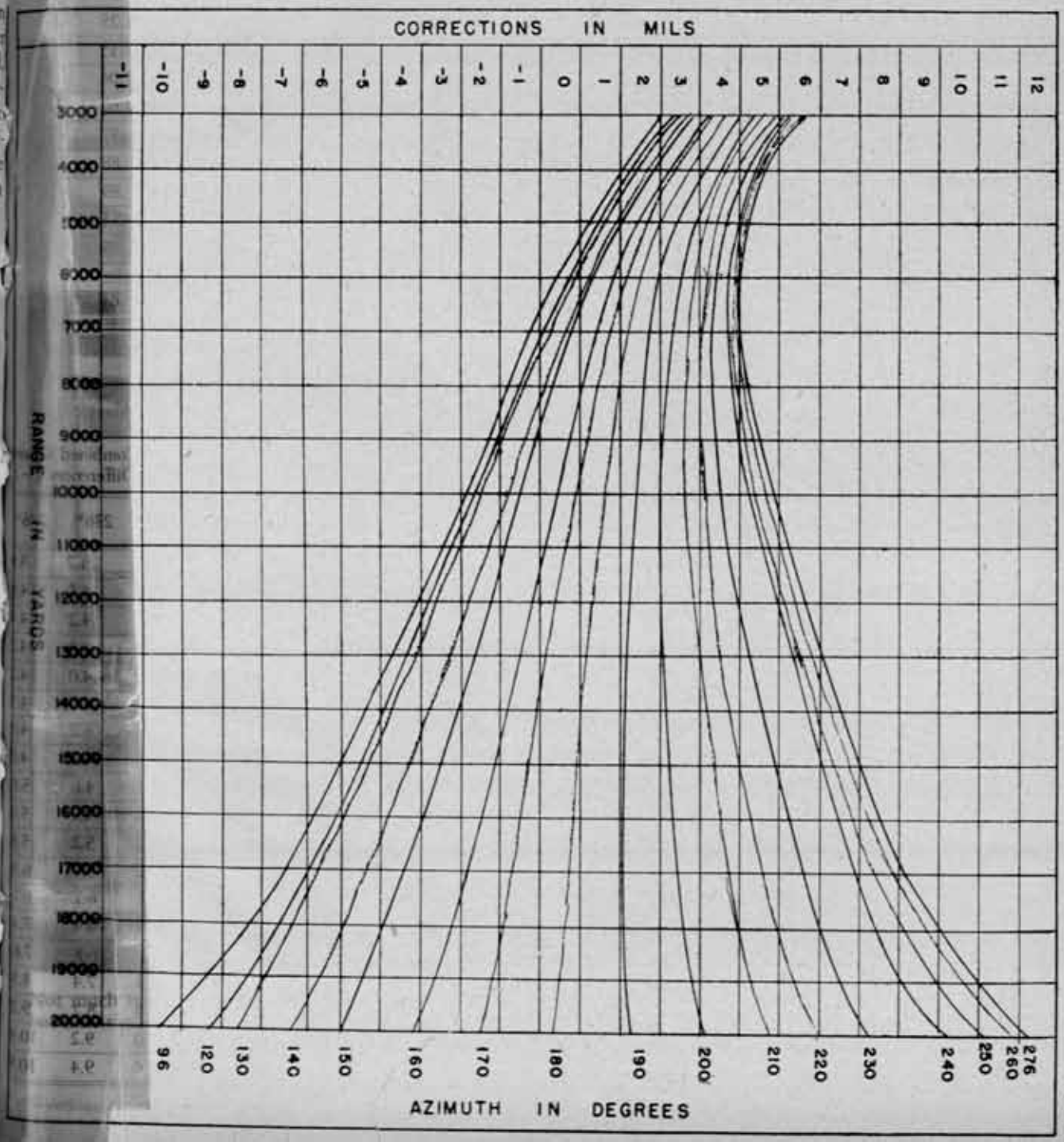


TABLE I

Azimuth D.P. to No. 4 Gun 96°
Azimuth D.P. to No. 4 Gun 146 yards

Range in Yards	96°	106°	116°	126°	136°	146°	156°	166°
3,000	1.7	1.6	1.5	1.4	1.2	1.1	0.8	0.6
4,000	1.7	1.6	1.5	1.4	1.2	1.1	0.8	0.6
5,000	2.0	1.9	1.8	1.7	1.5	1.4	1.0	0.7
6,000	2.3	2.2	2.1	1.9	1.7	1.5	1.1	0.8
7,000	2.6	2.5	2.4	2.2	2.0	1.6	1.3	0.9
8,000	2.9	2.8	2.7	2.5	2.2	1.8	1.5	1.0
9,000	3.4	3.3	3.2	2.9	2.6	2.1	1.7	1.1
10,000	3.7	3.6	3.5	3.2	2.8	2.3	1.8	1.2
11,000	4.3	4.2	4.0	3.6	3.3	2.7	2.1	1.5
12,000	4.9	4.8	4.6	4.2	3.7	3.1	2.5	1.6
13,000	5.4	5.2	5.0	4.6	4.1	3.4	2.7	1.8
14,000	6.0	5.8	5.6	5.1	4.6	3.8	3.0	2.1
15,000	6.6	6.4	6.2	5.7	5.1	4.2	3.3	2.3
16,000	7.2	7.0	6.6	6.2	5.6	4.6	3.6	2.5
17,000	7.7	7.5	7.2	6.6	5.9	5.0	3.9	2.6
18,000	8.6	8.4	8.1	7.4	6.6	5.5	4.3	3.0
19,000	9.7	9.5	9.2	8.4	7.5	6.2	4.9	3.4
20,000	10.9	10.7	10.3	9.5	8.4	7.1	5.5	3.8
20,100	11.1	10.9	10.4	9.6	8.5	7.2	5.6	3.9

TABLE II

Firing Table 155-U-1
Shell HE M101
Fuze M51
Supercharge
Height of Site—40 feet

Range in Yards	Site in Mils	Site Correction in Mils	Totals in Mils
3,000	4.4	.00	4.4
4,000	3.3	.01	3.31
5,000	2.7	.01	2.71
6,000	2.2	.02	2.22
7,000	1.9	.02	1.92
8,000	1.7	.03	1.73
9,000	1.5	.03	1.53
10,000	1.3	.04	1.34
11,000	1.2	.05	1.25
12,000	1.1	.05	1.15
13,000	1.0	.06	1.06
14,000	0.95	.07	1.02
15,000	.9	.07	.97
16,000	.8	.08	.88
17,000	.8	.09	.89
18,000	.7	.11	.81
19,000	.7	.15	.85
20,000	7	22	.92
20,100	7	23	.93

TABLE III

Combined Chart
Ht. of Site (+) and Elevation Differences

Range in Yards	96°	106°	116°	126°	136°	146°	156°	166°	176°	186°	196°	206°	216°	226°	236°
3,000	+ 2.7	+ 2.7	+ 2.8	+ 2.9	+ 3.1	+ 3.3	+ 3.5	+ 3.8	+ 4.1	+ 4.4	4.7	5.0	5.3	5.5	5.7
4,000	+ 1.6	+ 1.6	+ 1.7	+ 1.8	+ 2.0	+ 2.2	+ 2.4	+ 2.7	+ 3.0	+ 3.3	3.6	3.9	4.2	4.4	4.6
5,000	+ 0.7	+ 0.7	+ 0.8	+ 1.0	+ 1.2	+ 1.4	+ 1.7	+ 2.0	+ 2.3	+ 2.7	3.1	3.4	3.7	4.0	4.2
6,000	— .1	— .1	— 0.0	+ .2	+ .4	+ .7	+ 1.0	+ 1.4	+ 1.8	+ 2.2	2.6	3.0	3.4	3.7	4.0
7,000	— .6	— .5	— .4	— .2	0	+ .3	+ .7	+ 1.1	+ 1.5	+ 2.0	2.5	2.9	3.3	3.7	4.0
8,000	— 1.1	— 1.1	— .9	— .7	— .4	— .1	+ .3	+ .8	+ 1.3	+ 1.8	2.3	2.8	3.3	3.7	4.0
9,000	— 1.8	— 1.7	— 1.6	— 1.4	— 1.0	— .6	— .1	+ .4	+ 1.0	+ 1.6	2.2	2.8	3.3	3.8	4.2
10,000	— 2.3	— 2.2	— 2.1	— 1.8	— 1.4	— 1.0	— .4	+ .1	+ .7	+ 1.4	2.1	2.7	3.2	3.8	4.2
11,000	— 3.0	— 2.9	— 2.7	— 2.4	— 2.0	— 1.5	— .9	— .2	+ .5	+ 1.3	2.1	2.8	3.5	4.1	4.6
12,000	— 3.7	— 3.6	— 3.4	— 3.0	— 2.5	— 1.9	— 1.3	— .5	+ .3	+ 1.2	2.1	2.9	3.7	4.3	4.9
13,000	— 4.3	— 4.2	— 4.0	— 3.6	— 3.0	— 2.4	— 1.6	— .7	+ .2	+ 1.1	2.0	2.9	3.8	4.6	5.2
14,000	— 4.9	— 4.8	— 4.5	— 4.1	— 3.5	— 2.8	— 1.9	— .9	0	+ 1.1	2.2	3.1	4.1	5.0	5.7
15,000	— 5.6	— 5.5	— 5.2	— 4.7	— 4.1	— 3.2	— 2.3	— 1.2	— .2	+ 1.0	2.2	3.2	4.3	5.2	6.1
16,000	— 6.3	— 6.2	— 5.8	— 5.3	— 4.6	— 3.8	— 2.8	— 1.6	— .4	+ .9	2.2	3.4	4.5	5.5	6.4
17,000	— 6.8	— 6.7	— 6.3	— 5.8	— 5.0	— 4.1	— 2.9	— 1.7	— .5	+ .9	2.3	3.5	4.7	5.9	6.8
18,000	— 7.8	— 7.7	— 7.3	— 6.7	— 5.8	— 4.7	— 3.5	— 2.1	— .7	+ .8	2.3	3.7	5.1	6.3	7.4
19,000	— 8.9	— 8.7	— 8.3	— 7.6	— 6.6	— 5.4	— 4.0	— 2.5	— .9	+ .8	2.5	4.1	5.6	7.0	8.2
20,000	— 10.0	— 9.8	— 9.3	— 8.5	— 7.4	— 6.1	— 4.5	— 2.8	— 1.0	+ .9	2.8	4.6	6.3	7.0	9.2
20,100	— 10.2	— 10.0	— 9.5	— 8.7	— 7.6	— 6.2	— 4.6	— 2.9	— 1.0	+ .9	2.8	4.7	6.4	8.0	9.4

All corrections + unless otherwise indicated.

of site of forty feet for every 1,000 yards of range above the minimum range. This table appears below. Corrections for nonrigidity of trajectory are included.

These two tables were then combined into one with proper regard to sign. In our case the height of site correction was always plus, the elevation difference correction for the quadrant from 166° to 246° was plus, while the elevation difference correction for the quadrant from 96° to 166° was negative. The results are shown in Table III.

Table III was then translated into the chart shown in Fig. I. We used colored-in K's on our chart for the azimuth lines to facilitate reading. A T-square graduated in range aids the operator. Final computations are made to the nearest whole mil.

The correction is computed initially and applied directly to the height of site scale of the M-8 sight. From this point identical elevations are sent to all guns.

Of course by the time we had this nicely solved our position was changed and we had to throw it away but it was a problem which may face someone else some day.

U. S. Navy Photo

Not much has been written about our submarines in this war, since secrecy is one of the subs' weapons and protective devices, but now the wraps are off to some extent. This is the *Tinosa*, returning to the Pearl Harbor sub base after a successful patrol in which she and eight other subs sank 46 Jap ships in the Sea of Japan, with four "probables."

COAST ARTILLERY

Citations and Commendations

Distinguished Service Cross

TO: Albert A. Alop, First Lieut. (then 2nd Lieut.) CAC.

FOR: Extraordinary heroism in action against the enemy during a severe enemy counterattack at Mantes-Gassicourt in August, 1944.

Distinguished Service Medal

TO: Frederick L. Hayden, Brigadier General (then Colonel CAC), U. S. Army. Fort Screven, Georgia.

FOR: Service from May, 1941, to March, 1944. As Chief of the Enlisted Branch, Military Personnel Division, and later as Deputy Director of the Military Personnel Division, Army Service Forces, he, with keen foresight and unusual ability established and adhered to the basic theory that the objective of personnel direction was the conservation of military manpower. He maintained close liaison with the Selective Service System, Army Service Commands, Army Ground Forces and Army Air Forces, and efficiently accomplished the procurement of enlisted men through selective service and recruiting. His rare abilities contributed greatly to the solution of the major military personnel and manpower problems.

TO: Frank J. McSherry, Brigadier General, U. S. Army, 3232 Garfield St., N.W., Washington, D. C.

FOR: He served with distinction as Deputy Assistant Chief, G-5 Division, Supreme Headquarters, Allied Expeditionary Force, from December, 1944, to June, 1945. In this capacity he played a preëminent rôle in the development of a system of military government through which the will of the Supreme Commander could be imposed, firmly and justly, upon the conquered German people. He supervised the preparation of early instructions and directions designed to establish a pattern for the accomplishment of this unprecedented mission. He guided and directed the molding of these instructions to meet the requirements of ever changing conditions. In this work he spent much time in the field with officers and men of military government detachments upon whom fell the responsibility for application of the policies formulated by his staff. His contribution to the fulfillment of this combined command's mission was of outstanding value in prosecuting the war in Europe.

Oak Leaf Cluster to Distinguished Service Medal

TO: William F. Marquat, Major General, U. S. Army, 1132 N. 77th St., Seattle, Washington.

FOR: He served with distinction in the highly important and responsible positions of Antiaircraft Officer, General Headquarters and Commanding General, 14th Antiaircraft Command, Southwest Pacific Area, from April, 1942, to June, 1945. With brilliant technical skill, great resourcefulness and able direction, he developed the antiaircraft artillery to an unusually high degree of combat efficiency. From the time of organization of the Southwest Pacific Area, through the Papua, New Guinea, Northern Solomons, Bismarck Archipelago, Southern Philippines and Luzon campaigns, he directed and supervised its training and coördinated its employment. By his sound judgment, energetic leadership and professional ability he made a material contribution to the successful antiaircraft defense of the Southwest Pacific Area.

Legion of Merit

TO: Thomas A. Terry, Major General, U. S. Army, Birthplace: Abbeville, Ala.

FOR: Service as Commander of the First Coast Artillery District, subsequently the New England Frontier Defense Sector, during the period November 9, 1940, to April 30, 1942. Under his supervision the Harbor Defenses of Portland, Portsmouth, Boston, New Bedford, Narragansett Bay and Long Island Sound were brought from the status of small caretaking establishments to war strength organizations. All assigned units were trained, coördinated and developed to exceptional combat efficiency. By his able direction a large amount of material replacement, particularly with respect to electrical installations, was accomplished and every seacoast battery was placed in good condition, capable of delivering effective fire. Through his skillful planning, the Harbor Entrance Control Posts were created, organized and coördinated so that both Army and Navy elements were able to place these Control Posts in continuous operation. The centralized preparation of harbor defense projects under the modernization program were completed through his direction and close supervision. By careful attention to the problems confronting him and vigorous execution of plans, he trained and developed his command in the minimum of time and placed it in readiness for war before December 7, 1941.

TO: Harvey C. Allen, Brigadier General, U. S. Army, Florham Farms, Madison, N. J.

FOR: He served the government with conspicuous and meritorious achievement as Commanding General, Antiaircraft Artillery Training Center, Camp Hulen, Texas, from December, 1941, to September, 1944. Organizing this

training center immediately after the outbreak of war, he ably trained scores of antiaircraft units at this camp so that, technically, they were able to perform efficiently in combat. During this period his command increased from a few units to a maximum strength of over 13,000 when at the height of the Army's rapid expansion. The results obtained by him, through his exceptional qualities of vision, skill in leadership and untiring effort have stamped him as one of the outstanding commanders of training centers, and are reflected in the notable performance of these well trained antiaircraft units in combat.

TO: Charles I. Clark, Colonel, General Staff Corps (CAC), 171 Muirfield Road, Rockville Center, New York.

FOR: In the performance of outstanding services in the Office of the Assistant Chief of Staff, Operations Division, War Department General Staff, during the period March, 1941, to September, 1944, he demonstrated a keen understanding of the problems of overseas supply logistics, particularly from the standpoint of troop unit planning. He originated, developed and supervised the monthly Overseas Troop Basis. At the time of its inception this document was the only reliable basis for overseas supply and was vital not only to ports of embarkation but throughout the War Department was considered valuable for supply control and as a planning tool. His intimate knowledge of troop units and supply control were of inestimable value to the War Department Special Committee for the Re-Study of Reserves on which he served as a member during the last half of 1943. The success of his work on this important committee can best be measured by the significant savings in material and money effected by carrying out the recommendations of the committee. He was designated as one of the original associate members of the Joint Logistics Plans Committee and ably represented the Operations Division at the conference of Allied leaders in Quebec, August, 1943, on matters of troop shipping and deployments. His ability in research, his unusual faculties for assimilation and analysis, and his thoroughness in undertaking the most involved and arduous planning have made his contribution to the war effort outstanding.

TO: Lee A. Denson, Colonel, CAC, 3900 Cathedral Avenue, N.W., Washington, D. C.

FOR: He displayed exceptionally meritorious conduct in the performance of outstanding service in Headquarters, Army Service Forces, from March 9, 1942, to June 30, 1945. As Deputy Director and Director of the Requirements Division and as Deputy Director of the Requirements and Stock Control Division, he made exceptional contributions to the establishment of the Army Supply Program and to the creation of its successor, the Supply Control System. He established and assigned responsibilities for the staff administration of the Army Supply Program, determined the bases and policies under which the Procurement Program of 1944, amounting to more than $17,000,000,000, was computed, and formulated the basic plan for the Supply Control System. As a result of his foresight and energetic and effective staff work in computing the supply requirements for a one-front war against Japan, the Army Service Forces had available a sound Period I procurement program well in advance of the defeat of Germany. His shrewd direction of difficult planning, his tenacity, superior judgment, foresight and devotion to duty have contributed materially to the successful prosecution of the war.

TO: Ralph I. Glascow, Colonel, CAC, Omaha, Nebraska.

FOR: Services as Chief of the Operations Branch, Oversea Supply Division, New York Port of Embarkation. He was faced with the task of preparing instructions and supervising operations relative to the movement of supplies and equipment for shipment to the United States forces bases in the European and North African theaters of operations. Necessary and unexpected changes in supply and movements complicated this task. By his foresight, organizational ability, high degree of initiative and exceptional skill, he contributed in large part toward insuring the timely movement of all classes of supply to these theaters.

TO: William W. Hicks, Colonel, CAC, Chattanooga, Tennessee.

FOR: Exceptionally meritorious conduct in the performance of outstanding service. On 7 December 1941, in addition to placing his own command on the alert, by utilizing all members of his Station Complement he was able to rapidly emplace and man additional 155mm gun batteries to cover twenty miles of beach in the Los Angeles Area, completing such installation by the evening of 8 December; by 9 December an emergency fire control system was installed and the beach batteries housed in portable buildings secured for the emergency. Thus the Harbor Defenses of Los Angeles were prepared to meet the expected Japanese attack of 9 December 1941 which was indicated by intelligence sources as impending. He also directed the movement into position in the Harbor Defenses of the leading elements of the 7th and 40th Divisions until the arrival of the higher headquarters. He provided these elements with ammunition, improvised mounts for antiaircraft machine guns, and motor transportation until their own material became available. He secured civilian trucks, busses and passenger vehicles, enabling these leading elements to function in guarding the airplane and shipbuilding plants. The resourcefulness, leadership and exceptional ability displayed by Colonel Hicks in this emergency were notable.

TO: Robert N. Mackin, Colonel, CAC, Yorktown, Virginia.

FOR: Streamlining the G-2 section of the Africa-Middle East Theater . . . maintaining the utmost security in the movement of POW's released from neutral countries, Colonel Mackin displayed unusual leadership and judgment in the supervision and expeditious handling of those who passed through the theater . . . developed and maintained closest coöperation and liaison with the British and other allies. As a result of his series of lectures to the British in this area, Colonel Mackin was considered one of the most informed and outstanding lecturers on the subject of operations in the Far East.

TO: John E. Metzler, Colonel, CAC, 3153 21st Street, North, Arlington, Virginia.

FOR: As Chief, European Section, Theater Branch, Planning Division, Headquarters, Army Service Forces, from August, 1943, to May, 1945, he displayed a measure of military proficiency conspicuously above and beyond the usual. By tireless energy, great resourcefulness and sound judgment in handling and solving constantly arising problems he assisted materially in the establishment of procedures and policies which provided for the expeditious delivery of supplies and equipment to the European Theater of Operations. The adequate and timely provision of supplies to meet the requirements of directed tactical operations was largely a result of his skillful staff work. His exceptional logistical acumen, forceful personality, professional efficiency and devotion to duty enabled him to achieve results of inestimable value to the Commanding General, Army Service Forces.

TO: Kenneth G. Merriam, Lieutenant Colonel, CAC, 56 Havelock Rd., Worcester, Mass.

FOR: Services from September, 1942, to August, 1944. In addition to his regular duties at the Antiaircraft Artillery School, Camp Davis, North Carolina, on his own initiative, he conducted and supervised extensive research which resulted in the development of the "Slant plane" concept of automatic weapons control and prepared the studies for its presentation and solution. He contributed materially to the preparation and revision of the Army Ground Force Automatic Weapons Tests and with the assistance of other officers, he perfected and proved to be practical the "Down Course" spotting system. The accepted concepts of automatic weapons gunnery and fire control doctrine are due in great measure to his efforts.

Oak Leaf Cluster to Legion of Merit

TO: Willard W. Irvine, Brigadier General, U. S. Army, 2841 29th Street, N.W., Washington, D. C.

FOR: While Deputy Assistant Chief of Staff, G-3, War Department General Staff, from March, 1944, to May, 1945, he displayed exceptional leadership and foresight in effecting needed improvements in the strength accounting and reporting system of the Army, and contributed to the development of plans for postwar training. During the critical period immediately preceding the Normandy invasion and while the drive to victory in Europe was in progress, his efforts to maintain the flow of replacements greatly assisted our forces in mounting and sustaining the final offensive against Germany.

Silver Star

TO: Marvin W. Orso, Private First Class, CAC.

FOR: Gallantry in action in connection with military operations against an armed enemy of the United States on Saipan, Marianas Islands, on 4 July 1945. In the late afternoon Private First Class Marvin W. Orso was a member of a patrol engaged in clearing remnants of the Japanese Military Force from caves in the Mt. Tapotchau area. The patrol suddenly encountered determined resistance from the vicinity of a cave. Rifle and machine-gun fire and grenades were exchanged in a brisk fire fight, and it soon became evident that it would be difficult to dislodge the enemy from their position. In order to create a diversion, Private First Class Marvin W. Orso voluntarily advanced to the cliff and started to climb by means of the clinging vines. Upon reaching a ledge near the cave he was shot and killed by enemy fire. By his intrepid and gallant conduct at the cost of his own life, his comrades were able to advance and secure higher ground from which the enemy pocket of resistance was eliminated by killing five and capturing three enemy military personnel.

Soldier's Medal

TO: Howard L. Rivers, First Lieutenant, CAC, 309-B West Palmetto St., Florence, S. C.

FOR: At great personal risk and without hesitation he went to the aid of a drowning soldier two miles offshore in Delaware Bay on June 23, 1945. The soldier, a member of a near-by working party, having fallen overboard and unable to swim, was being swept away by the strong current in the choppy seas then prevailing. Disregarding the known danger Lieutenant Rivers immediately dived from a near-by boat and with great effort reached the drowning soldier and despite the latter's struggles kept him afloat until another swimmer and a boat came to the rescue. His courageous action reflects great credit upon himself as well as the Armed Forces of the United States.

Bronze Star Medal

TO: Charles E. Atkinson, Colonel, CAC.

FOR: Meritorious service in connection with military operations 14 July 1944 to 15 January 1945.

TO: Robin E. McCormick, Lieut. Col., CAC.

FOR: (Citation not released.)

TO: Tony B. Lumpkin, Captain, CAC, 803 Woodlawn, Mexico, Missouri.

FOR: He performed meritorious services while incarcerated in a German prison camp at Oflag 64, Schubin, Poland, from June, 1943 to December, 1944. Conditions were appalling. A starvation ration, lack of laundry facilities, a shortage of drinking water, coupled with the degrading and harassing tactics presented by the enemy, all contributed to making the conditions more deplorable. He was placed in charge of receiving and distributing all American food parcels received through the Red Cross. In addition he maintained a "tin store" where the prisoners were able to store their tins of food received in their parcels and prorate their use over a period of time. Due to his aggressive spirit and good, sound judgment, he was able to prevent the Germans from enforcing any of the harassing restrictions which they attempted from time to time to place upon the use of this private food. At the risk of his life, he argued daily with various Germans in an effort to assist the American prisoners. He contributed greatly to the morale and health of his fellow prisoners, giving them aid and comfort until they were finally liberated.

TO: Cleveland Henriquez, Corporal, CAC, 116 Fitzpatrick Street, Key West, Florida.

FOR: On April 24, 1942, at Battery Crockett, Fort Mills,

Philippine Islands, he was seriously wounded by enemy fire. After receiving partial first aid treatment, he voluntarily crawled from the battery area under constant enemy artillery fire and bombing and descended a cliff and secured aid for wounded comrades. His heroic action at great personal risk was an inspiration to those about him.

TO: Ben P. Lewis, Sergeant, CAC.

FOR: While on patrol during mopping-up operations on the Island of Saipan, he discovered an obvious enemy trail leading up the side of a hill to a steep cliff that had several ledges, one above the other. Accompanied by three of his men, Sergeant Lewis reached the first ledge where a tree was noticed that showed signs of having been used as a means of access to the second ledge. With complete disregard for his own safety, Sergeant Lewis climbed the tree to a point where he observed six Japanese soldiers on the ledge just a few feet from his head, and he thereupon fired into the group, wounding one of them. In the face of severe hostile rifle fire and grenades, he jumped from the tree and advanced up the slope until in a position to fire onto the ledge. His example inspired the other three men to follow, and from this position they held the enemy under fire until additional men from another patrol arrived to assist in capturing nine of the enemy. The devotion to duty, courage, and leadership displayed by Sergeant Lewis reflect great credit upon himself and the military service.

Brazilian War Medal

TO: Linscott A. Hall, Colonel, GSC (CAC), 4954 West Pine St., St. Louis, Mo.

FOR: Citation not released.

Cross of Cavalier Officer of the Crown of Italy

TO: L. A. Zimmer, Lt. Col., CAC, 33A Venetian Way, Miami Beach, Florida.

FOR: Services in the final phase of the surrender of the German Forces in Italy.

Distinguished Unit Citation

TO: The 863rd Antiaircraft Artillery Automatic Weapons Battalion.

FOR: Extraordinary heroism in armed conflict with the enemy from 16 December to 23 December 1944. The officers and men of this organization rendered outstanding services in holding off German counterattacks in the Ardennes sector. At the time when the enemy launched a series of vicious and determined attacks against our ground forces in the area south of Monchau, the 863d AAA AW Bn. was established behind the front lines to provide defensive fire against hostile dive bombers and pilotless aircraft. When the enemy penetrated our front-line positions this Battalion immediately assumed the initiative by dispatching provisional batteries to the forward enemy troop concentration. Despite heavy enemy artillery, mortar, and small-arms fire the members of this organization remained gallantly at their posts and repelled the determined attacks by air, infantry, and armored infantry of the resurgent enemy. Although widely extended and subjected to continuous probing attacks, this Battalion held its ground against great odds without a break. The courage and aggressive fighting spirit displayed by the officers and men of this organization prevented the enemy forces from making further advances in the Monschau-Hofen-Kalterherberg area, and evidenced a devotion to duty and *esprit de corps* in keeping with the finest traditions of the Armed Forces of the United States.

Commendation for Meritorious Service

TO: The 377th Antiaircraft Artillery Automatic Weapons Battalion.

FOR: The 377th AAA AW Battalion was attached to the 4th Infantry Division on 8 March 1944. Since that time, it has been an integral part of the division and shared in all of our training and combat experiences. Its standards, morale and combat efficiency have always been high. The alertness and attention to duty of gun crews under the most difficult weather conditions have been outstanding, particularly during the Hürtgen Forest battle, the crossing of the Sauer River and the second attack through the Schnee Eifel.

During the entire period that the 377th AAA AW Battalion was attached to the 4th Infantry Division, it was commanded by Lt. Col. George W. Fisher. The superior accomplishments of this battalion are due largely to his outstanding leadership.

Commendation

THRU: Commanding General, Third U. S. Army, APO 403, U. S. Army.

TO: Commanding Officer, 115th AAA Group, APO 230, U. S. Army.

1. The 115th AAA Group was assigned to the V Corps early in 1944 and served continuously under this command until 25 May 1945. This period included the preparation and training phase in the United Kingdom prior to the assault on the beaches of Normandy, as well as the entire phase of active operations in Northern Europe. The Group served in the United Kingdom, France, Belgium, Luxembourg, Germany and Czechoslovakia.

2. The high caliber of performance of the 115th AAA Group and its attached battalions makes it difficult, in reviewing such a long period of service, to single out particularly outstanding achievements. Among the most noteworthy accomplishments of your command, however, were the high standard of training achieved in a short period of time, and against numerous obstacles in the preparation for the invasion; the superior antiaircraft protection afforded the forces under the command of the V Corps during the assault and establishment of the Normandy beachhead, and the courageous and effective ground support missions executed by the battalions under your command to check the German counteroffensive in December 1944.

3. The program for future military operations has necessitated, after such a long period of outstanding service, the relief of the 115th AAA Group from attachment to this command. The V Corps extends to all of you its sincere thanks and best wishes.

COAST ARTILLERY BOARD NOTES

Any individual, whether or not he is a member of the service, is invited to submit constructive suggestions relating to problems under study by the Coast Artillery Board, or to present any new problem that properly may be considered by the Board. Communications should be addressed to the President, Coast Artillery Board, Fort Monroe, Virginia.

Items pertaining to Antiaircraft Artillery should be sent to the Antiaircraft Command, Fort Bliss, Texas.

Replacement of the SCR-582 by SCR-682-A.

It now appears that the SCR-582 is to be relegated to the obsolete list and its place taken by the SCR-682-A.

The SCR-582 was built under a crash procurement program to meet pressing military needs. Only 55 of these sets were built; many of them are now out of the service and the rest are showing marked signs of wear. Since no adequate supply of spare parts was set up it is now most difficult to keep these sets in operation. The Radio Set SCR-682-A is a major redesign of the SCR-582 and incorporates improvements found desirable as a result of experience.

It has been recommended that the SCR-582 be replaced by the SCR-682-A because of the following advantages: greater range, greater resolution, superior electrical and mechanical design which simplifies maintenance problems, and greater immunity to jamming.

Time of Flight Indicators.

For some years batteries have used a stop-watch operated by an additional member of the range section to inform spotting observers of the instant when a splash is expected to occur. This method is satisfactory only when single guns are fired, and when the time of flight is less than the firing interval. Since the standardization of radar with means for spotting, it has become increasingly desirable to warn the observer of the time at which the splash will occur, in order to lessen the necessity for close straining scrutiny of the scope, and in order to avoid mistaking miscellaneous signals for the splash signal. A requirement for an automatic or semi-automatic time of flight indicator is thus indicated.

With a view to investigating means of fulfilling this requirement, the Coast Artillery Board has tested the British Time of Flight Indicator Mk IV and the Canadian (Local Pattern) Time of Flight Indicator Mk I. It has also studied a description of a "splash timer" built at the Harbor Defenses of Los Angeles, which utilizes a moving paper tape in which a hole is punched at the time the gun is fired; the punch can be set so that, at the end of the time of flight, this hole passes under an electrical contact which completes a buzzer circuit. Finally the Board has tested a time of flight indicator, similar in many respects to the Los Angeles "splash timer" but with additional automatic features; this indicator was designed and built by a member of the Board.

The Board found none of these mechanisms completely satisfactory for standardization but recommended to the Commanding General, Army Ground Forces, that the Chief of Ordnance be requested to develop a time of flight indicator embodying characteristics listed by the Board. Among other characteristics this indicator should give visual and aural signals for as many as four guns; and the timing mechanism is to be started automatically by the recoil of each gun. An adjustable advance warning time is to be provided in order to make the operation of the instrument more flexible.

Neoprene Obturator Pads.

The Board recently completed tests on a neoprene obturator pad for 155mm Guns M1 M1A1 and M2. This pad is the same size as the present standard obturator pad and is used with the present set of split rings. The neoprene pad is not easily damaged in handling or shipping and no special precautions have to be taken for its lubrication or preservation. A total of 750 supercharge rounds were fired by the Coast Artillery School and the Board using the subject pad. There was evidence that very slight leakage had started but the pad was still serviceable. The Board's recommendations were:

a. The neoprene obturator pads be standardized for use in 155mm Guns, M1, M1A1 and M2 in use by 155mm Coast Artillery units.

b. The basis of issue be two pads complete with split rings per 155mm Gun M1, M1A1 and M2, issued to Coast Artillery units.

Rubber Jacketed Submarine Mine Cables.

A ten-year test of rubber jacketed submarine mine cable

furnished evidence that M3, Type I cable can be kept dry storage equally as well as in wet storage. While in storage, cable should be protected from sunlight and ather, with temperatures maintained below 100°F. if acticable.

The reels of test cable are unique in that their values of sulation resistance are higher at the end of the test period an they were at the beginning of the test. These results ave been confirmed by the manufacturer who was unable make any prediction, on the basis of chemical and electri- l tests made this year, as to which reels of cable had been ored in a conventional manner and which had been stored dry.

All of the cable under test had been rereeled periodically, ith a reverse bend, with the expectation that such han- ling would cause faults and cracks to show up early in the est. It now seems reasonable to suppose that the reversal f mechanical stresses prevented the insulation from acquir- g a "set." Further tests will be required to ascertain the mportance of cable reeling in the long-time storage of sub- arine mine cable.

Care of Rubber Covered Field Cables.

Recommendations have been made for the issuance of mall amounts of five- and ten-pair rubber-covered field able to 155mm gun batteries and battalions. It has come to the attention of the Board that the rubber latex that is now used for the conductor insulation on these field cables, will, after exposure to sunlight and weather, become hard and sun-cracked. This hardening and checking is an undesirable characteristic of rubber when used in exposed places. A remedy that can be suggested in using the present cable and cable stubs is to protect the exposed rubber latex insulation on the wires by taping the individual exposed wires with friction tape. This taping will protect the latex from sunlight and prolong the life of the insulation.

* * *

It is desired to point out that the majority of subjects handled by the Board are classified and that information pertaining to them cannot be published in the JOURNAL.

The following tabulation shows the number of projects and subjects which were handled by the Board during July and August:

Number on hand 1 July	51
Received during July and August	100
TOTAL	151
Completed during July and August	109
Number on hand 1 September	42

Undeveloped Film from Overseas

Undeveloped film sent by all service personnel overseas to the United States should be wrapped in a separate package and distinctly marked "UNDEVELOPED FILM" on the outside wrapper. Packages shipped from overseas are examined by an inspectroscope, an X-ray-like machine, installed at various Ports of Entry to detect the shipment of stolen Government property.

The rays of the inspectroscope ruin undeveloped film. Many rolls of film have been damaged because personnel have not followed previous instructions. Any effort to label packages "Undeveloped Film" which contain contraband items will be easily detected and offenders will subject themselves to possible court-martial proceedings.

Thousands of dollars worth of stolen Government property is being recovered each week by the use of the inspectroscope.

Coast Artillery Journal

Fifty-fourth Year of Publication

COLONEL E. B. WALKER, Editor

LT. COL. ARTHUR SYMONS, Associate Editor

The United States Coast Artillery Association

OFFICERS

LIEUTENANT GENERAL LEROY LUTES
PRESIDENT

MAJOR GENERAL JOHN T. LEWIS
VICE PRESIDENT

COLONEL E. B. WALKER
SECRETARY-TREASURER

ADDITIONAL MEMBERS OF THE EXECUTIVE COUNCIL

BRIG. GENERAL EDWARD A. EVANS
BRIG. GENERAL BRYAN L. MILBURN
BRIG. GENERAL RUPERT E. STARR
BRIG. GENERAL EDWARD A. STOCKTON, JR.
BRIG. GENERAL LAWRENCE B. WEEKS
COLONEL FRANKLIN E. EDGECOMB
COLONEL E. B. WALKER

The purpose of the Association shall be to promote the efficiency of the Coast Artillery Corps by maintaining its standards and traditions, by disseminating professional knowledge, by inspiring greater effort towards the improvement of matériel and methods of training and by fostering mutual understanding, respect and coöperation among all arms, branches and components of the Regular Army, National Guard, Organized Reserves, and Reserve Officers' Training Corps.

News and Comment

Group Subscriptions

The end of the actual fighting has brought numerous changes in the military picture, but many officers realize that the usefulness of the JOURNAL has not ended because the war has stopped. In fact, with the easing of censorship regulations and with the lessening of the pressure on hundreds of soldiers who should be authors but never had the time, the JOURNAL will be better and more valuable than ever.

Lieutenant Colonel William H. Warrick, for instance, sent us 83 subscriptions from individuals of his 863d AAA AW Battalion. The 56th AAA Brigade, Colonel R. H. Grinder, Executive, reached the 100% group with 20 new subscriptions. Lieutenant Colonel Harry C. Bailey's 61st AAA Gun Battalion sent in seven subscriptions.

The larger units, too, are doing their share. Headquarters, Third Army, sent in 255 subscriptions; Fourteenth AA Command, as part of a continuing effort, accounted for 85 since the last issue; and the Special Services Officer, Panama Coast Artillery Command, ordered 165 subscriptions.

Army and Navy Club of Manila

The Army and Navy Club of Manila, formed more than forty years ago but quiescent by necessity during the three years of Japanese occupation of the Philippines, is now being reorganized.

Plans are being made to rebuild the club's once-handsome home on Manila Bay, now roofless and badly battered as a result of the bitter fighting that took place in and around it last February.

The club continued to function after war broke out 7 December 1941, but under blackout conditions. Manila was declared an open city 27 December and the club was closed on New Year's eve 1942. The Japs then took it over.

Major General William F. Marquat, antiaircraft officer of Army Forces in the Pacific, has been elected president of the reactivated club. Other officers are: Captain M. L. Hersey, USN, first vice president; Major General C. L. Sturdevant, second vice president; Colonel Harry Adamson, secretary-assistant treasurer; and E. B. Ford, civilian member, treasurer-assistant secretary.

The Club, a private corporation, has $32,600 on deposit in three banks in the United States and has in addition $20,000 which was donated by the Noumea Officers Club, after SWPA went out of existence.

The Club held its first meeting since the recapture of Manila on 5 August in the Normal School Building, and elected a Board of Directors. The meeting was called by General Marquat, who was a director at the time the club had ceased to function after the war began. He said many requests had been made for prompt reorganization because there was an apparent need in Manila for recreation facilities for officers.

Eligible for membership in the club are Regular Army, Navy, Marine Corps, Coast Guard and Public Health Service officers, as well as civilians who were formerly commissioned officers. Plans are being considered to elect Reserve and AUS officers to associate membership, without payment of entrance fees, General Marquat said.

* * *

Radar and the Atomic Bomb

Some of our readers may wonder why, in this issue, Radar and the atomic bomb are not featured.

We assume that our readers are familiar with the technical details and field applications of radar. Up to 14 August censorship regulations forbade the publication of anything concerning radar. The lifting of the restrictions resulted in the publication, in magazines and newspapers of general circulation, of articles on the general subject of radar which in scope and quality of illustrations far surpass anything that the JOURNAL could afford. The detailed technical applications of radar, which our readers would find desirable, are still classified.

In general the same remarks apply to the publication of articles dealing with the atomic bomb. Recent articles in the national magazines and syndicated newspaper columns covering the theory of atomic energy, the use of uranium and its isotopes in making the bomb, the atomic furnace and other details, clarified with excellent illustrations, have caused the editor to decide to omit such a discussion, at least for the present.

The entire subject as far as can be told at the present time is carried in the Smyth Report. Anyone interested in the atomic bomb should obtain a copy (see ad on cover).

If enough of our readers request articles on these subjects to justify it, the JOURNAL will publish them.

* * *

Radar and Britain's Coast Artillery

Commanded from a small air-conditioned room under Dover Castle, in cliffs honey-combed with passages cut when Napoleon threatened England, and guided by Radar so delicate it could follow the flight of a shell, British guns covering the Straits of Dover fought 70 actions during the European war, sinking between 20 to 30 ships and helping to completely shatter the morale of the German Mercantile Marine.

According to Brigadier C. W. Raw, C.B.E., who commanded Dover's Coastal Artillery throughout the war, Radar completely changed the work of coastal batteries, making it offensive as well as defensive. In fog and darkness Radar could pick out enemy ships with uncanny accuracy. To achieve these coastal successes 49 batteries, equipped with Radar, were strung out from Hastings to Margate. First, they used 9" and later 15" guns.

"From Radar reports received every minute the admiral at Dover, the Officer Commanding, R.A.F., and myself had the whole battle before our eyes," said Raw. "When naval forces were waiting to attack a target, we could decide the exact moment to cease fire. Radar told which ships were hostile and which friendly, and we would actually see our light naval forces engaging enemy shipping. We could follow the flight of the heaviest shells, and pin-point the spot where they fell, so that range corrections could be made instantaneously."

Radar's first success at Dover was in 1942, when the *Scharnhorst* and the *Prinz Eugen* dashed through the fog. Radar picked them up. Although the *Scharnhorst* was 28,000 to 30,000 yards away, travelling at 30 knots, Dover's 9" guns fired 33 rounds in the short time she was in range, scoring three hits.

The underground room at Dover Castle contains a large round table, covered with a map broken up into numbered squares. A.T.S. girls, leaning over a table, wearing earphones, with rulers, tapes and pencils in hand, awaited information from the batteries, which they immediately conveyed to the map.

In one Radar out-post, along the South East coast of England, the centimetric wave length of the Radar equipment used to control the fire of heavy medium Coast Artillery batteries traces the ship's position and observes the shell splashes, and so can correct the batteries' fire. The equipment is mounted in a concrete building, through the roof of which the control gear is taken to a double paraboloid aerial system. The operator in the building controls the aerial rotation, following the target for bearing. Another operator follows the target for range. Information is transmitted electrically to the fire control instruments, and thence to the guns.—*British Information Services.*

* * *

A Fine Outfit Departs

(Editorial in Victory News, *5th Armored Division)*

This week the 387th Antiaircraft Artillery (Automatic Weapons) Battalion (Self-Propelled) was relieved from attachment to this Division and passed to control of XXIII Corps. Except for three days in March (25-28) when the 387th was attached to XVIII (Airborne) Corps of the Second British Army to guard important bridges at Wesel, the battalion supported the 5th Armored Division continuously from August 1, 1944 to the end of the war and did a magnificent job.

Landing in France on June 29, the 387th AAA Battalion protected Cherbourg harbor and then was attached to the Victory Division just prior to its commitment. From August until May, 1945, the multiple .50 caliber machine guns and 37mm automatic weapons kept the Luftwaffe away. Units of the battalion served with Division Field Artillery and its half-tracks were frequently in the forefront of battle, lending direct support to infantry, blasting ground targets in hedgerows, buildings and church towers. At Wallendorf on Sept. 19, men of the 387th recaptured from the Germans a vitally important bridge on the supply route to the men fighting in the Siegfried Line. Even after the Division reached the Elbe the "Ack-Ack" men were engaged as sporadic enemy aerial raids. They were among the first and last troops of the Division to see action.

The record of 86 enemy aircraft destroyed is a fitting testimonial to the efficiency of this fine outfit. To Lt. Col. Elmer I. Kenneweg, the officers and enlisted men of the 387th AAA Battalion go our best wishes and sincere appreciation for a job well done. They added a brilliant chapter to the history of the Victory Division.

Regular Army Commissions

Dated 10 August 1945, War Department Circular Number 243 provides information for those emergency officers who desire to obtain commissions in the Regular Army. The Circular reads as follows:

INTEREST IN COMMISSIONS IN THE REGULAR ARMY

1. *Outlook for Permanent Commissions in the Regular Army.*

a. Present indications are that a number of outstanding officers who have proven their capabilities in this emergency will be needed in the Regular Army peacetime establishment. Until appropriate legislation is enacted the War Department cannot announce the conditions which will govern selection of these officers or the number required. However, it is desired that officers who have served in the emergency, whether or not they are still on active duty, be given the opportunity of indicating their interest in obtaining a Regular Army commission. An officer making such a statement of interest may go off active duty or remain in the service without prejudice to his chances of being tendered a commission when legislation is enacted. It is the intention of the War Department that the fact that an officer has not remained in active service will not affect the grade to be offered or the position he will occupy on the promotion list.

b. The plan for selecting and integrating officers into the Regular Army officers corps, as well as the size and composition of that corps, will finally be determined by Congress. The War Department will recommend that those officers integrated into the Regular Army will be of such age and physical condition as will permit them to serve for a reasonably long period before being retired. No officer will be appointed in a grade higher than that which he held in wartime.

c. The content of this circular will be brought to the attention of every officer at the earliest opportunity.

2. *Submission of "Statement of Interest"*

a. Officers interested in being considered for commission in the Regular Army, following enactment of appropriate legislation, will submit a "Statement of Interest," in duplicate, to their immediate commanding officer using the following form:

_____
(Name) (Serial No., Year of Birth, Component, Unit)

_____ _____
(Date) (Present Address)

To: The Adjutant General, Washington 25, D. C.
Subject: Statement of Interest in Consideration for Commission in the Regular Army.

1. I have read the statement concerning the outlook for the commissioning of present wartime officers in the Regular Army as published in WD Circular 243.

2. I desire to be considered for a commission in the Regular Army. My first choice is: _____
(Arm or Service)

Second Choice: _____.
(Arm or Service)

3. I have attended the following schools or colleges for the indicated number of years and hold the indicated degrees. _____

4. My professional or business experience is as follo

_____

5. My military record is as follows: (Indicate source an date of commission; date of entry on active duty; total ye of active duty, separately for enlisted and commissione service; decorations, etc.) _____

6. I desire to add the following information concernin myself which I believe would make me valuable as a Reg lar Army officer. _____

7. Former immediate (preferably recent) commandin officers from whom an Officer Evaluation Report may b obtained: (List three.)

1. _____
2. _____
3. _____
(Name) (Rank) (Last known address) (Dates served unde

(Signed) _____

_____
(Permanent Home Mailing Address)

Note: Officers of Arms or Services with the Air Forces wh desire such a status may enter their choice in para graph 2 thus: Air Corps (Signal Corps) (or othe Arm or Service).

b. *Indorsements*

(1) First indorsement.—The immediate commanding officer will indorse each copy of "Statement of Interest" and will include the following statements:

(a) "I do (or do not) recommend this officer for commission in the Regular Army and consider him of (below average, average, above average, or superior) suitability."

(b) "In comparing this officer with other officers of similar grade under my command or personally known to me and whom I would be willing to recommend for permanent commission in the Regular Army, I rank him No. _____ out of a total of _____ such officers."

(c) "His last five efficiency ratings were: _____."

(d) "I have known this officer for _____ months; he has served under me _____ months."

Indorsing officers with insufficient personal knowledge for recommendation will substitute: "Insufficient information for recommendation" in (a) above and will omit (b).

(2) Second Indorsement.—The next higher headquarters of the officer making the First Indorsement will indorse the "Statement of Interest" indicating concurrence or non-concurrence with the First Indorsement. If commission in the Regular Army is recommended, a statement as in (b) of the first indorsement will be included.

c. *Forwarding*

Upon completion of the Second Indorsement, the "Statement of Interest" and accompanying papers (see paragraph 4 b below) will be forwarded directly to The Adjutant General, Washington 25, D. C., or through such other channels as local headquarters may direct.

Army and Navy Club of Manila.

3. *Procedure for Officers not on Active Duty.*

Officers and former officers, other than retired, who have served since 7 December 1941 and who have been relieved from active duty under honorable conditions may submit the above "Statement of Interest" form to The Adjutant General, Washington 25, D. C., directly.

4. *Officer Evaluation Report*

Officer Evaluation Reports (form WD AGO PRT 461) provide a thorough evaluation of individual officers for use in consideration for commission in the Regular Army. They will be prepared with extreme care and thoroughness and must be based on adequate personal information.

a. Each "Statement of Interest" will be accompanied by an Officer Evaluation Report (form WD AGO PRT 461) properly filled out by the immediate commanding officer of the interested officer, unless the superior officer has insufficient knowledge of the interested officer to properly evaluate his qualifications. If Officer Evaluation Report forms are not available, the report will be prepared and forwarded when they are received.

b. The next higher headquarters to the rating officer will indorse the Officer Evaluation Report, either indicating concurrence or non-concurrence with the ratings given in Sections III, IV, and V of the Officer Evaluation Report and forward the file as described in paragraph 2c above.

c. Officer Evaluation Reports upon which accurate rating by immediate superiors is impossible because of insufficient time of observation, will be forwarded as prescribed in paragraph 4a above, with Side 1 completed as far as practicable. Any intermediate headquarters having any officer listed in paragraph 7 of the "Statement of Interest" under its jurisdiction, will arrange for completion of the report by that officer. In such cases, the indorsement mentioned in paragraph 4b above, may be omitted if impracticable to prepare.

6. *Disposition of Applications and Officer Evaluation Reports.*

After processing by The Adjutant General, the "Statements of Interest" and Officer Evaluation Reports will be forwarded for study and appraisal to the Major Force of the Army or Service for which first choice is indicated, and returned therefrom to The Adjutant General for custody within 30 days.

7. *Additional Evaluation.*

The Adjutant General will obtain additional Officer Evaluation Reports from listed former immediate superiors upon request from the interested Major Force. These will be disposed of as prescribed in paragraph 6, above.

8. *Distribution of Officer Evaluation Reports.*

Officer Evaluation Report forms (WD AGO PRT 461) and instructions for their use. Officer Evaluation Report Instruction Booklets (WD AGO PRT 462), will be distributed through channels as soon as available.

* * *

The New Volunteer Army

The building of a volunteer Army will start immediately.

Enlistments in the Regular Army for a period of three years will be accepted. Qualified individuals now in the Army who desire to enlist in the Regular Army will be discharged and reënlisted. Men who have been honorably discharged from the Army of the United States may be enlisted if they apply within three months of the date of their discharge and upon reënlistment will be promoted to the grade held at the time of discharge. Individuals without prior service and those who have been out of service for more than three months may enlist by volunteering for induction. Such individuals upon induction will be enlisted in the Regular Army.

Men now in the Army who enlist in the Regular Army will be granted furloughs up to 90 days depending upon their length of service. Those overseas qualified for furlough will be returned to the United States to enable them to spend their furloughs at home.

In addition, those now in the service, upon reënlistment become eligible for a reënlistment bonus. The amount of the bonus is dependent upon the grade of the individual at the time of his discharge and upon length of continuous service.

Planning Industrial Mobilization

President Harry S. Truman, as Commander in Chief of the Army and Navy, has directed that the Army and Navy Munitions Board take over the important postwar assignment of planning for industrial mobilization in the event of a future emergency.

This means that the Board will become one of the key agencies in the defense program to be adopted to safeguard the security of the United States after the present wartime military establishment is demobilized.

Assignment of the task to the Board is a part of the program of reconversion which is now taking place in the Government preparatory to the liquidation of wartime agencies and the shifting of their functions to regular peacetime organizations.

As a preliminary step in the preparation for assuming its new task, the Board is at present being reconstituted and strengthened in the light of experiences gained during World War II and the far-reaching changes which seem to lie ahead.

* * *

Pacific Bases

Plans for the establishment of permanent advanced major bases considered necessary in the future because of their strategical importance to the Navy have been announced.

The following bases were mentioned: Kodiak, Adak, Hawaii, Balboa, Guam, Saipan, Tinian, Bonins, Ryukyus, Manus, and the Philippines. Action on the Navy recommendation, of course, is dependent upon Congress, with approval by the President.

534th Captures American Planes

When the 7th U.S. Army overran several Nazi air fields during the last week of war in Europe, members of the 534th AAA (AW) Bn., discovered Allied planes bearing Nazi markings. A P-47 was hidden among trees and was ready for flight. It was taxied to the center of the field and guarded by the 534th ack-ackers. Several P-51's and Spitfires, painted with Nazi crosses and swastikas, were found hidden in the forest near the airfield at Bad Worishofen, Germany.

One P-51 had made a crash landing in the field near Fussen, Germany. Under a clump of trees was a battered P-38 with similar markings.

* * *

End of Censorship

The Joint Chiefs of Staff on 2 September ordered the discontinuance of censorship of mail and telecommunications of all members of the U.S. Armed Forces in the Asiatic-Pacific Theaters and in the ETO.

* * *

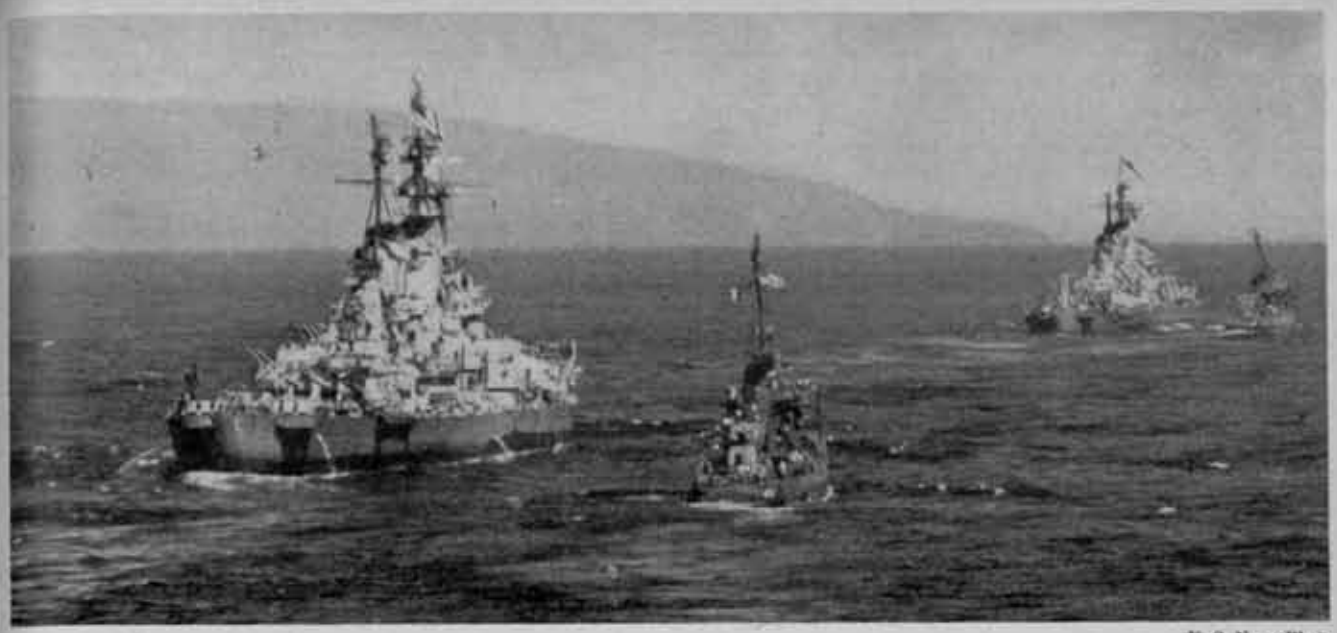
No Cutbacks in Army's Athletic Equipment

Because of the needs of the Army's recreational program, carried out by the Special Services Division for soldiers stationed in Europe and in the Pacific, no cutbacks in procurement of athletic equipment can be expected, at least until the first of the year.

Already in full swing in Europe, the program has been greatly expanded since the Japanese surrender to include

Signal Corps Photo

Milling machines in the V-1 bomb factory in an iron mine at Thil, France. The capacity of this plant was 200 V-1's daily



U. S. Navy Photo

The *Missouri*, with the *Iowa* astern, steams into Tokyo Bay for the surrender ceremony.

the Pacific Theater. Need for athletic equipment in the Pacific is even greater than in Europe because of the lack of established resorts and the lack of recreational facilities.

The Pacific program will include championship contests such as are now in progress in Europe. Baseball diamonds, football fields, basketball and tennis courts, and boxing rings are being built throughout the vast area of the Pacific Theater. Even on tiny Iwo Jima, a softball field is already in operation. On Leyte, where 20,000 Navy men are ashore every day, there are now ten baseball and softball diamonds, 12 basketball courts, 20 volleyball courts, and 100 horseshoe pits, all of which are constantly patronized.

The Quartermaster Corps is rushing the procurement of equipment.

* * *

Army Motors

The September issue of *Army Motors* was its last as a Government-financed publication. It is now a commercial magazine, available to individuals at $3.00 a year. A larger-than-usual discount will probably be available to those who subscribe through the JOURNAL, after arrangements are made with the publishers.

* * *

Quotes from Subscribers

"I desire that you change my address from that as shown on the statement to the following: . . .

I also desire to thank you for your faithful service during my time overseas for I haven't missed a copy.

Many times articles published in the JOURNAL have preceded official information by many months. This rapid dissemination of information has therefore been very helpful."

MAJOR ROBERT F. MEIKLEJOHN.

* * *

"It is with pleasure that I settle this debt and look forward to the coming issues of COAST ARTILLERY JOURNAL, which has brought up many excellent articles that I have put to good use here in an Infantry cannon company."

LIEUT. RALPH L. HOPKINS.

* * *

"Sorry to report that since March Capt. Ketter has been detailed into the Infantry. More than ever now we will need the CA JOURNAL as it is our only link with our former activities.

Best wishes for your continued success and a speedy Victory."

MRS. GEORGE S. KETTER.

* * *

"Have enjoyed the JOURNAL very much this past year. Keep up the good work."

LT. GEORGE W. SANDROCK.

* * *

Age of Military Leaders

The promotion of younger men to positions of high responsibility has been common practice in the Army, particularly the Air Forces, during the wartime expansion program.

One brigadier general was appointed at the age of 28, another at 29; both in the Air Forces. The youngest outside of the Air Forces to become a general was 34 at the time of his appointment.

The average age of the 322 generals in the Army Air Corps on 1 July was just short of 47 years, or 4½ years below the average for the Army as a whole. The fact reflects itself in the high proportion of Air Corps generals at the younger ages. Whereas the Air Forces had one-fifth of all the generals in the Army, they accounted for all five generals under age 35, and for fully one-half of those at ages 40 to 44 years. On the other hand, at 50 and over the generals in the Army Air Corps comprised a little more than one-eighth of the total at those ages.

—*Metropolitan Life Insurance Company.*

Coast Artillery News Letters

Harbor Defenses of Chesapeake Bay

BRIGADIER GENERAL ROLLIN L. TILTON, *Commanding*

By Captain Alonza F. Colonna

Japan's downfall failed to dampen the enthusiasm and excellent *esprit* of striving for perfection in training prevalent in the Harbor Defenses of Chesapeake Bay. "Business as usual" was the order of the day.

In fact it might be said that the promise of early release and return to civilian life made by the surrender of the last of the Axis powers buoyed the spirits of the personnel and programs planned long in advance were carried out with a more vigorous will.

Realizing, however, that the inevitable letdown would come, plans were already prepared and the installations of the Harbor Defenses of Chesapeake Bay were ready.

Full advantage of the exceptional summer weather has been taken and practically all of the target practices required by training memoranda have been completed. These included 40mm seacoast firing, Case II, six-inch firing, and 90mm seacoast and antiaircraft firing. These practices, always a highlight in the training program of harbor defense units, were up to the usual standard and indicated no let-up in the caliber of perfection required.

Small-arms firing for personnel at Fort John Custis, Fort Story, Fort Monroe and the Little Creek Mine Base has been completed and some exceptional scores marked up by the men in the batteries.

Interest is running high in the proposed practice of the 16-inch rifles scheduled with in the next ninety days. This will be the first time the big seacoast guns have been fired in practice and no doubt men who have spent many long weary months learning the technique will be glad to see the firing become a reality.

The past several weeks have not been without color in these Harbor Defenses, and Retreat parades have been marked with special ceremonies presenting personnel with awards. At Fort Monroe, two noncommissioned officers and an officer were given Certificates of Merit, and at Fort Story several reviews were held for visiting dignitaries.

Orientation has taken on an added significance during the past few weeks and the hours have stretched much longer with the discussions of postwar planning and the adjustments to be made following return to civilian life. Each battery has made special efforts to bring the men out and have them express their views and judging from the deep thought that has been evidenced in some of these discourses the G. I.'s have not just been waiting for release but doing some fine intelligent thinking.

The major sport has held the highlight of the outdoor season and Fort Monroe's baseball team completed a successful year against other service teams, taking the Tidewater Virginia championship and playing in the Third Service Command finals.

Special schools for off-duty education have been in progress for some time at Fort Monroe and Fort Story. At Fort Monroe a special course in basic radio under the direction of Staff Sergeant Frederick D. Hackworth was conducted for men wishing to enroll in the USAFI course. The class consisted of sixteen enlisted men and fourteen of them have already enrolled in the advance course.

Col. Wilmer S. Phillips, a former editor of the COAST ARTILLERY JOURNAL, commanding officer of Fort Story left the command for another assignment and was replaced by Col. Adam E. Potts.

Brig. Gen. Gustavo Corderio de Farias, Director of Military training in Brazil, accompanied by his aide, Capt. Godofredo Rocha, and Major Wallace C. Liberty of the United States Army, paid a visit to Fort Monroe in June and inspected the various departments of the Coast Artillery School. While here General Corderio and his party were entertained by General Tilton and looked over the Harbor Defense installations.

Brig. Gen. Gustavo Corderio de Farias, Brig. Gen. Lawrence B. Weeks (Commandant, Coast Artillery School), and Brig. Gen. Rollin L. Tilton.

Northwestern Sector

BRIGADIER GENERAL JAMES H. CUNNINGHAM, *Assistant Sector Commander for Harbor Defense Matters*

Major General Henry C. Pratt, Commanding General, Western Defense Command, accompanied by the Sector Commander, made an inspection of both harbor defenses during the period 9 to 11 August. A regular radar practice was held at Fort Ebey and demonstration target practices were held at Fort Worden, and Camp Hayden, where General Pratt had the opportunity of meeting Brigadier Preston, M. C., Fortress Commander, Esquimalt Fortress and Brigadier Stewart, CGE, DSO, who had just returned from duty in England.

Four Canadian Radar Officers from Esquimalt Fortress and Hq. Pacific Command recently visited the Harbor Defenses of Puget Sound for a three-day inspection and instruction tour of Harbor Defense Radar Installations including an inspection of Navy Airborne Radar Equipment at Ault Field.

On 11 July, the Sector Commander, accompanied by Brigadier General Cunningham, Major General Worthington, CGE, MC, MM, General Officer Commanding In Chief, Pacific Command, Brigadier Preston and Colonel Harrington, U. S. Liaison Officer at Vancouver, visited Forke Island, near the northern end of Vancouver Island and witnessed a day and night seacoast target practice.

The 63-foot aircraft rescue boats recently received in both harbor defenses are being used extensively, especially for towing high-speed targets as shown in the accompanying photograph taken in Admiralty Inlet, HD of PS. A winch operated by a small gasoline motor has been mounted on the stern of this boat and steel airplane target tow cable is used as towline. A special high speed pyramidal target has been constructed, which has been towed at speeds as high as 27 miles per hour in target practices using 600 yards of towline. (Towline in the photo is only a little over 100 yards in order that the details of the target may be observed.) The target is of lattice construction mounted on three plank skis. Screen has been fastened to the lattice work to permit radar firing by AMTB batteries.

Officers' and noncommissioned officers' schools have been continued in both harbor defenses. In the HD of the Columbia an officers' school was held on 2 August during which practical instruction was given in firing a 75mm gun at seacoast targets. In the Harbor Defenses of Puget Sound, an eight-weeks school for enlisted men in the care and preservation, adjustment, operation and firing of automatic weapons is being conducted at Fort Casey using both radio-controlled airplane and towed sleeve targets.

During July and August, personnel from both harbor defenses were engaged in fighting forest fires. Troops from the Harbor Defenses of the Columbia aided materially in checking the huge Tillamook forest fire on the Oregon Coast. A forest fire fighting detail of eighty men and four officers worked for two weeks under the technical supervision of the State Forestry Officials in an attempt to confine the fire to a 200,000-acre area which had been devastated. The Harbor Defenses of Puget Sound furnished troops to combat several smaller fires on Whidby and Marrowstone Islands.

An active schedule of outdoor athletics has been conducted during the summer in both harbor defenses, climaxed by a three-game baseball series between the two harbor defense teams. The final and deciding game, played at Fort Worden on 12 August was won by the HD of the Columbia team by a score of 1-0.

The high-speed target at 25 mph.

If you are going to be moving around for a while, why not have the JOURNAL sent to your home address?

Harbor Defenses of San Francisco-

COLONEL WILLIAM F. LAFRENZ, *Commanding*

The Commanding Officer, Harbor Defenses of San Francisco, has taken over the activities of the Northern California Sector. The Sector was inactivated 31 August 45.

Harbor Defense troops topped all previous War Bond drives when they reached a total of $106,937, culminating a three-month effort in the 7th War Loan. Ace contributors were men of the 174th C.A. Bn. mine command who registered an amazing 76 per cent participation total.

Hq. & Hq. Det., 173rd C.A. Bn., Fort Baker, won the first of a series of four trophies to be awarded by the commanding officer for the most unusual, unique and informational orientation display with the HDSF command. The award to Corporal Jess Haigler, Clemson College, South Carolina, graduate, originator of the orientation display in the detachment dayroom.

Athletics dominated minds of majority of the Coast Artillerymen in the Harbor Defenses of San Francisco during the month of August, with the Ninth Service Command softball finals having been concluded at Fort Winfield Scott August 26 after five days of competition.

Camp Anza, Arlington, Calif., won the softball title, defeating Fort Lewis, Wash., 1-0, in eleven innings for the crown. Other teams in the tournament included Fort Winfield Scott; Camp Stoneman, Calif.; Camp George Gordon, Seattle, Wash.; Dugway Proving Grounds, Utah; Tooele Ordnance Depot, Utah; Birmingham General Hospital, Van Nuys, Calif.

Fort Winfield Scott won the right to enter the finals (representing eight Western states comprising the largest of all the U.S. service commands) by defeating Camp Stoneman in the Central District play-offs earlier in the month at Fort Scott.

The Fort Scott Gunner baseball team traveled to Camp Stoneman Aug. 29 for the Ninth Service Command finals, emerging second best. Fort Lewis, Wash., won the pennant with the coast artillerymen runners-up, losing to the Warriors, 9-6, in the final game. The Fort Scott club was coached by Captain James McDermott and had two soldiers placed on the service command "all-star teams"—Sergeant Norman Hibbard, first base, and Private Don "Red" Weber, pitcher.

The Fort Scott WAC softball team also went to the Ninth Service Command finals, thus giving the Golden Gate installation the unique distinction of being the only post in the Ninth Service Command to put three teams into the NSC softball and baseball finals. The Fort Scott Wacs reached the quarter-finals before being eliminated.

More than half a hundred government civilian employees and soldiers from San Francisco to Reno, Nevada, convened at Fort Scott in mid-August for the first of a series of twenty scheduled conferences in Work Simplification sponsored by the Ninth Service Command. Colonel Philip Biehl, post executive and commanding officer, station complement, 1932 SCU, welcomed the group.

More than 600 Harbor Defense enlisted men—majority of them veterans of earlier South Pacific campaigns—left Fort Scott in mid-July for various separation centers for discharge under the point system. It was the first mass Army release of San Francisco soldiers who have defended the city and harbor from possible enemy attack. Private First Class Henry Hattal, 25, Philadelphia, Pennsylvania, had the high-point total of 141.

Antiaircraft Replacement Training Center

Fort Bliss, Texas

COLONEL E. C. SEAMAN, *Commanding*

By Major Rex Ragan

Despite the impending approach of V-J Day at this writing, with its mounting tension among officers and men alike, training of troops at the Antiaircraft Replacement Training Center continued without a falter.

The AARTC "lost" one of its largest battalions, the 582d AW (Sp) Battalion when the Antiaircraft Artillery Training Center reopened late in July and the organization returned to its former command, as did several ordnance units recently attached to the AARTC.

During the shift from training replacements from European Theater combat to Pacific warfare the tempo has increased, and among other features of training, much stress has been placed on scouting and patrolling, for which a desert course has been mapped out northwest of El Paso, along the Rio Grande.

Trainees, in their fourth week of basic, are run through the course which is a practical test of their knowledge of map-reading, use of the compass, and individual ingenuity. Crossing desert terrain, the men negotiate arid lands and end by fording the sluggish Rio Grande, where they relax until a night phase of the problem completes the test. During the hot Texas weather, the river crossing is one of the most enjoyable parts of the training program.

Following action by Congress prohibiting men under 19 from going overseas, and into combat, without a required minimum of training, one new battery has been formed—the First Provisional Battery—and another in process of organization, for giving teen-age youths an additional nine weeks of advanced AA training before being made available for shipment. The training for these men closely parallels the regular AARTC schedule, but is more detailed and advanced than the usual 17-week cycle.

Men going on desert field exercises have been taught more and more about the realities of war. Besides digging in when on maneuvers, they are acquainted with the ide

how it feels to be attacked by planes and tanks. Low-flying planes from the Deming Air Base at Deming, New Mexico, demonstrate low-level bombing and strafing tactics, and simultaneously a light tank, belonging to the AARTC, simulates firing, while throwing colored smoke bombs at trainees who are taught to seek protective cover while employing small-arms fire against the enemy.

2273d AAA Command

As the number of days left in the war rapidly became fewer and fewer, the Hawaiian Antiaircraft Artillery Command began planning for the postwar period. The problem of redeployment of many officers and men with long periods of duty overseas and with high ASR scores was paramount. The establishment of schools and classes under the Information and Education program, and widespread recreational activities under the Athletic and Recreation Office were being planned. But in the midst of working and planning for the post-V-J Day period, a high degree of combat efficiency was being constantly maintained.

One of the factors contributing to training in this command over the last two years has been the coöperation of the Navy in a monthly "Joint Army-Navy Exercise." These exercises were designed to test all the Air Defense agencies on Oahu. The Navy provided many carefully planned and executed saturation attacks utilizing hundreds of carrier-type planes simulating the enemy. Radio and radar countermeasures were freely employed by the "drill-hostile" forces in an effort to confuse the defenders, to protect the attackers, and to add realism to the exercise. The defending forces included all those available to the Air Defense Commander in addition to those strike groups available to the Hawaiian Sea Frontier. A monthly night battle practice utilizing four or more tow-target planes, both high and low altitudes, was held in conjunction with the Joint Army-Navy Exercises. General Perkins has said, "The fine spirit of coöperation between the services exhibited in the planning and carrying out of these exercises is commendable. The training received has greatly benefited antiaircraft units." Participating navy units have also received much valuable training from the exercises.

Other out-of-the-ordinary training activities engaged in by the command included the indoctrination of Navy carrier pilots in low-level night flying in searchlight-defended areas. Of great training value to antiaircraft units engaged in spread-beam defense, these problems trained carrier pilots who soon were scheduled to fly against similar defenses in Japan.

Problems confronting units equipped with 120mm antiaircraft guns are constantly being studied by the command. Current projects include the development of a forward-area sight for firing against close-in targets by gun commanders' action. A study of the rate of wear on the 120mm tubes and the correspond ng loss of muzzle-velocity has also been undertaken.

Extensive tes.s of the use of searchlights for furnishing "artificial moonlight" in dense jungle terrain have been completed at the Pacific Combat Training Center.

An antiaircraft gun battalion commanded by Lt. Col. William H. Vail, CAC, for a long time a part of this command, has established an enviable record since going into action in the Ryukyus. In a single night's action this one battalion set a new Pacific record when it shot down fifteen enemy planes. During one four-minute period the battalion was credited with a plane a minute. As of 1 August 1945, the battalion was credited with 35 planes destroyed and 24 probably destroyed. Colonel Vail was recently commended by Fleet Admiral Chester W. Nimitz for the fine record his battalion has established.

After a very successful Tennis Tournament conducted by the AAA Special Service Office, the singles crown was awarded Pvt. Jack Rodgers, former Wisconsin State Singles Champion. Col. F. T. Folk, Chief of Staff, and Capt. Paul S. Burger of the G-3 Section teamed up to win the doubles. Rodgers represented the quarter finals. In the CPBC Summer Baseball League the Command Team finished fourth. This AAA nine was the only team in the league to defeat the strong Bellows Field team headed by big league players from the New York Yankees, St. Louis Cardinals, St. Louis Browns and the Boston Braves. An AAA team also came away with honors in the CPBC Horseshoe Tournament.

Sgt. Frank De Luccia, Lt. Col. William Vail, and Captain Robert Cannon discuss action in the Ryukyus.

The JOURNAL can supply any book in print, at the usual Association discount.

From the Front Office

SELECTED SPEECHES AND STATEMENTS OF GEORGE C. MARSHALL. Edited by Major H. A. DeWeerd. Washington: Infantry Journal, 1945. 259 Pages; Index. $2.75.

Forty-eight speeches by General of the Army George C. Marshall appear in this book; they were made in such diverse places as in Congressional hearing rooms, and to nation-wide radio audiences.

Traditionally, soldiers in the position of General Marshall, Chief of Staff of the Army, have either said nothing, or have said things that have caused political and military repercussions. General Marshall's speeches, on the other hand, have brought unity and understanding to the country as a whole, and to those who shape our policies.

Dispassionate, with no axe to grind except the welfare of the United States, the General's speeches and statements have in them the quality of simplicity, the germs of time-proved prophecy, and the calmness born of knowledge and confidence. The speeches are not stuffy—they are too full of meat and too straightforward for any of that.

Douglas Southall Freeman, the great historian of the South, says of this book, "To these papers, when they have read everything else, students will turn for final explanation and integration. This volume is a major source book of American military history."

* * *

The New Army

UNIVERSAL MILITARY TRAINING. By Colonel Edward A. Fitzpatrick. New York: Whittlesey House, 1945. 358 Pages; Appendix; Index. $3.00.

The subject of universal military training is one that is guaranteed to touch off acrimonious debate in almost any gathering. Colonel Fitzpatrick's treatment of the question is so unbiased and so temperate, without resorting to hedging, that this book may well be used as a handbook by debaters on both sides of the question, even though the author believes in universal military training.

The author sticks pins in the bubbles of the more active proponents of the proposition as well as in those of its opponents. He believes in universal military training because it is necessary for the protection of the United States in the event of future wars, not because it will make our youth any better mentally, physically, or morally. He admits that the Army has made mistakes and will make them again, and that absolute Army control of the program might be a mistake in itself, but he questions the idea that this is a valid reason for rejecting the program—Congress could specify the conditions of the training.

He rejects the idea that young people owe a year of their lives to the government; the thought that a glorified CCC is desirable also leaves him cold. He does not believe that the year of training should be anything but training—no garrison duty, no occupation duty. He sticks to the premise that we need trained men in the event of another war, and that the way to get them is to train them. The side issues, one by one, pro and con, are analyzed, evaluated, and then filed—we still need a trained reserve and a fair-sized standing army. The most economical and fairest way to attain this objective is universal military training.

The conscientious objector problem is treated justly and completely in this book, as are the problems of the National Guard and countless other issues. Temperateness and cold logic based on facts and statistics are the outstanding virtues of this volume. Nobody, from President Roosevelt to the pacifists, is treated as a sacred cow—the reader is never permitted to forget that the objective is important, and that there is one just and certain way to reach it.

* * *

Semper Fidelis

THE U. S. MARINES ON IWO JIMA. By Five Official Marine Combat Writers. Washington: Infantry Journal, 1945. 312 Pages; Illustrated. 25¢ to Members of the Armed Forces.

The bloody battles of Guadalcanal and Tarawa, Kwajelein and Bougainville, were war enough for any man or group of men, but Iwo Jima will remain as the toughest of them all. There was a lot of killing in a small area when this volcanic pile was wrested from the stubborn Japs. When we at home read about this campaign we wondered what there was on the island worth the losses—until we began to hear about the numbers of B-29s that were saved on the island or by search planes from it.

The whole story of the fighting would take volumes, but this book (and it isn't such a little book, at that) makes a good start in explaining what the Marines met in the way of resistance, and how they overcame it. The pictures are more plentiful than is usual in a book of this sort, and they add much to the final product. Iwo, as pictured, is a rather dismal pile of ash.

People Going Crazy

PERSIAN GULF COMMAND. By Joel Sayre. New York: Random House, 1945. 140 Pages; Illustrated. $2.00.

Iran is hot; not hot like a Washington summer, nor like the California desert, but so hot that the heat kills the flies in July. A temperature of 189 has been recorded, and 120 in the shade is common. Add to this heat the fact that the country's only railroad was little more than a streak of soft iron, that the road system was reminiscent of a General Motors testing track, and that the natives had little idea of things mechanical. Mud in certain seasons, flies, strange diseases, strange religious customs, and mountainous territory were a few more complications.

With all these works of man and Nature to contend with, the Persion Gulf Command forwarded untold tons of vital war materials to the Russians—war materials which had much to do with the turn in the tide of the Russians' part of the war. The Americans built their own roads, docks, and plants; they patched and fixed and restocked the railroad; they assembled a truck every five minutes with native labor; and they got the tonnage through. There was no enemy to fight, but there was the heat and the boredom. Four and one-half million long tons of supplies went to Russia through Iran—Americans did it.

Joel Sayre tells how they did it, in *New Yorker* style, which makes it very good reading indeed.

* * *

Ambulance in the Desert

I DREAM OF THE DAY. By Caleb Milne. New York: Longmans, Green & Co., 1945. 122 Pages. $2.00.

These are the letters from a sensitive, young, and talented American Field Service driver to his mother. Milne drove for the British and the French in North Africa, and was killed while serving with General Leclerc. Part travelogue, part personal experience narrative, the book helps to explain some of the thoughts of an intellectual pacifist.

* * *

For Truck-Busters

KEEP 'EM ROLLING: A Driver's Handbook. By Richard Gordon McCloskey. Washington: Infantry Journal, 1945. 270 Pages; Illustrated; Index. 50¢.

This new and enlarged edition of the now-familiar *Keep 'Em Rolling* is the sixth to come from the presses. The author, who wrote the first editions when he was editor of *Army Motors*, is an expert at putting over instruction in the form of colloquial, everyday language.

Ducks, motorcycles, camouflage, the care and feeding of winches, and other related subjects are added to the expected information on driving and first-echelon maintenance.

The reviewer, who has been driving for twenty years, didn't realize how little he knew about modern vehicles and their operation and maintenance until he read this new edition. Every driver, mechanic, motor sergeant, and motor transport officer should have his personal copy of this breezy book.

* * *

Crash and Burn

AIRPLANE CRASH FIRE FIGHTING MANUAL. Boston: National Fire Protection Association, 1945. 96 Pages; Illustrated. $1.00.

Fighting fire in crashed airplanes is no job for amateurs, and even trained city firemen often have much to learn about this

specialized task. It entails knowledge of aircraft structure a equipment, armament, airport management, and traffic patter among other things. This pamphlet, meant for use as a t by fire companies or crews which might have to cope with fi in crashed aircraft, is well illustrated.

* * *

Restless Waters

LAKE ERIE. By Harlan Hatcher. New York: The Bobb Merrill Company, 1945. 396 Pages; Index; Illustrated. $3.5

In this fifth book of the American Lakes series, Harla Hatcher deals with Lake Erie. Of all the Great Lakes, Erie h had, probably, the most profound effect on the people who li in the immediate area, and on the growth of the country as whole. Handling astronomical tonnages of waterborne freigh bordered by rich farming lands and thriving cities, Lake Er combines the elements that have made America great.

The early French explorers found the lake and founded so of the cities, notably Detroit; the British took over as the pag of history turned; and finally the Americans owned the sout ern shore. The War of 1812 highlighted the importance Lake Erie. A ready but dangerous highway, the Lake ma possible the commerce that in turn made possible Buffal Cleveland, Erie, and Toledo, along with the once-importa cities of Sandusky and Vermilion. Canals were promoted connect with the Lake; the terminal cities grew fast with th increased trade.

Today huge freighters carry wheat and ore, and lesser item the length and breadth of the Lake. Shallow and tempestuou the roughness of the water and the narrowness of the channel and seaways make the Lake a hazardous place for the sailo and the ships, but the commerce continues. The breed of me who became the industrial giants of the last century, wh founded and helped the lake cities to grow, still carry o The desire for one last trip before the ice sets in has co many a ship and many a man, but the people of the lakes st take out the ships. Tragedies and losses are taken in stride.

Combined with the background of great cities, huge unloa ing docks and elevators, and the making and losing of money we have stories of the Underground Railroad of slavery day Perry and the War of 1812, Jack Miner and his game refuge Cadillac and La Salle, and Captain John Brown, Jr.

The book is good history, illuminated by good writing.

* * *

Eaton in Africa

FIRST AMERICANS IN NORTH AFRICA. By Louis B Wright and Julia H. MacLeod. Princeton: Princeton Uni versity Press, 1945. 206 Pages; Notes; Index; Illustrated $3.00.

There have been fictionalized histories of the labors and ad ventures of William Eaton in his struggles against the Barbary pirates, and there have been chapters in histories covering the subject, but this book is a refreshing change from the previous treatments. It is factual without being dry, presumably accurate and seemingly objective in its treatment of William Eaton.

The story of Eaton is fairly well known—as one of our consuls in North Africa at the time the United States was paying tribute and losing Americans to slavery in Morocco Tripoli, and Algeria, he fought to stiffen America's attitude to make a show of force, or even to fight. That the policy Eaton urged was adopted years later, and that it was proved right by the savings in men and money (to say nothing of na tional prestige), was of little satisfaction to Eaton, who by that time was a poor and broken man.

Eaton's march across the desert, as "General" of an army of six marines, a company of Greek mercenaries, and a volatile group of fickle Arabs, is probably the best known of his feats. Lack of coördination with the Navy and his own State Department colleagues nullified the results of the march, but it was still one for the annals.

Our early dealings with the Barbary pirates is a shameful chapter in American history; Eaton did his best to change our policies, and his best was very good indeed. When the Navy finally did take the matter in hand, the power of the pirates was broken for all times.

* * *

Patrick Henry

SON OF THUNDER. By Julia M. H. Carson. New York: Longmans, Green & Co., 1945. 240 Pages; Bibliography. $2.50.

This fictionalized biography of Patrick Henry covers the important events in his brilliant career with sympathetic understanding. It does not hide the fact that Henry had enemies as well as friends, and that the courses he followed were not always considered in the best interests of his state and his country, although his motives and sincerity were never in doubt. The sugar-coating of fiction does not detract too much from the authenticity of the biography.

* * *

Working for Uncle Sam

GOVERNMENT JOBS AND HOW TO GET THEM. Edited by Sterling D. Spero. Philadelphia: J. B. Lippincott Company, 1945. 325 Pages; Index. $2.95.

Many soldiers, even those who moan the loudest about their present "employment," will have learned to like working for the government. The sureness of the pay checks, the relatively greater security of tenure, and (in some cases at least) the limited sphere of activities will have their attractions. Polls of about-to-be-discharged soldiers have indicated that a large proportion are interested in Civil Service jobs.

Veterans' Preference rights will make it somewhat easier for service people to obtain these jobs, and in some cases, the jobs are reserved for those with military service.

This book presents a list of 500 government jobs, explains the requirements, gives some hints as to the types of examinations, and tells how to go about finding openings and applying for the vacancies. The Veterans' Preference angle is explained fully.

It will be a shock to many with a desire to enter government work that a large number of the jobs pay relatively low wages, and that even moderate salary grades require education and experience that will eliminate many job-seekers.

The person who wants a government job will save much shoe leather and time by reading this book thoroughly before he begins his search.

* * *

Your Own Boss

HOW TO START YOUR OWN BUSINESS. By Walter F. Shaw and E. W. Kay. New York: Ziff-Davis Publishing Company, 1945. 227 Pages; Index; Illustrated. $2.00.

The most valuable contribution of the authors in this book is the fact that they plant the idea, both directly and indirectly, that without proper management and much work any business cannot last. There is more to opening a business than renting a vacant store, buying some merchandise blindly, and using the cash receipts for household expenses.

The book contains valuable information on how to choose a business, how to choose a location, how to control stock inventories, how to keep records, how to budget, how to advertise, how to create and keep good will, and hundreds of other "hows" that will make or break a small retail business. Not the least valuable item in the book is the reading list for further study at the end of each chapter.

Work for Veterans

500 POSTWAR JOBS FOR MEN. By Vocational Guidance Research. New York: Doubleday, Doran & Co., 1945. 270 Pages; Index. $2.50.

Many soldiers, officers and enlisted men alike, have only a vague idea, or no idea at all, of what they intend to do when they leave the service. With millions being discharged in the next few months, it behooves the prospective civilian to do what he can about finding profitable and congenial employment.

This book lists 500 jobs; under each one are listed the following subheads: Present Outlook, Job Description, Requirements, Advantages, Disadvantages, Earnings, Advancement Opportunities, and Where to Apply.

* * *

Atrocities

THIS MUST NOT HAPPEN AGAIN. By Clark Kinnaird. New York: Howell, Soskin, 1945. 160 Pages; Illustrated. $2.00.

Putting on record, in pictures and in text, the atrocities of our late enemies, this book is far from pleasant reading. Most of the pictures and much of the text have been seen before, in newspapers and other periodicals, but never in such a huge dose as this. The apologists for the Germans, the Japs, and the Italian fascists might do well to avoid those who have read this book.

* * *

Dark Days for Spain

SMOULDERING FREEDOM. By Isabel de Palencia. New York: Longmans, Green and Company, 1945. 247 Pages; Notes; Index. $3.00.

This is the story of the struggles and the exile of the Spanish Republicans, whose government was overthrown by Franco in the late Spanish Civil War. The war was bitter and bloody, in the fashion of civil wars, and there was no place in Spain for the vanquished except in the cemeteries or in prison. Isabel d Palencia found haven in Mexico, where she still works an fights for the Republican cause.

The internment in France of many of the Republicans, an the wanderings and sufferings of the group as a whole mak bitter reading. The book is part history, part biography.

* * *

How a Unit is Born

"E" COMPANY. By Frank O'Rourke. New York: Simon and Schuster, 1945. 166 Pages. $2.00.

"E" Company was organized about ten days after Pear Harbor, went through the normal training (including the grea "broomstick maneuvers"), and fought in Africa. This novel portrays very well the task of forming a fighting unit from a hun dred-odd assorted characters; the author does a fine job o delineating the personalities of many of the men, "key" and otherwise, from the CO to the phoney dice expert. This isn' great literature, but it is a workmanlike, straightforward bit o writing that is a far cry from the Hollywood school of militar glamor.

* * *

Cartoons Again

STOP OR I'LL SCREAM. Edited by Gurney Williams. New York: Robert M. McBride & Company, 1945. 159 Page $2.00.

More than 300 cartoons from *Collier's* fill this book. There isn't a cartoon in the collection that is obscure in meaning— which does not mean that subtle humor is lacking— Chon Day's pair of tykes, with one of them saying, "Let's go down to the depot and yell 'Daddy' at the servicemen," gives you an idea. There is a good representation from Virgil Partch; Foster Hum freville's Alfred the Sailor bobs up on page after page; and Gardner Rea, Larry Reynolds, and the rest of the *Collier's* stable are here.

The standard edition of any book will be sent unless the paper-bound Fighting Forces edition is specifically requested

THE COAST ARTILLERY JOURNAL,
631 Pennsylvania Avenue, N.W.,
Washington 4, D. C.

Please send the following books:

REMARKS, OTHER ITEMS

☐ I inclose remittance in the amount of $----------

☐ Send bill to Battery Fund.
(For unit orders only.)

☐ Please charge to my account.

Name (Please Print)

(Street address or box number)

(Town — Post) (City and State)

(CA545)

BOOKS

In the Present, Prepare for the Future

If the book you want is not listed here, the Journal can get it for you.

(Titles marked * for sale to members of the Armed Services only)

Military Training

Psychology for the Armed Services	3.00
Psychology for the Returning Serviceman	.25
Fear in Battle (Dollard)	.25
Map Reading for the Soldier	1.00
Combat Problems for Small Units	1.00
Cadence System of Teaching Drill	.75
Essentials of Infantry Training	
Cloth edition	2.00
Paper edition	1.50
FSR & SOFM Combined	1.50
How to Use Your Eyes at Night	.10
Infantry in Battle: Examples from War	3.00
Leadership for American Army Leaders (Gen. Munson)	.25
Map & Aerial Photo Reading Complete	1.00
New Infantry Drill Regulations	
Cloth edition	.75
Paper edition	.30
Psychology for the Fighting Man	
Cloth edition	1.50
Fighting Forces edition	.25
Riot Control (Col. Wood)	1.50
Scouting & Patrolling	.25
State Defense Force Manual (State Guards)	1.00
Tactics & Technique of Infantry, *Basic*	3.00
Tactics & Technique of Infantry, *Advanced*	5.00

Psychology & Leadership

Psychology for the Armed Services	3.00
Psychology for the Returning Serviceman	.25
Infantry Attacks (Rommel)	3.00
Fear in Battle (Dollard)	.25
Americans vs. Germans, 1917-18	.25
The Battle is the Pay-Off (Lt. Col. Ingersoll)	
Cloth edition	2.00
Fighting Forces edition	.25
Generals and Generalship (Gen. Wavell)	1.00
Infantry in Battle: Examples from War	3.00
Leadership for U. S. Army Leaders (Gen. Munson)	.25
Management and Morale (Roethlisberger)	2.00
Psychiatry in War (Mira)	2.75
Psychology and the Soldier (Copeland)	1.00
Psychology for the Fighting Man	
Paper edition	.25
Cloth edition	1.50

Headquarters & Administration

Military Correspondence Checklist	.25
Stock Clerk's Manual, Air Forces	1.00
Handbook to AR & Admin. (Sczudlo)	2.50
How to Write a Military Letter (Klein)	1.25
Administration of the Army (AG School)	.10
The Army Clerk (AG School)	1.00
Army Food & Messing (Mess Management)	2.50
The Army Personnel System (AG School)	.10
Co. Administration & Personnel Records	
Paper edition	1.50
Cloth edition	2.00
Company Duties: A Checklist	.25
General & Special Staffs (AG School)	.10
Orders: Guide to Preparation (AGS)	.50
SOP for Regimental Adjutant's Office	.10
Travel: Guide to Regulations (AGS)	.60

Weapons and Weapons Training

Coming Age of Rocket Power (Pendray)	3.50
Ordnance Field Guide, 3 vols., *each*	2.50
Tanks and Armored Vehicles (Col. Icks)	4.75
Rockets and Jets (Zim)	3.00
Rifles & MGs of the World's Armies (Johnson)	
Cloth edition	5.00
**Fighting Forces edition*	.25
Rockets (Ley)	3.50
A Manual of Military Small Arms (Smith)	2.00
How to Shoot the U. S. Army Rifle	.25
Ammunition (Johnson & Haven) (with 100 tables)	5.00
Gun Care and Repair (Chapel)	3.75
The Book of the Springfield	4.00
Firearms Investigation (Gen. Hatcher)	7.50
*The Gun (Forester)	.25
History of Automatic Arms (Johnson & Haven)	5.00
Machine Gunner's Handbook (Col. Coates)	.50
Military & Sporting Rifle Shooting	4.50
Story of Weapons & Tactics (Wintringham)	2.25
The Tools of War (Newman)	5.00
Weapons for the Future (Johnson & Haven)	.25
What You Should Know About Our Arms & Weapons (Major Hicks)	2.50

Air Forces Study

Rockets and Jets (Zim)	3.00
Survival: Land, Sea, Jungle, Arctic	
Cloth edition	1.50
Fighting Forces edition	.25
Flight Crew Training Program	.25
Mechanics Handbook	.60
Of Instruments and Things	.25
Instructor's Manual	.25
Refueling the Airplane	.25
Attitude	.25
Radio Principles	1.00
Hydraulic Principles	1.00
Engine Principles	1.75
Radio Operating	.60
Mechanical Principles	.60
Use of Numbers	.60
Flight Principles	.60
Electrical Shop	.40
Stock Clerk's Manual	1.00
Loading and Cruising	1.00
Weather Principles	1.00
Electrical Principles	1.25
Celestial Navigation	1.00
Navigation Principles	1.75
Pilot's Technical Manual	1.50
So You're Going to Fly the Big Ones (Wynn)	1.50
Roger Wilco: Radio for Flyers	2.00
The Air Future: Jobs Ahead in Aviation	2.75
Aircraft Construction Handbook	2.50
Aircraft Math. (Walling & Hill)	1.75
Aircraft Navigation (Stewart & others)	2.00
Basic Math. for Aviation (Ayres)	3.25
Basic Math. for Pilots & Crews	2.00
Basic Physics for Pilots & Crews	1.65
Elements of Aeronautics (Pope & Ellis)	3.75
Elements of Radio (Marcus)	4.00
Navigation for Mariners & Aviators	5.00
Navigation (Kingsland & Seager)	1.00
Primer of Celestial Navigation (Favill)	2.00

Cavalry

Modern Reconnaissance	1.50

Artillery

Coming Age of Rocket Power (Pendray)	3.50
Rockets (Ley)	3.50
Field Artillery, *Basic*	5.00
Seacoast Artillery (A complete textbook)	3.00
Battery Duties: A Checklist	.25

Gas Warfare

Gas Warfare (Gen. Waitt)	
Cloth edition	2.75
**Fighting Forces edition*	.25

Ordnance

Ordnance Field Guide, 3 vols., *each*	2.50

Medical

Doctors at War	5.00
Burma Surgeon (Col. Seagrave)	
Cloth edition	3.00
**Fighting Forces edition*	.25
Handbook for Nurses' Aides (Orbison)	2.00
Medical Soldier's Handbook	1.00
Military Medical Manual (complete text)	4.50
Military Preventive Medicine (Dunham)	3.25
What You Should Know About Wartime Medicine (Darnall & Cooper)	2.50

Military Intelligence

Combat Intelligence (Gen. Schwien)	2.00
S-2 in Action (Col. Thomas)	1.50
What You Should Know About Spies & Saboteurs (Irwin & Johnson)	2.50

Motors & Drivers

Driver Training: Handbook for Instructors	.25
Keep 'em Rolling: Handbook for Drivers	.50
Preventive Maintenance	1.00

Sports and Games

Scarne on Dice	2.50
Boxing: Skills & Techniques (Haislet)	1.25
Get Tough (Fairbairn)	1.00
Kill or Get Killed (Applegate)	2.00
Military Ski Manual (Harper)	2.00
Modern Judo (Yerkow)	3.00
Softball: How to Play It (Noren)	1.25
Sports as Taught & Played at West Point (Col. Baumer)	2.00
Touch Football (Col. Grombach)	1.25
Wrestling: Skills & Techniques (Gallagher)	1.25
Volleyball: How to Play It (Laveaga)	1.25
You Must Be Fit (WAC Physical Training)	
Cloth edition	1.00
Paper edition	.50

Military Law

Occupation of Enemy Territory	1.25
Lawful Action of State Military Forces	
Paper edition	1.50
Cloth edition	3.00
Military Justice for the Field Soldier (Col. Wiener) (Preparation for trial, trial, and records)	1.00
Articles of War Annotated (Col. Tillotson)	2.50
Court-Martial Practical Guide (McCarthy) (Handy Courtroom Manual)	1.00
Manual for Courts-Martial (War Dept.)	1.00
Manual of Martial Law (Col. Wiener) (Military Control of Civilian Areas)	2.00
The Soldier and the Law (Col. McComsey & Major Edwards)	2.00

Military Thought

Balance of Tomorrow (Strausz-Hupé)	3.50
Military Staff: History & Development	2.00
Military Institutions (Vegetius)	1.00
Frederick's Instruction to His Generals	1.00
Saxe's Reveries on the Art of War	1.00

Art of War (Sun-Tzu) 1.00
Still Time to Die (Belden) 3.00
The German Army (Rosinski) 3.00
Defense (General von Leeb) 1.00
The Framework of Battle (Col. Burt) 3.00
Lifelines of Victory (Harris) 2.00
The Living Thoughts of Clausewitz
*Fighting Forces edition ..... .25
MacArthur on War 3.00
Makers of Modern Strategy 3.75
Maneuver in War (Gen. Willoughby) ... 3.00
Masters of Mobile Warfare (Col. Colby) . 2.00
Napoleon and Modern War (Col. Lanza) . 1.00
The Nature of Modern Warfare
(Capt. Falls) 1.25
On War: Clausewitz Full Text 1.45
Principles of War (Clausewitz Outline) .. 1.00
Roots of Strategy (Gen. Phillips) 3.00
Sergeant Terry Bull: His Ideas on War ... .25
Studies on War: From *Military Affairs* ... .25
Surprise in War (General Erfurth) 1.00

Notebooks

Army Officer's Notebook 1.00
Platoon Record Book ..... .50
Squad Record Book ..... .25

Mathematics

Slide Rule ..... .50
Use of Numbers ..... .60
Military Application of Math. (Hanson) .. 3.00
Mathematics Refresher (Hooper) 2.50
Mathematics for the Million (Hogben) ... 3.75
Wartime Refresher in Fundamental Math.. 1.40

Navigation

Of Instruments and Things ..... .25
Loading and Cruising 1.00
Weather Principles 1.00
Celestial Navigation 1.00
Navigation Principles 1.75
Northern Routes ..... .25
The Raft Book (Gatty) 3.25
Navigation for Mariners & Aviators 5.00
Navigation (Kingsland & Seager) 1.00
Primer of Celestial Navigation (Farrill) .. 2.00

Radio

Radio Operating ..... .60
Radio Principles 1.00
Elements of Radio (Marcus) 4.00
Fundamentals of Electricity (Mott-Smith) . .25
Roger Wilco: Radio for Flyers 2.00

Sciences

Atomic Energy for Military Purposes (Smyth)
Paper edition 1.25
Cloth edition 2.50
Plant Life of Pacific World (Merrill)
Cloth edition 3.50
Fighting Forces edition ..... .25
Reptiles of Pacific World (Loveridge)
Cloth edition 3.00
Fighting Forces edition ..... .25
Native Peoples of Pacific World (Keesing)
Cloth edition 3.00
Fighting Forces edition ..... .25
Survival: Land, Sea, Jungle, Arctic
Cloth edition 1.50
Fighting Forces edition ..... .25
Animals of the Pacific World
Cloth edition 3.00
Fighting Forces edition ..... .25
Fundamentals of Mechanics (Mott-Smith
& Van de Water) ..... .25
Use of Numbers ..... .60
The Pacific World
Cloth edition 3.00
Fighting Forces edition ..... .50
The Raft Book (Gatty) 3.25
Science at War (Gray) 3.00
Cryptography: Science of Secret Writing.. 2.50
Fundamentals of Electricity (Mott-Smith) . .25
Handbook of Elementary Physics (Lindsay) 2.25
Secret & Urgent: Story of Codes & Ciphers 1.00
Wartime Refresher in Fundamental Math.. 1.40

War Aims

Human Nature and Enduring Peace 3.50
U. S. War Aims (Lippmann) 1.50
We Cannot Escape History (Whitaker)
Cloth edition 2.75
Fighting Forces edition ..... .25
The Time for Decision (Welles) 3.00
Geography of the Peace (Spykman) 2.75
One World (Wendell Willkie)
Cloth edition 2.00
Paper edition 1.00

Use of Air Power

Carrier War (Jensen) 2.50
Fighting Wings (Paust & Lancelot) 2.75
Bombers Across (Wynn) 2.50
Bombardment Aviation (Ayling) 2.00
The British Navy's Air Arm ..... .25
Combat Aviation (Ayling) 2.00
Douhet and Aerial Warfare (Col. Sigaud) 1.75
Fighter Facts and Fallacies 1.25
Horizons Unlimited: History of Aviation.. 3.75
War in the Air, 1939-41 (Garnett) 3.50
Winged Mars: The Luftwaffe 1870-1914. 2.00
Winged Warfare (Gens. Arnold & Eaker) 3.00

Airborne Troops

We Jumped to Fight (Raff) 2.50
He's in the Paratroops Now (Rathbone).. 2.50
Modern Battle (Col. Thompson) ..... .25
Paratroops: Airborne Tactics (Miksche).. 2.50

Commandos & Amphibious War

U. S. Marines on Iwo Jima
Cloth edition 3.00
Fighting Forces edition ..... .25
Betio Beachhead (U. S. Marines) 2.50
Amphibious Warfare (Adm. Keyes) 1.50
Combined Operations: Commando Raids.. 2.00
Dress Rehearsal: The Dieppe Raid 2.00
Guerrilla Warfare (Yank Levy) ..... .25
New Ways of War (Wintringham) ..... .25

Mechanized Warfare

Tanks and Armored Vehicles (Col. Icks). 4.75
Armored Warfare: Lectures on FSR III ... 1.00
The Army of the Future (Gen. DeGaulle) 2.00
Blitzkrieg: Its History (Col. Marshall) ... 2.00
Guerrilla Warfare (Yank Levy) ..... .25
Machine Warfare (Gen. J. F. C. Fuller)
Cloth edition 2.50
Fighting Forces edition ..... .25
Tank-Fighter Team: France 1940 (Gerard) .25
Modern Battle (Col. Thompson) ..... .25
War on Wheels: History of Mechanized
War 2.00

Naval Warfare

Carrier War (Jensen) 2.50
Battle Report: Pearl Harbor to Coral Sea.. 3.50
Guide to Naval Strategy (Lt. Brodie) 2.75
East of Malta, West of Suez (Bartimeus).. 2.50
The British Navy's Air Arm ..... .25
America's Navy in World War II (Cant)
Cloth edition 3.75
Fighting Forces edition ..... .25
Sea Power in the Machine Age (Lt. Brodie) 3.75
They Were Expendable: The PT Boats
Cloth edition 2.00
Fighting Forces edition ..... .25
Toward a New Order of Sea Power
(Sprout) 3.75
What You Should Know About Modern
War (Pratt) 2.50

War History & Geopolitics

48,000,000 Tons to Eisenhower 2.00
The Mightiest Army (Col. Detzer) ..... .35
Selected Speeches & Statements of General
Marshall
Cloth edition 2.75
Fighting Forces edition ..... .25
The World at War: 1939-1945 ..... .25
Great Soldiers of World War II
(DeWeerd) 3.75
Europe: An Atlas of Human Geography
(Rajchman) 2.00
Our Army at War (WD Photos) 3.00
Invasion (Wertenbaker) 2.50
Geopolitics (Strausz-Hupé) 2.75
Grave Diggers of France (Pertinax) 6.00
Invasion Diary: Sicily and Italy (Tregaskis) 2.75
Atlas of Global Geography (Raisz) 3.50
Use of Presidential Power, 1789-1943 .... 3.00
The Six Weeks War (Draper) ..... 3.
Geography of the Peace (Spykman) ..... 2.
D Day: What Preceded & Followed ..... 3.
Global Warfare (Mowrer & Rajchman) ... 1.
Report on the Army, 1939-43 (Gen.
Marshall)
Cloth edition ..... 1.
Fighting Forces edition ..... .

China, Burma, India

Solution in Asia (Lattimore)
Cloth edition ..... 2.
Fighting Forces edition ..... .
Pilots Also Pray (Harmon) ..... 2.
Still Time to Die (Belden) ..... 3.
Report on India (Raman)
Cloth edition ..... 2.
Fighting Forces edition ..... .
The Making of Modern China (Lattimore)
Cloth Edition ..... 2.
Fighting Forces edition ..... .
The Changing Far East (Johnstone) ..... .
Burma Surgeon (Col. Seagrave)
Cloth edition ..... 3.
Fighting Forces edition ..... .
China Handbook, 1937-1943 ..... 5.
Introduction to India (Moraes & Stimson) 2.
Retreat with Stilwell (Belden) ..... 3.
They Shall Not Sleep (Stowe) ..... 3.
Thirty Seconds Over Tokyo (Capt. Lawson)
Fighting Forces edition ..... .

The War in Europe

48,000,000 Tons to Eisenhower ..... 2.
The Mightiest Army (Col. Detzer) ..... .
I Knew Your Soldier (Martin & Stevenson) .
Still Time to Die (Belden) ..... 3.
Brave Men (Ernie Pyle) ..... 3.
One Damn Thing After Another (Treanor) 2.
Invasion (Wertenbaker) ..... 2.
Grave Diggers of France (Pertinax) ..... 6.
The Six Weeks War, 1940 (Draper) ..... 3.
Engineers in Battle (Col. Thompson) .... 1.
Modern Battle (Col. Thompson) ..... .
Tank-Fighter Team, 1940 (Gerard) ..... .
War in the West (Battle of France, 1940) 2.

North African War

Artist at War (Biddle) ..... 3.
One Damn Thing After Another (Treanor) 2.
We Jumped to Fight (Raff) ..... 2.
Pipeline to Battle (Major Rainier)
Cloth edition ..... 2.
Fighting Forces edition ..... .
Assignment to Nowhere: Battle for Tunisia 2.
The Battle is the Pay-Off (Lt. Col. Ingersoll)
Cloth edition ..... 2.
Fighting Forces edition ..... .
Conquest of North Africa, 1939-42 ..... 3.
The End in Africa (Moorehead) ..... 2.
Here is Your War (Ernie Pyle) ..... 3.
Tunis Expedition: Americans in Battle ... 2.

The Pacific War

U. S. Marines on Iwo Jima
Cloth edition ..... 3.
Fighting Forces edition ..... .
Betio Beachhead (U. S. Marines) ..... 2.
Green Armor (White) ..... 3.
Bridge to Victory: Attu (Handleman) ... 2.
Capture of Attu: By Men Who Fought There
Cloth edition ..... 2.
Fighting Forces edition ..... .
Island Victory: Critique on Kwajalein
Cloth edition ..... 2.
Fighting Forces edition ..... .
Still Time to Die (Belden) ..... 3.
Tarawa (Sherrod) ..... 2.
Bataan: The Judgment Seat (Ind) ..... 3.
c/o Postmaster (Cpl. St. George) ..... 1.
*The Fight at Pearl Harbor (Clark) ..... .
Guadalcanal Diary (Tregaskis)
Cloth edition ..... 2.
Fighting Forces edition ..... .
I Saw the Fall of the Philippines (Romulo) 3.
Men on Bataan (Hersey) ..... 2.
They Were Expendable: The PT Boats
Cloth edition ..... 2.
Fighting Forces edition ..... .
Thirty Seconds Over Tokyo (Capt. Lawson)
Fighting Forces edition ..... .

The Enemy: Germany

The Time for Decision (Welles) 3.00
The Nazi State (Ebenstein)
Cloth edition 2.75
**Fighting Forces edition* ..... .25
The Axis Grand Strategy 3.50
The German Army (Rosinski) 3.00
Berlin Diary (Shirer) 3.00
Blitzkrieg: Armies on Wheels (Marshall) .25
The German Soldier: His Training for War .25
The Guilt of the German Army (Fried) .. 3.50
Hitler's Second Army (Vagts) 1.00
Last Train from Berlin (Smith) 2.75
Men Behind the War (Steel) 3.50
Modern Battle (Col. Thompson) ..... .25
Pattern of Conquest: German Plans 2.50
We Cannot Escape History (Whitaker)
Cloth edition 2.75
**Fighting Forces edition* ..... .25

The Enemy: Japan

Through Japanese Eyes (Tolischus)
Cloth edition 2.00
**Fighting Forces edition* ..... .25
U. S. Marines on Iwo Jima
Cloth edition 3.00
Fighting Forces edition ..... .25
Robinson Crusoe, USN (Clark) 2.75
Betio Beachhead (U. S. Marines) 2.50
Leyte Calling (Lt. St. John) 2.00
Green Armor (White) 3.00
Bridge to Victory: Attu (Handleman) 2.00
Japan & the Japanese (Editors of *Fortune*) .25
Capture of Attu: By Men Who Fought There
Cloth edition 2.00
Fighting Forces edition ..... .25
Island Victory: Critique on Kwajalein
Cloth edition 2.00
Fighting Forces edition ..... .25
Still Time to Die (Belden) 3.00
Traveler from Tokyo (Morris) 2.75
Ten Years in Japan (Grew) 3.75
Our Enemy Japan (Fleisher)
Cloth edition 2.00
**Fighting Forces edition* ..... .25
In Peace Japan Breeds War (Eckstein) ... 2.50
The Jap Soldier: Training for Conquest .. .25
Japan's Military Masters (Lory)
Cloth edition 2.50
**Fighting Forces edition* ..... .25
Men Behind the War (Steel) 3.50
With Japan's Leaders (Moore) 2.75

Air Warfare Against Germany

Air Gunner (Hutton & Rooney) 2.50
The Use of Air Power (Lt. Blunt) 1.00

Air Warfare Against Japan

Thirty Seconds Over Tokyo
Fighting Forces edition ..... .25

Our Armed Forces

Use of Presidential Power, 1789-1943 .... 3.00
Report on Demobilization 3.00
Short History of the Army & Navy (Pratt) .25

Our Army

48,000,000 Tons to Eisenhower 2.00
The Mightiest Army (Col. Detzer) ..... .35
Selected Speeches & Statements of General Marshall
Cloth edition 2.75
Fighting Forces edition ..... .25
Up Front (Sgt. Bill Mauldin) 3.00
Situation Normal (Miller) 2.00
I Knew Your Soldier (Martin & Stevenson) .25
Brave Men (Ernie Pyle) 3.00
Our Army at War (WD photos) 3.00
America in Arms (Gen. Palmer)
Cloth edition 2.00
Fighting Forces edition ..... .25
Handbook for Army Wives & Mothers ... .25
History of the U. S. Army (Col. Ganoe) .. 5.00
The Officer's Guide 2.50
Our Soldiers Speak: 1775-1918 ..... 3.50
Report on the Army (1939-43) (Gen. Marshall)
Cloth edition 1.50
Fighting Forces edition ..... .25
The U. S. Army in War & Peace (Spaulding) 6.00
The Wacs (Shea) 2.50
Weapons for the Future (Johnson & Haven) ..... .25
West Point (Col. Baumer) 3.00
West Point Today (Banning) 2.50
What You Should Know About Army Ground Forces (Col. Greene) 2.50

Our Navy

Carrier War (Jensen) 2.50
Battle Report: Pearl Harbor to Coral Sea .. 3.50
Annapolis (Capt. Puleston) 3.00
America's Navy in World War II (Cant)
Cloth edition 3.75
**Fighting Forces edition* ..... .25
This is the Navy (Cant) ..... .25
The Navy's War (Pratt) 2.75
The Book of the Navy 3.00
Annapolis Today (Banning) 2.50
Command at Sea (Capt. Cope) 2.75
Naval Officer's Guide (Com. Ageton) 3.00
Naval Reserve Guide 2.50
The Navy Has Wings (Pratt) 2.75
Queen of the Flat-Tops: *The Lexington* .. 3.00

Marine Corps

U. S. Marines on Iwo Jima
Cloth edition 3.00
Fighting Forces edition ..... .25
Betio Beachhead (U. S. Marines) 2.50
Tarawa (Sherrod) 2.00
Guadalcanal Diary (Tregaskis)
Cloth edition 2.50
Fighting Forces edition ..... .25
Marine Corps Reader 3.00

Our Air Forces

(See also Air Forces Study)

Air Gunner (Hutton & Rooney) 2.50
Fighting Wings (Paust & Lancelot) 2.75
Air Forces Reader 3.75
200,000 Flyers (Wiener) 2.75
Bombers Across (Wynn) 2.50
Official Guide to the AAF
Cloth edition 2.50
Pocketbook edition ..... .25
So You're Going to Fly the Big Ones (Wynn) 1.50
How Our Army Grew Wings (Gens. Chandler & Lahm) 3.75
Winged Victory (A Play by Moss Hart) .. 2.00

Great Britain & Dominions

Coöperation for What? (U.S. & British Commonwealth) ..... .25
Report on India (Raman)
Cloth edition 2.50
**Fighting Forces edition* ..... .25
Pacific Partner: Australia (Johnston) 2.50
The English People: Their History 3.00
Introducing Australia (Grattan) 3.00
Introduction to India (Moraes & Stimson) 2.00
New Zealand (Nash) 3.50
The Making of Modern Britain (Brebner & Nevins) 2.50

The Netherlands & Dominions

The Netherlands (Landheer) 5.00

Near East

Balkan Background (Newman) 2.50
East and West of Suez (Badeau) ..... .25

Middle East

The Middle East (Ben-Horin) 3.00

Far East

Fishes & Shells of the Pacific World (Nichols & Bartsch)
Cloth edition 3.00
**Fighting Forces edition* ..... .25
Insects of Pacific World (Curran)
Cloth edition 3.75
**Fighting Forces edition* ..... .25
Plant Life of Pacific World (Merrill)
Cloth edition 3.50
**Fighting Forces edition* ..... .25
Solution in Asia (Lattimore)
Cloth edition 2.00
**Fighting Forces edition* ..... .25
Reptiles of Pacific World (Loveridge)
Cloth edition 3.00
**Fighting Forces edition* ..... .25
Wartime China (Stewart) ..... .25
America's Job in the Pacific (Wallace) .. .25
Filipinos & their Country (Porter) ..... .25
Pacific Islands in War and Peace (Keesing) .25
Korea Looks Ahead (Grajdanzev) ..... .25
Native Peoples of Pacific World (Keesing)
Cloth edition 3.00
**Fighting Forces edition* ..... .25
The Pacific World
Cloth edition 3.00
**Fighting Forces edition* ..... .50
Animals of the Pacific World
Cloth edition 3.00
**Fighting Forces edition* ..... .25
The Soviet Far East (Mandel) 2.50
The Changing Far East (Johnstone) ..... .25

USSR

The Soviet Far East (Mandel) 2.50
The Red Army (Berchin & Ben-Horin) .. 3.00
Russia (Sir Bernard Pares) *new edition* .. .25
The Russian Army (Kerr)
Cloth edition 2.75
**Fighting Forces edition* ..... .25

United States

Selected Speeches & Statements of General Marshall
Cloth edition 2.75
Fighting Forces edition ..... .25
U. S. War Aims (Lippmann) 1.50
Use of Presidential Power, 1789-1943 ... 3.00
Report on Demobilization 3.00
America in Arms (Gen. Palmer)
Cloth edition 2.00
Fighting Forces edition ..... .25
America's Foreign Policies ..... .25
Pocket History of the U. S. (Nevins & Commager) ..... .25
Short History of American Democracy (Hicks) 5.50
Under Cover: Quislings in the U. S. 1.49
U. S. Foreign Policy (Walter Lippmann) . 1.50
Weapons for the Future (Johnson & Haven) ..... .25

South America

Our American Neighbors 3.00
Look at Latin America (Raushenbush) ... .25

Mexico

Mexico: Making of a Nation (Herring) .. .25

Guide Books & Atlases

Fishes & Shells of the Pacific World (Nichols & Bartsch)
Cloth edition 3.00
**Fighting Forces edition* ..... .25
Insects of Pacific World (Curran)
Cloth edition 3.75
**Fighting Forces edition* ..... .25
Plant Life of Pacific World (Merrill)
Cloth edition 3.50
**Fighting Forces edition* ..... .25
Reptiles of Pacific World (Loveridge)
Cloth edition 3.00
**Fighting Forces edition* ..... .25
Native Peoples of Pacific World (Keesing)
Cloth edition 3.00
**Fighting Forces edition* ..... .25
Europe: An Atlas of Human Geography (Rajchman) 2.00
Survival: Land, Sea, Jungle, Arctic
Cloth edition 1.50
Fighting Forces edition ..... .25
The Pacific World
Cloth edition 3.00
**Fighting Forces edition* ..... .50
Animals of the Pacific World
Cloth edition 3.00
**Fighting Forces edition* ..... .25
Global War (Mowrer & Rajchman) 1.00
Goode's School Atlas 4.40
How to Live in the Tropics (Hunt) 2.00
Look at the World (Harrison) 3.50
A War Atlas for Americans (OWI)
Cloth edition 2.50
Paper edition 1.00

Going Overseas

Survival: Land, Sea, Jungle, Arctic
Cloth edition 1.50
Fighting Forces edition ..... .25
So You're Going Overseas (Barker) .... .25
The Raft Book (Gatty) 3.25
How to Abandon Ship (Richards & Banigan)
Cloth edition 1.00
**Fighting Forces edition* ..... .25
What to do Aboard the Transport
Cloth edition 1.50
Fighting Forces edition ..... .25

Biography & Experiences

Leyte Calling (Lt. St. John) 2.00
Robinson Crusoe, USN (Clark) 2.75
McNair: Educator of an Army 2.00
Great Soldiers of World War II (DeWeerd) 3.75
I Never Left Home (Bob Hope) 1.00
Woodrow Wilson (Johnson) 2.00
Captain Retread (Hough) 2.50
Allenby (Gen. Wavell) 3.00
Americans vs. Germans, 1917-18 ..... .25
The Army Life (CWO Kahn)
Cloth edition 1.75
Fighting Forces edition ..... .25
Genghis Khan (Harold Lamb) ..... .25
Great Soldiers of the First World War ... .25
A Roving Commission (Winston Churchill) 1.75
See Here, Private Hargrove ..... .25
Signposts of Experience, 1917-19 (Gen. Snow) 2.75

Early American Wars

American Campaigns: 1690-1899, *2 vols.* ... 8.00
Patriot Battles, 1775-1782 (Col. Azoy) .... .25
Soldiers in the Philippines, 1898-1902 ... .25
The War of 1812 (Henry Adams) 3.00
Short History of the Army & Navy (Pratt) .25

The Civil War

Use of Presidential Power, 1789-1943 ... 3.00
Abraham Lincoln & the Fifth Column
Cloth edition 3.75
Fighting Forces edition ..... .25
American Campaigns: 1690-1899, *2 vols.* .. 8.00
Conflict: The Civil War (Milton)
Cloth edition 3.50
**Fighting Forces edition* ..... .25
Lee's Lieutenants (Freeman) *3 vols., each* 5.00
Our Soldiers Speak: 1775-1918 ..... 3.50
Reveille in Washington (Leech) 3.50
Short History of the Army & Navy (Pratt) .25
With Sherman to the Sea 2.25

The First World War

Woodrow Wilson (Johnson) 2.00
Woodrow Wilson & the Lost Peace (Bailey) 3.00
Official History of 1st Division 1.50
Official History of 2d Division 1.50
Official History of 3d Division 1.50
Official History of 4th Division 1.50
Official History of 5th Division 1.25
Official History of 7th Division ..... .75
Official History of 26th Division 1.25
Official History of 27th Division 1.00
Official History of 28th Division 1.50
Official History of 29th Division ..... .75
Official History of 30th Division 1.00
Official History of 32d Division 1.25
Official History of 33d Division 1.25
Official History of 35th Division ..... .75
Official History of 36th Division ..... .75
Official History of 37th Division ..... .75
Official History of 42d Division 1.50
Official History of 77th Division 1.50
Official History of 78th Division ..... .75
Official History of 79th Division ..... .75
Official History of 80th Division 1.25
Official History of 81st Division ..... .75
Official History of 82d Division 1.00
Official History of 89th Division 1.00
Official History of 90th Division 1.00
Official History of 91st Division 1.00
Official History of 92d Division ..... .75
Official History of 93d Division 1.00
Captain Retread (Hough) 2.50
Use of Presidential Power, 1789-1943 .... 3.00
Report on Demobilization 3.00
Infantry Attacks (Rommel) 3.00
Allenby (Gen. Wavell) 3.00
America in Arms: Our Military Policy ... .25
Americans vs. Germans, 1917-18 ..... .25
Combat Intelligence (Gen. Schwien) 2.00
Great Soldiers of the First World War ... .25
How Our Army Grew Wings (Generals Chandler & Lahm) 3.75
Infantry in Battle: Examples from War .. 3.00
The Lost Battalion (Johnson & Pratt) ... .25
Signposts of Experience (Gen. Snow) ... 2.75
Winged Mars: The Luftwaffe, 1870-1914. 2.50

Military Histories

Military Staff: History and Development .. 2.00
War Through the Ages (Montross) 5.00
The War of 1812 (Adams) 3.00
Decisive Battles of the World (Creasy) .. 3.00
Masters of Mobile Warfare (Col. Colby) 2.00
175 Battles, 490 B.C. to 1937 (Shaw) ... 2.00
Warfare (Early Times to Frederick) 3.00
World's Military History (to 1918) 3.00

Insignia & Identification

Identification: Insignia of All Armies 2.00
Insignia of the Services (Brown) 1.50
Military & Naval Recognition Book 2.50

Language Books

Elementary Chinese Reader and Grammar (Chen) 2.25
Spanish Dictionary for the Soldier (Henius) .50
The Loom of Language (Bodmer) 3.75
Army Talk (Soldier Language) 2.00
Blitz French (Nicot) ..... .75
Blitz German (Brandl) ..... .75
Civil & Military German (Pfeffer) 2.50
Current Spanish (Martinez) 1.00
Easy Malay Words & Phrases (Mendlesen) 1.00
Elementary Japanese (Col. Sullivan)
Cloth edition 2.50
**Fighting Forces edition* 1.00
English for the Armed Forces 1.50
French Dictionary for the Soldier (Henius) .50
German Dictionary for the Soldier (Henius) .50
How to Say it in Spanish ..... .75
Italian Dictionary for the Soldier (Henius) .50
Italian Sentence Book for the Soldier ... .25
Modern Military Dictionary (Col. Garber & Col. Bond) 2.50
Speech for the Military 1.20

Personal Affairs

So You're Going Overseas (Capt. Barker) .25
Report on Demobilization 3.00
Handbook for Army Wives & Mothers .... .25
The Army Wife (Shea) 2.50
The Fourth Horseman: Legal Provisions . 1.00

For Returning Servicemen

Psychology for the Returning Serviceman .25
Veteran's Rights & Benefits (Eraña & Symons) 1.00
Report on Demobilization (Mock) 3.00
The Fourth Horseman: Legal Provisions . 1.00

Reference Books

Tanks and Armored Vehicles (Col. Icks) . 4.75
The World at War: 1939-1945 ..... .25
Handbook to AR (Sczudlo) 2.50
The Raft Book (Gatty) 3.25
Identification (Insignia of all Armies) ... 2.00
Index to Army Regulations ..... .65
Military & Naval Recognition Book 2.50
U. S. Government Manual 1.00

Anthologies, Readers, Humor

Cartoons for Fighters ..... .25
Male Call (Milton Caniff) 1.00
Up Front (Sgt. Bill Mauldin) 3.00
The Best from *Yank* 3.50
Air Forces Reader 3.75
The Marine Corps Reader 3.00
The Second Navy Reader 3.75
A Treasury of American Folklore 3.00
Freedom Speaks (Poetry & Prose)
Cloth edition 2.00
**Fighting Forces edition* ..... .25
As You Were: Woollcott's Reader
**Servicemen's edition* .....
At Ease: Brain Teasers (Leopold) .....
A Book of War Letters .....
Infantry Journal Reader .....
Men at War (Hemingway's Reader) .....
Patriotic Anthology (of American Writings) .....
Pocket Book of War Humor .....
A Soldier's Reader .....
The Stag's Hornbook (Soldier Poetry) ...
Steinbeck's Anthology .....
*Thesaurus of Humor (8,000 Jokes) .....

College Outline Series

Math for General Chemistry (Frey) .....
Best Methods of Study (Smith & Littlefield)
Spanish Grammar (Greenfield) .....
German Grammar .....
French Grammar (du Mont) .....
Educational Psychology (revised) .....
Atlas of Human Anatomy .....
Ancient, Medieval & Modern History ...
Ancient History .....
Business Law .....
First Year College Physics .....
First Year College Chemistry .....
General American Government .....
General Forestry .....
History of the Middle Ages .....
New History of the World Since 1914 ...
History of Latin America .....
History of the U. S. to 1865 .....
History of the U. S. Since 1865 .....
History of England .....
History of Europe, 1500-1848 .....
History of Europe, 1815 to 1944 .....
Latin America in Maps .....
Organic Chemistry (revised) .....
Survey of Journalism .....
Topical Survey of American History .....
Everyday Law Guide .....

AMERICAN TECHNICAL SOCIETY BOOKS

Aviation

Aircraft Sheet Metal Work .....
Aircraft Sheet Metal Blueprint Reading..
Flight—Aviation Engines .....
Flight—First Principles .....
Flight—Construction and Maintenance ..
Flight—Meteorology, Aircraft Instruments & Navigation .....
Fundamentals of Machines .....

Air Conditioning and Building Trades

Air Conditioning Design and Construction of Ducts .....
Air Conditioning—Furnace & Unit Heaters
Air Conditioning—Heating and Ventilating
Building Trades Blueprint Reading—Parts 1 & 2 .....
Building Insulation .....
Carpentry .....
How to Design and Install Plumbing .....
How to Estimate for the Building Trades
Sheet Metal Work .....
How to Plan a House .....
How to Remodel a House .....
Painting and Decorating .....
Stair Building .....
Steam and Hot Water Fitting .....
Steel Construction .....
Steel Square .....

Business and Management

Fundamental Business Law .....
Bookkeeping for Personal and Business Use
Effective Retail Selling .....
How to Write Business Letters .....
How to Train Shop Workers .....
Production Management .....

Drawing, Drafting and Designing

Freehand and Prospective Drawing .....
Mechanical Drawing .....
Machine Design .....
Tool Design .....

Book Dividend Coupons

Good for 5¢, 10¢, 25¢ Credit

BOOK DIVIDEND COUPON

GOOD FOR 25¢ CREDIT

in books or magazines when used in partial or full payment for books or magazines ordered at published list prices from the

COAST ARTILLERY JOURNAL

631 Pennsylvania Ave., N.W., Washington 4, D. C.

List Prices Furnished Upon Request

SPECIMEN

COAST ARTILLERY JOURNAL Dividend Coupons represent a bonus for individual members of the Association *who send cash with their order.*

Because of the difficulties in keeping informed of changes in addresses with consequent increased correspondence and financial loss, these coupons are to be used to encourage cash transactions. To that end discounts to be returned to members will be the maximum that the JOURNAL can afford.

Send in your orders accompanied by cash in an amount equal to list prices and it will be of mutual benefit.

Dividend Coupons are not issued on orders for official publications nor on orders for organizations. Organizations are given cash discount when cash accompanies the order.

THE COAST ARTILLERY JOURNAL

631 Pennsylvania Avenue, N.W. Washington 4, D. C.

48,000,000 TONS
to
EISENHOWER

By LIEUTENANT COLONEL RANDOLPH LEIGH

The inspiring story of the greatest logistical job ever accomplished in the history of warfare. Never before had armies struck by land and air with such sustained speed. Never before had the striking power and velocity of combat forces been so completely dependent on the ability of supply troops to cope with unprecedented burdens. The logistical experts of past wars would have deemed the task impossible. The fight was won because the men who braved the fire were supported by men who dared to move mountains. Contains much formerly secret information.

After the forward fighters of ground and air came the soldiers of the Services of Supply. Members of the port battalions—men on the docks, unloading ships—railway men —truck drivers. . . . Men piling ammunition in lonely forests—moving masses of supplies through bleak warehouses. . . . Men in repair shops and maintenance depots—men handling clothing and tentage. . . . Skilled surgeons and nurses, tending the wounded. . . . Thousands of men doing their duty wherever they happened to be, in defiance of danger and exhaustion.

With 32 Pages of Pictures, 20 Charts

$2.00

ATOMIC ENERGY
for
MILITARY PURPOSES

By H. D. SMYTH

Consultant, Manhattan Engineer District

(Prepared at the Request of Major General L. R. Groves, U. S. Army)

From the Foreword by General Groves . . .

"The story of the development of the atomic bomb by the combined efforts of many groups in the United States is a fascinating but highly technical account of an enormous enterprise. Obviously military security prevents this story from being told in full at this time. However, there is no reason why the administrative history of the Atomic Bomb project and the basic scientific knowledge on which the several developments were based should not be available now to the general public. To this end Professor Smyth's account is presented.

"All pertinent scientific information which can be released to the public at this time without violating the needs of national security is contained in this volume. . . ."

Paper $1.25 — Cloth $2.50