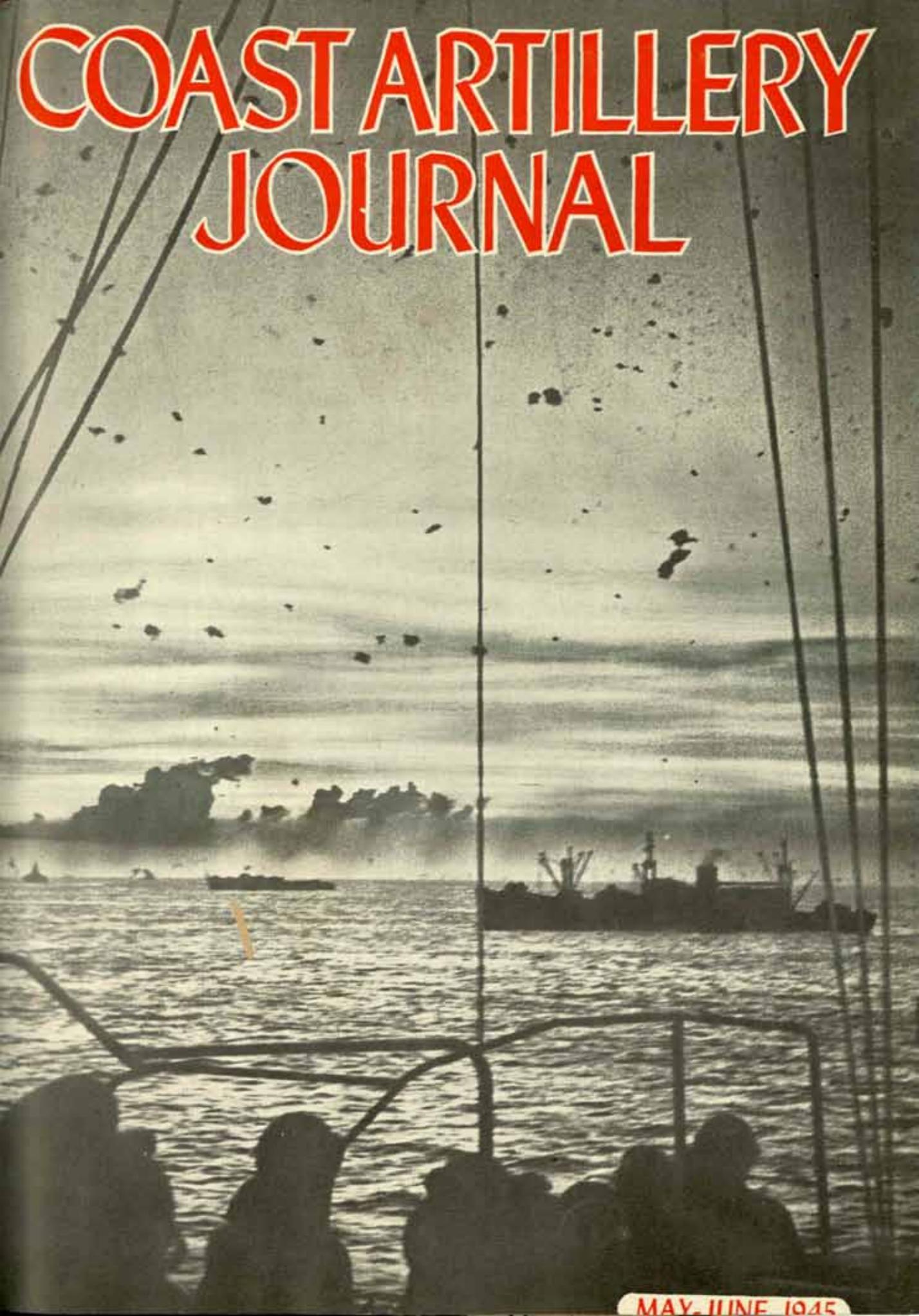


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CONTENTS



COVER: *AA Bursts off Saipan. Coast Guard Photo.*

FROM THE FIGHTING FRONTS:

AW GROUND TARGETS IN FRANCE. <i>By Colonel John C. Henagan</i>	2
AN AW BATTALION WITH AN INFANTRY DIVISION. <i>By Major Charles B. Miller</i>	8
MORE AID TO THE INFANTRY. <i>By Lieutenant Colonel John C. Mazzei</i>	10
THE INNER RING. <i>By Private First Class Martin Fass</i>	13
ARTIFICIAL MOONLIGHT.	16
AW IN EUROPE. <i>By Lieutenant Colonel William R. Kintner</i>	17
THE AA DEFENSE OF THE REMAGEN BRIDGEHEAD. <i>By Captain E. Hamlin Turner</i>	20
AA WEAPONS SUPPORT THE INFANTRY. <i>By Captain Edwin W. Philbrick, Jr.</i>	22
EVERYTHING BUT COMBAT. <i>By Sergeant Kenneth Schomborg</i>	24
TRAINING CHINESE TROOPS. <i>By Captain D. L. Ducey</i>	28
SERVICE WITH COLORED AAA TROOPS IN NEW GUINEA. <i>By Lieutenants John H. Jemison and James A. Taylor, Jr.</i>	30
THE MUZZLE BRAKE. <i>By Oscar Schwager</i>	32
KEEP 'EM FIRING. <i>By Captain Richard M. Bleier</i>	37
ALTERNATE METHODS OF FIRE CONTROL FOR AMTB BATTERIES. <i>By Lieutenant Gustave A. Peyer, Jr.</i>	39
DEMONSTRATION OF AIR DEFENSE AT THE AAA SCHOOL. <i>By Lieutenant Archibald D. Eddy</i>	43
WEBFOOT ARTILLERY. <i>By Lieutenant Colonel Bernard S. Waterman</i>	46
A GRAPHIC METHOD OF AA ANALYSIS. <i>By Colonel C. H. Treat</i>	51
VICTORY IN EUROPE. (<i>Maps</i>)	56
PRESSURE ON JAPAN. (<i>Maps</i>)	60
SOME OF OUR SUBSCRIBERS ARE MISSING	62
COAST ARTILLERY CITATIONS AND COMMENDATIONS	63
COAST ARTILLERY BOARD NOTES	67
NEWS AND COMMENT	70
NEWS LETTERS	83
BOOK REVIEWS	87

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AW Ground Targets in France

By Colonel John C. Henagan, Coast Artillery Corps

The advance through Southern and Eastern France, due to a number of factors, has brought a new conception of AW tactics, and much thought and experimentation has been encouraged by both Infantry and Antiaircraft Commanders in an effort to evolve a sound tactical doctrine in the dual use of AW half-tracks. The factors influencing this concept include:

- (1) The very limited enemy air activity.
- (2) The critical supply problem which has limited the use of artillery.
- (3) The very rapid advance which has often left flanks exposed or very thinly covered and has dictated the maximum use of all available weapons for support.
- (4) The terrific fire power of the AA half-tracks.

- (5) The mobility of the mount.
- (6) The demoralizing effect of multiple fire.
- (7) Economy of manpower in relation to fire power.
- (8) The light armor of the half-tracks which affords protection from enemy small-arms fire.

Three self-propelled battalions, the 106th, 441st, and 443d AAA AW Battalions (SP) operating under the 58th AAA Group in support of the three American Divisions of the VI Corps, in the drive through Southern France and the Vosges Mountains, have each evolved a plan for direct Infantry Support and have made certain elements available with this support as their primary mission.

Considerable ground firing has been done by each battalion and several types of missions have been accomplished.

Figure 1. Bois des Bouxaus (1659, Overlay No. 1) in center foreground. Picture taken from M-15 half-track (149590, same overlay), distance 660 yards. The thin line of scrubs before the tree mass is a sunken creek bed used by the Infantry for concealment and as cover from the fire of the 'tracks.



Figure 2. As the Bois des Bouxaus looked to the Infantry patrol.

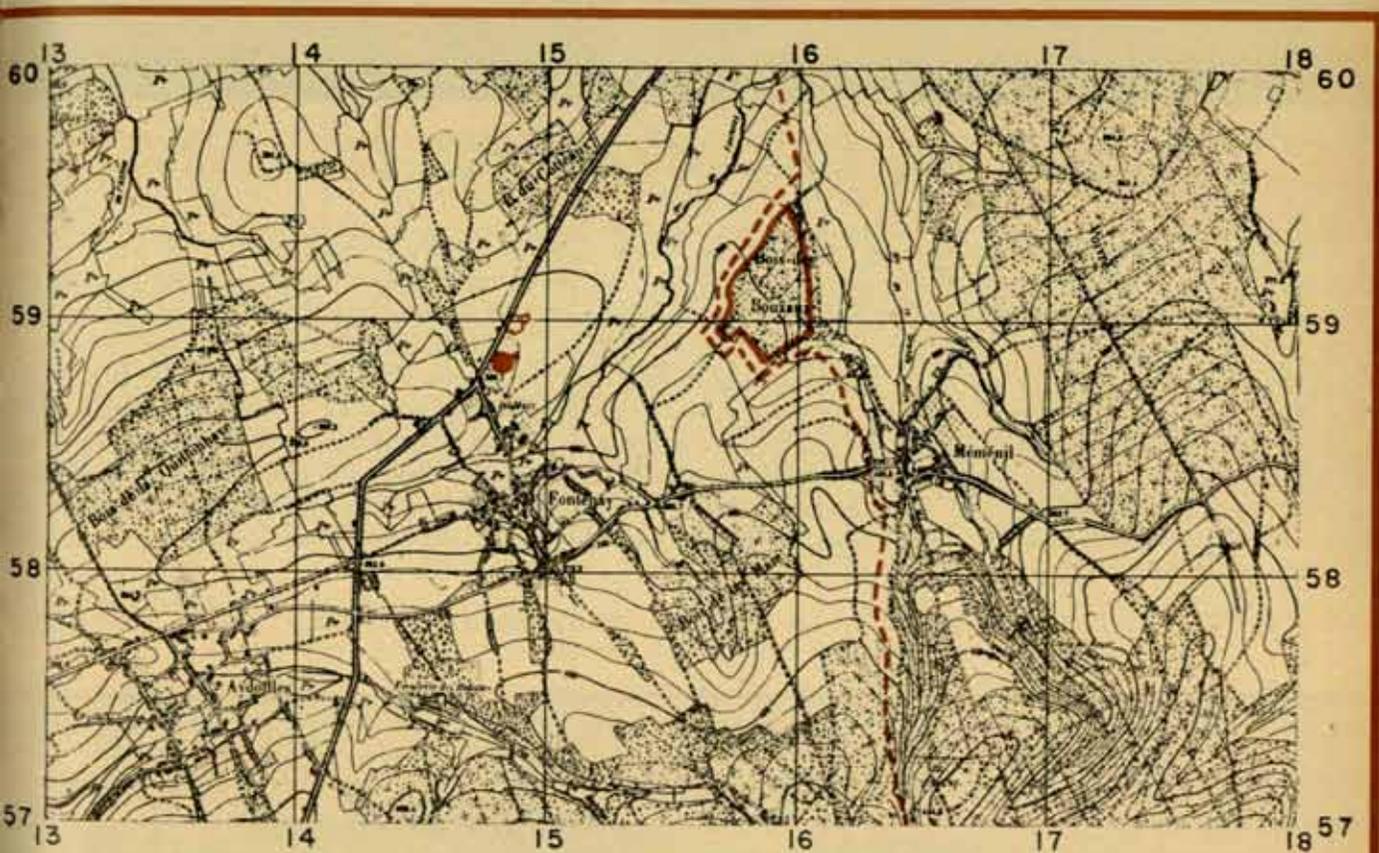


ING FRONTS

with such success as to indicate certain satisfactory tactical policies.

One of the most successful missions has been the use of enfilade or cover fire for an infantry advance which, aside from the destructive effect of the fire, keeps the enemy pinned down during the advance. The Infantry Commander controls the fire by radio and from covered positions

can and does direct fire, sometimes within a few yards of his position. This type of fire is necessarily "observed" and is limited in range to the tracer burn-out range of the ammunition. The following account of action by 106th AAA AW Battalion (SP) and accompanying overlay illustrates an actual example of this type of mission. The 2d Battalion, 179th Infantry of the 45th Infantry Division



OVERLAY NO. 1

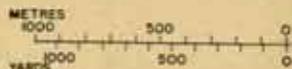
5TH AAA GROUP

OVERLAY SHOWING AA (SP) GROUND FIRE IN CLOSE SUPPORT OF INFANTRY OPERATIONS

1600A HRS 27 SEPT. 1944

 M15 SP HALFTRACK
 M16 SP HALFTRACK

 FRONT LINE
 TARGET AREA



Contour Interval 25 metres

MAP FRANCE SHEET XXXV-18 1&2 SCALE 1:25,000

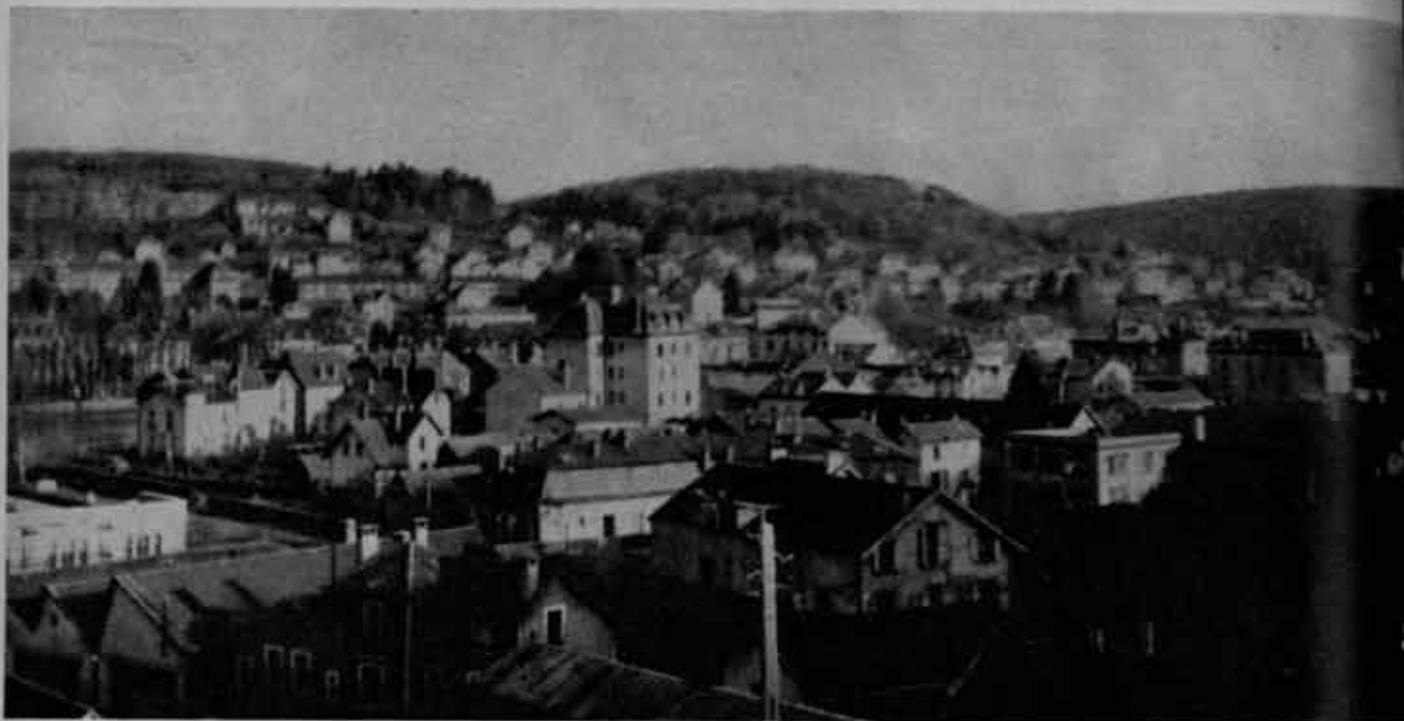
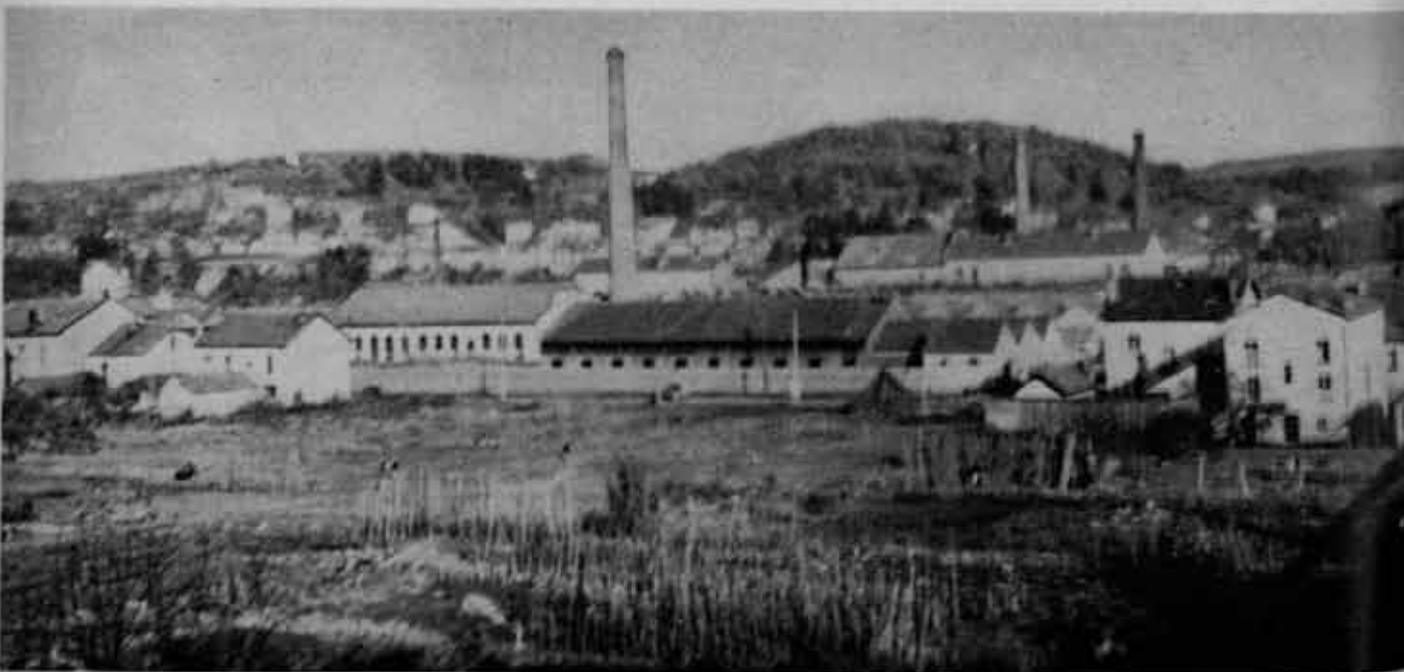


Figure 3. This picture was taken from a gun position overlooking Epinal (Overlay 2). Hill mass in center and right center was target area. Moselle River in lower left center. Range about 1,200 yards.

was advancing along the road between Fontenay to Memmel, France, east of Epinal, France. A short distance out of Fontenay they were engaged from the left flank by light mortar and machine-gun fire, coming from a woods 1,000 kilometers away. The Infantry dispersed along the right side of the road in the woods, Bois du la Maie. One platoon of Infantry was designated to flank the wooded strong point and neutralize it. The 106th AAA AW Battalion (SP) was called up for additional support. Two 'tracks of Battery C, an M-15 and an M-16, joined the patrol in

Fontenay. At 1550A 27 September 1944, the two 'tracks moved up the road north, going into firing position alongside two houses, screened by a row of trees. (See Overlay No. 1.) They were immediately taken under light mortar fire from the woods. On a signal from the Infantry they opened fire on the woods at a range of 660 yards. (See Figure 1.) The light mortar action stopped immediately. Crawling up the depressed creek bed to the northeast under the hail of .50-caliber and 37mm from the half-tracks the Infantry got into position to attack—with the SP weap-

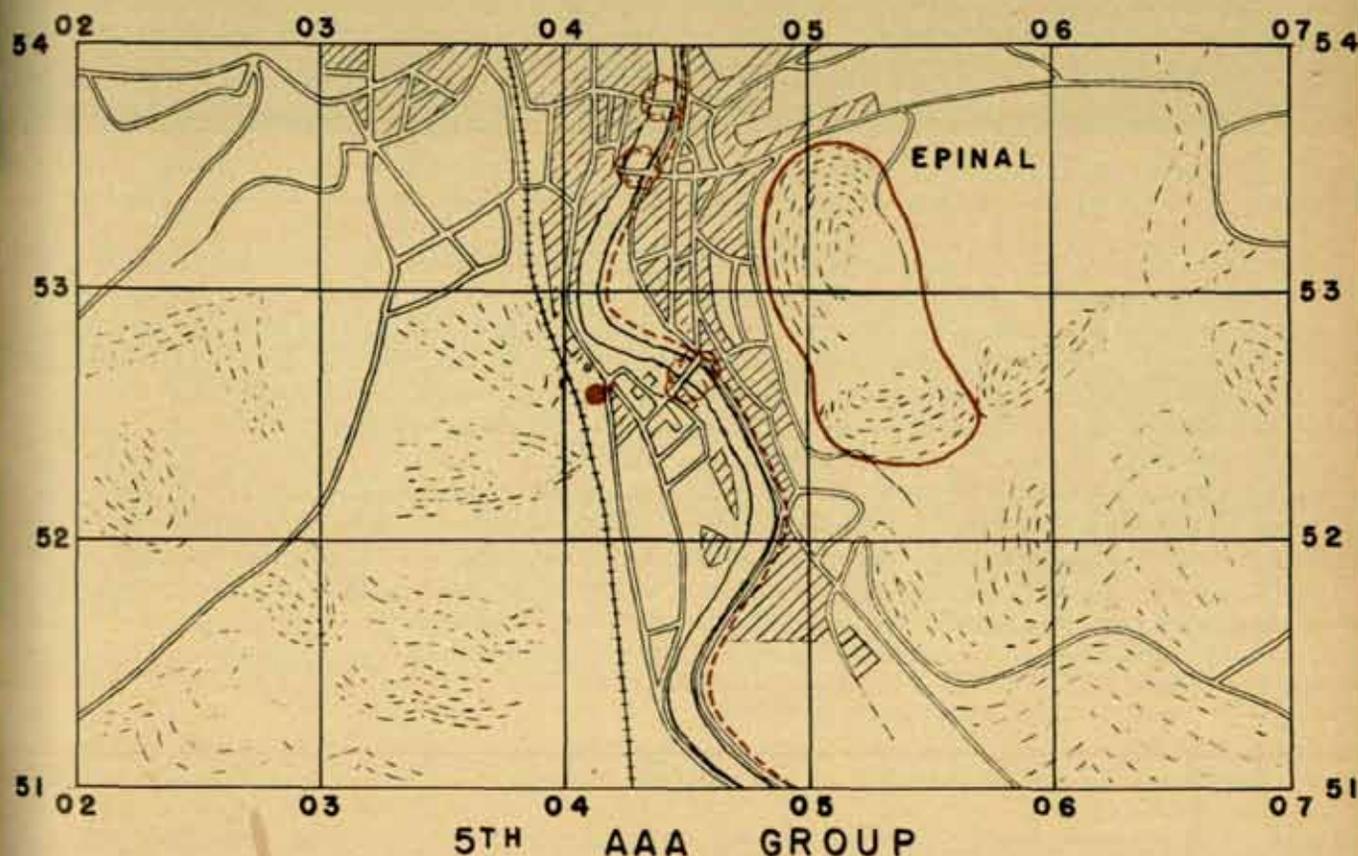
Figure 4. Another view from a gun position above Epinal. Hill mass at right center is target area. Range about 1,200 yards.



keeping the Krauts well occupied. The walkie-talkie crackled again and firing ceased as the Doughboys launched their attack. (See Figure 2.) Within three minutes the woods—Bois du Bouxaus—was cleared. Heavy mortars from long range were directed against the tracks, but they were unable to pull out and retire without damage. Forty rounds of 75mm and 1,600 rounds of .50-caliber were expended, and another typical ground support mission for self-propelled AAA was a complete success.

Another type of mission more closely allied to terrain is illustrated by an account of an action by 106th AAA AW Battalion (SP) in direct support of Infantry in a hostile river crossing. On 23 September 1944 the 45th Infantry Division was engaged in a river crossing operation to cross the Moselle River at Epinal, France, in face of emplaced

hostile troops. They called upon the 106th AAA AW Battalion (SP) to lend support by firing over the heads of the advancing Infantry into the wooded slopes across the river. At 1845A hours one section of Battery B went into position on the inhabited west slope of the Moselle River and sighted over the houses of the town, into the woods on the opposite slope about 2,000 yards away. (See Overlay No. 2 and Figures 3 and 4.) At a signal from the Infantry the M-15 and M-16 opened up, hosing the target area with 62 rounds of 37mm and 1,400 rounds of .50-caliber as the Infantry forded the river under the coverage of this hail of AA fire. Fire was very effective in spreading confusion among enemy personnel and aided greatly in limiting the amount of expected small-arms and machine-gun resistance from the prepared sites on the opposite bank of the Moselle River.



OVERLAY SHOWING AA(SP) GROUND FIRE IN
CLOSE SUPPORT OF A RIVER CROSSING

1845A HRS 23 SEPT. 44

OVERLAY NO. 2

- M 15 SP HALFTRACK
- M 16 SP HALFTRACK
- ☼ BLOWN BRIDGES
- +—+—+— RAILROAD
- ROUTE NATIONALE
- ▨ INHABITED SECTOR
- TARGET AREA

MAP FRANCE SHEET XXXIV - 18 SCALE 1:25,000

CONTOUR INTERVAL 10 METRES



Figure 5. This picture was taken from the Battalion FDC. Actual gun positions were in the tree mass in the lower right corner (See Overlay No. 3.) Target area is the gentle slope rising to the mountain in the right center, just right of the smoke plume.

In each of the above cases, the effect has been to bring controlled artillery support in much closer to Infantry than is possible with any organic artillery weapons.

Indirect harassing fire has been used with undetermined results. To facilitate this type of mission, .50-caliber firing tables have been prepared for the effective ground impact range of the weapons. Laying is necessarily done by approximately accurate methods. Obviously, artillery could do a better job and only a shortage of artillery ammunition justifies this use of the .50-caliber machine gun.

A mobile situation which by-passes strong points offers occasional missions of interest, such as experienced by the 441st AAA AW battalion in its normal artillery coverage in convoy. A machine-gun nest was encountered on a slope near the road which halted the convoy. The M-16 was called up to reduce the position by driving past and firing on the move. The mission was successful with no personnel or matériel casualties.

A type of mission that is very popular with Infantry Commanders is flank defense for a battalion advance. The fire

Figure 6. The target area (Overlay No. 3) after the action. This area was thoroughly "hosed" by AW fire.



power of the half-tracks greatly reduces the manpower requirements of Infantry personnel. A minimum of one squad of Infantry is always used in support of each half-track in this type of situation. The 37mm is not considered an effective antitank weapon and antitank weapons are included if tank action is expected. Overlay No. 3 is an example of this use.

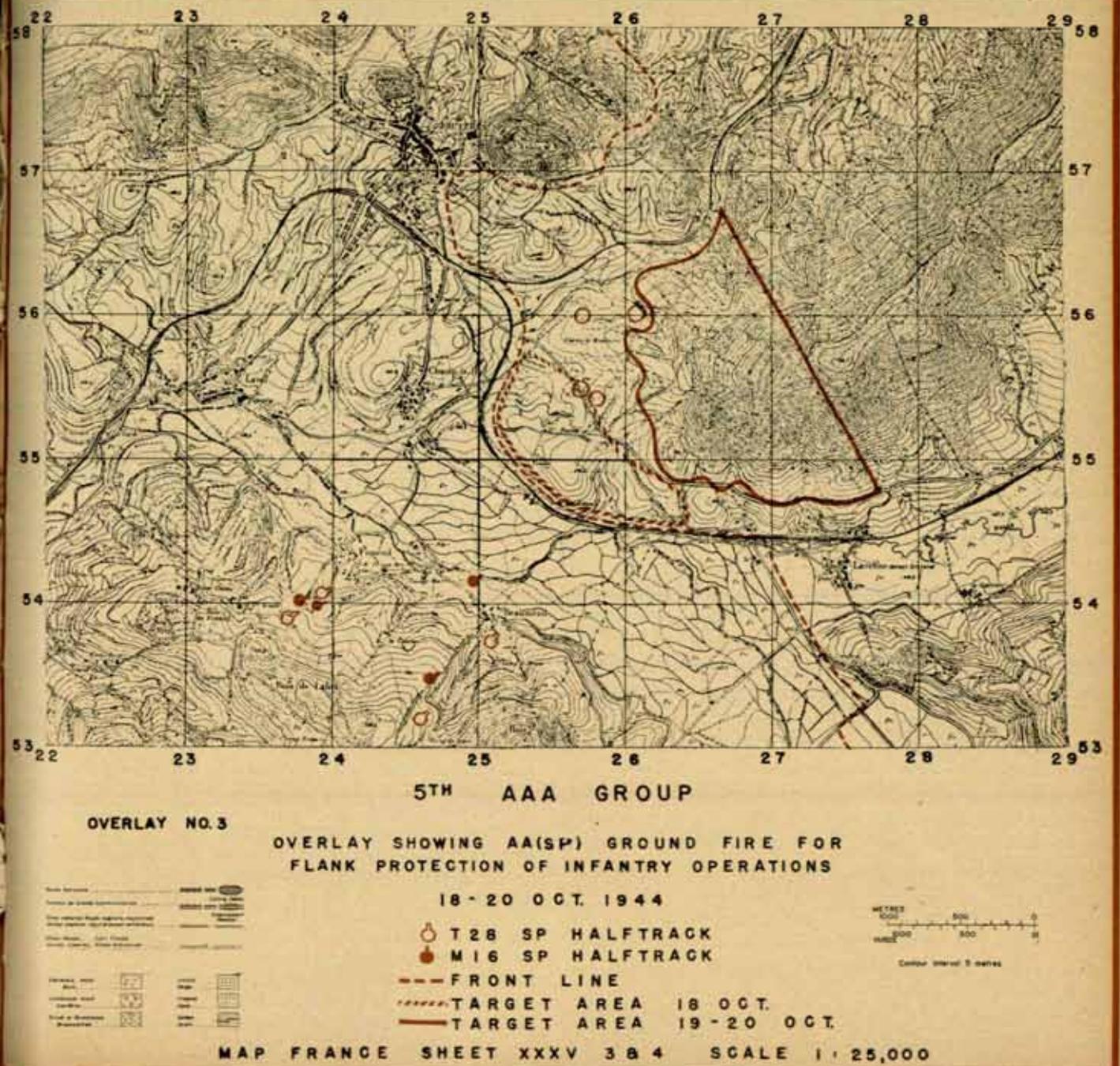
Among the numerous cases of SP AA weapons being used as flank protection for the advancing Infantry is the protection afforded the 143d RCT by the 443d AAA AW Battalion during the attack on 18-19 October 1944, near Bruyeres, France. The Infantry was mopping up the town of Bruyeres, and, aided by the 442d Japanese-American Regiment, was to secure the hill masses to the east of town. To protect their right flank, the battalion emplaced eight 'tracks in position to fire upon the wooded area of the southwestern finger of the Foret Domaniere de Champ, Bois de Bonmont, and the western slopes down to the River Vologne (See Overlay No. 3 and Figures 5 and 6.) The 'tracks were screened by a light growth of trees beside houses on the west bank of the river. At 1000A hours, 18 October 1944, the 'tracks began their harassing and diversionary firing in support of the attack launched by the 442d Japanese-American Regiment hitting for the hill mass directly northeast of Bruyeres and the 143d RCT coming through the town itself. They fired at intervals—varying from six to twelve minutes at a range of 2,000-2,500 yards. At 1230A hours they put heavy 15-minute sustained fire on definite enemy targets along the Railroad (V-260552 to V-253558). Again on 19 October 1944, the 'tracks, from the same position, fired intermittently upon the woods and against adjacent strong points. The fire greatly diminished enemy fire on the 143d Regimental Combat Team right flank. The objectives were taken by the Infantry.

One of the basic considerations in the use of these weapons in a ground rôle is that control must be left with

AA officers. Certain serious limitations must be considered in relation to each mission, and the AA officer can evaluate these and the weapons' capabilities more accurately than an infantry officer who may be unduly influenced by the fire power. Very careful ground reconnaissance must be made to include selection of proper firing position, alternate position, route of approach and route of withdrawal. Failure to find satisfactory positions and routes is considered justification for refusing a mission. This care is necessitated because the half-track is vulnerable to all types of fire, has a very high silhouette, is unwieldy to move in and out of position, gets stuck or bogs down easily, has a long turning radius, cannot be fired straight ahead due to mask of the cab, and must be very carefully emplaced in order to fire at lower than 0° elevation.

The use of half-tracks in a ground rôle does not entirely preclude their use as AAA. Most ground firing sites, due to importance of cover and concealment, are not satisfactory dual sites, but except for the actual firing time, the 'tracks can usually be placed in AA firing position, affording AA protection for the forward troops which have been the targets for numerous hostile strafing attacks.

The conclusion is drawn from actual battle experience of the 5th AAA Group that these weapons can be successfully employed in carefully planned and controlled missions. A mobile front without organized artillery and mortar opposition offers most opportunities and the profitable use is scaled downward in proportion to the increase in organized enemy resistance.



An AW Battalion With An Infantry Division

By Major Charles B. Miller, Coast Artillery Corps

For the past three months many situations have arisen in this battalion for the deployment of guns 40mm and M-51 in both primary and secondary rôles when the unit was attached to a division.

Solutions given in this article have proved satisfactory and the author presents them for whatever value they may have to units about to participate in similar missions.

In August, 1944 the 633d AAA AW Battalion was attached to an Infantry Division which had just been committed to action. Before this the Battalion had spent three months providing AW protection for airfields in England, and upon arrival in France on D plus 11, was assigned a similar mission on a fighter field that had been constructed on the newly won beachhead.

Upon joining the Division, experimental deployment was initially conducted in order to provide suitable AW protection for all necessary units. It was the desire of the Commanding General that protection be furnished the following in the priority indicated.

1. Bridges and Defiles.
2. Division Artillery.
3. Supply Installations and Vehicle Concentrations.
4. Division Command Post.

The exact dispositions of the fire units was left to the discretion of the AA Commander. This required a great deal of shuffling of units, for both the relative importance of the VP's and the number of fire units available had to be considered.

Within the Division are three combat teams, each composed of one regiment of Infantry; one battalion of Field Artillery, Light; one medium tank company; one gun company, TD; one company, Engineers; and service troops. One AW Battery was "informally" attached to each combat team; however, such attachment is to be considered flexible. In the event that a change in mission is desired, the fire units can be relieved from the combat team and assigned elsewhere. While utilized with the combat teams, one platoon is further attached to the service troops, protecting supply installations and vehicular concentrations, while the other platoon is attached to the Field Artillery battalion. Platoons, therefore, move independently of one another and the battery; for instance, if the Field Artillery battalion moves forward, the platoon attached to it accompanies it, providing AW protection meanwhile during the march. The battery Command Post is established adjacent to the combat team CP so that full contact and liaison is maintained even though the platoon be separated from the battery by a great distance.

At the desire of the Division Commander, one platoon remains with the Division Command Post. The second platoon of the last battery is utilized for the medium Field

Artillery battalion of the Division. Thus, all of the artillery supply installations, and Command Posts are provided with adequate coverage.

Since the attachments are not hard and fast, platoons can and are relieved from one mission and assigned another when necessity requires. This is accomplished when a crossing is to be made over a river or antitank ditch, or when AW protection is necessary for defiles. Normally, one platoon is drawn from one of the service troops for this function. The assignment is dependent upon the volume of fire available in the vicinity of the Train, for the platoon will not be relieved unless it is assured that there will be adequate protection provided by adjacent units. As soon as the Division has made the crossings or passed through the defiles, the platoon is relieved and rejoins the service troops. Prior to being relieved, Corps AA is notified and if necessary, a relieving unit is provided. A typical example of the deployment of AA fire units is shown on the attached map. Guns, 40mm and M-51, are considered as separate fire units and every effort is made to deploy the guns with this in mind. However, due to the proximity of the enemy, flooded lowlands, and wooded terrains, this is not always possible.

Due to the highly mobile rôle played by the Division and consequently by the Battalion, communications must be established to the Division Command Post. As soon as the new CP is established, wire is laid by the Battalion Communications Section to the Division switchboard. Batteries in turn, run lines from their respective CP's to the combat team Command Posts and thus this headquarters is

LEGEND

● -40MM ○ -M-51

Scale—1:25,000

MISSIONS

- 1st Platoon, Battery A—To provide AW protection for defiles, BAMBIDERSTROFF.
- 2nd Platoon, Battery A—To provide AW protection for units of Field Artillery Battalion.
- 1st Platoon, Battery B—To provide AW protection for Service Troops of Combat Team.
- 2nd Platoon, Battery B—To provide AW protection for units of Field Artillery Battalion.
- 1st Platoon, Battery C—To provide AW protection for Division Command Post.
- 2nd Platoon, Battery C—To provide AW protection for units of Field Artillery Battalion.
- 1st Platoon, Battery D—To provide AW protection for river crossing, GUINGLANGE.
- 2nd Platoon, Battery D—To provide AW protection for units of Field Artillery Battalion.

always in contact with the battery headquarters by wire.

Since every effort is made to minimize the use of radios, batteries in turn maintain telephone contact to their platoons through the combat team. Platoons attached to Field Artillery units run wire from their CP's to the Field Artillery battalion Command Post, while platoons with service troops do likewise through the Train CP. In the event that a platoon is assigned to protect a crossing, wire will be run to the nearest adjacent Division unit, if possible, or use will be made of the radio.

Despite the fact that the Battalion is adjacent to the Division constant liaison is maintained at the Division. One officer (Bn S-2) is dispatched as Liaison Officer and lives with the Division personnel, consequently the Battalion keeps up with the latest information. The time saved by traveling back and forth has more than justified the utilization of this officer in this capacity.

Batteries and platoons in turn maintain their own liaison with the respective organizations. At least three times daily, the battery commander or executive officer personally visits the combat team CP to secure the latest information, while the platoon commander maintains similar contact with his unit. When a move is scheduled by any unit a platoon proceeds with the advance elements of the Field Artillery officer (or service units) and conducts his reconnaissance with their reconnaissance party. Following the Movement and Deployment procedure, the platoons then follow with the main body.

Due to the extremely close harmony that exists between the Battalion and Division and in turn between the batteries and combat teams, each is able to assist the other. Request by combat team commanders for participation of AW units in ground rôles is accomplished through the Division G-3. If he considers the gun deployment necessary, the AW commander is called for consultation before G-3 formally requests the mission. Thus far, this unit has effectively deployed in four different positions for ground rôles and the results have more than justified the use of these weapons in such tasks.

Within the Division, an intelligence net is operated which relays all data such as location of mine fields, blown bridges, etc. The Battalion monitors this net at battalion headquarters and in the battery and platoon headquarters. Consequently all officers know the location of dangerous areas. As a member of this net, we in turn pass on all hostile or unidentified aircraft plots that appear over the division area, observed by the gun positions of OP's. In many instances, because of this early warning, non-AA units have

received sufficient warning to take cover prior to the appearance of the planes.

The following observations have been made during the period with the Infantry Division:

1. The importance of the Division and AA Commander realizing the capabilities of the AW fire units.
2. The importance of establishing priorities for AW protection and allocating fire units according to this priority and their availability.
3. The necessity of the AA Commander to visualize and foresee the possible movements of the Division and have the AW guns deployed by the time the Division arrives.
4. The necessity for close liaison between the Battalion and the Division and between batteries and combat teams. Due to the increased function of the S-2, it is recommended that provisions in the T/O be made for a Liaison Officer.
5. The necessity of each unit, AA, FA, Infantry, etc. realizing the importance of the other's mission, capabilities and limitations.

A great morale factor is the feeling that exists between the officers and men at being affiliated with the Division for it means they are associated and working with the men who are doing the fighting and can see the results daily without having to wait to read the *Stars and Stripes*.

EDITOR'S NOTE:

This article as written is a good account of how one AW battalion operated with an Infantry division. The priorities for AAA protection are logical. Ordinarily Field Artillery receives first priority but local conditions may dictate otherwise. The priorities as set up were violated in the disposition of troops, in that a platoon furnished protection for the Division CP, leaving the service troops of one Combat Team without protection.

The map showing disposition of troops contains some violations of accepted doctrine which do not appear to be dictated by conditions of terrain or combat.

- a. Both platoons of Battery "B" have placed their CP's in the town of Faulquemont, three-quarters of a mile from the guns of their platoons.
- b. The 1st platoon of Battery "D" has placed the Bofors close in to the VP and the MG's farther out, which is opposed to approved doctrine. The MG's should be placed close to the VP because of their ability to follow close-in, fast-moving targets.

Although the article does not entirely conform to accepted doctrine, it is believed to be of value as it sets forth the manner in which one battalion was disposed.

More Aid to the Infantry

By Lieutenant Colonel John C. Mazzei, Coast Artillery Corps

With the ever decreasing activity of the Luftwaffe and the ever increasing need for all the fire power available to be brought against the enemy, more frequent employments of AA weapons in ground rôles are being utilized. Almost every AW battalion in the ETO has conducted some form

of this type of fire. Although several articles have already appeared on the successful employment of AW mounts in support of Infantry divisions, subsequent employment has developed more experiences and the following narrative will show that all is not a bed of roses. This story deals

with the first attack made by a division and its attached AW battalion on the Siegfried Line, made more difficult by an included river crossing.

The attack was planned six days in advance, which gave sufficient time for careful reconnaissance and preparation for all elements of the command. As a matter of fact, it followed a brief rest period which found everyone in good condition. As usual these days, the CG of the division requested that the AA Battalion Commander make his recommendations in preparation for the attack on strong points of the Siegfried Line. Pending the publication of a field order, the AA commander surveyed the situation, from information available, both on the map and on the ground, and decided to go all out, and render as much support as possible by emplacing the M-51's of three batteries, B, C, and D as shown on the map. From these positions, the most effective fire could be brought on designated target areas 1 to 5, along the Siegfried Line East of the OUR and SAUER rivers. (See sketch.)

The Battery Commanders of the batteries involved were thoroughly briefed, and with the assistance of the Battalion Commander and S-2, immediately initiated detailed reconnaissance in the selected areas. The weather was cold and foggy, ideal for the purpose. On D-5, all reconnaissance was completed and the sites selected as shown on the accompanying figure. Taking full advantage of the time, the digging of emplacements was commenced on D-4 and was completed the following day. All during this period, the weather held cold and the fog persisted, which was just what the doctor ordered. Since the selected positions were well forward in this instance, in close proximity to the enemy, adequate shelter for the members of the gun crews were constructed.

A further study resulted in two new targets being selected on D-3, shown as 6 and 6a. Since these areas could not be reached effectively from the positions already selected and completed, it was decided that the first Platoon of Battery A would be utilized to cover these targets. It was

contemplated that the entire platoon, both 40mm and M-51's, be used, the former to effect tree bursts in the area, which was heavily wooded. Positions for the platoons were selected and were ready to be occupied by noon on D-2.

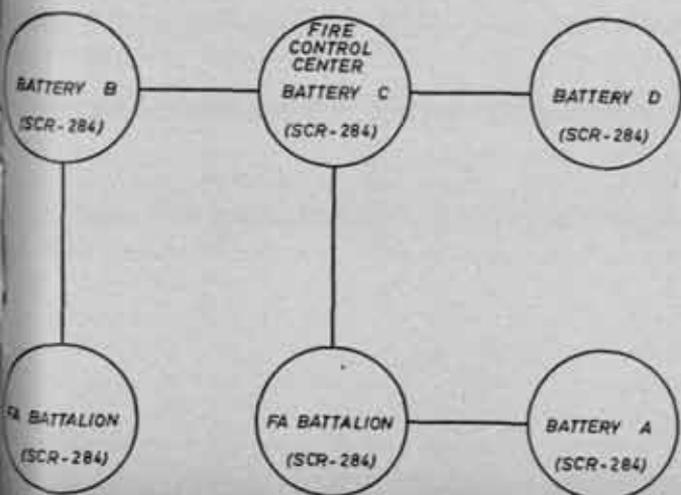
Hour was set at 0300 hours, which meant that the firing would be conducted during darkness. To insure correct and accurate laying, the guns were "zeroed in" by staking off the direction on the ground, and determining the elevation from firing tables. A luminous disc was placed at the proper elevation on the direction stake. All that the gunner did to be on target was to place his sight on the disk. This proved accurate by observation of subsequent fires conducted during daylight hours. The use of this method precluded the use of a light to read the gunners' quadrant in the dark and left no guess to the gunners. To make for speed and efficiency of ammunition handling, the belts were fed directly from ammunition cases to the guns, obviating the loading of chests. To slow down the over-all rate of fire and prevent burned out barrels, barrels were changed after firing one case of ammunition, 250 rounds. No burned-out barrels resulted from this engagement, even though it was of the longest duration yet undertaken by this battalion.

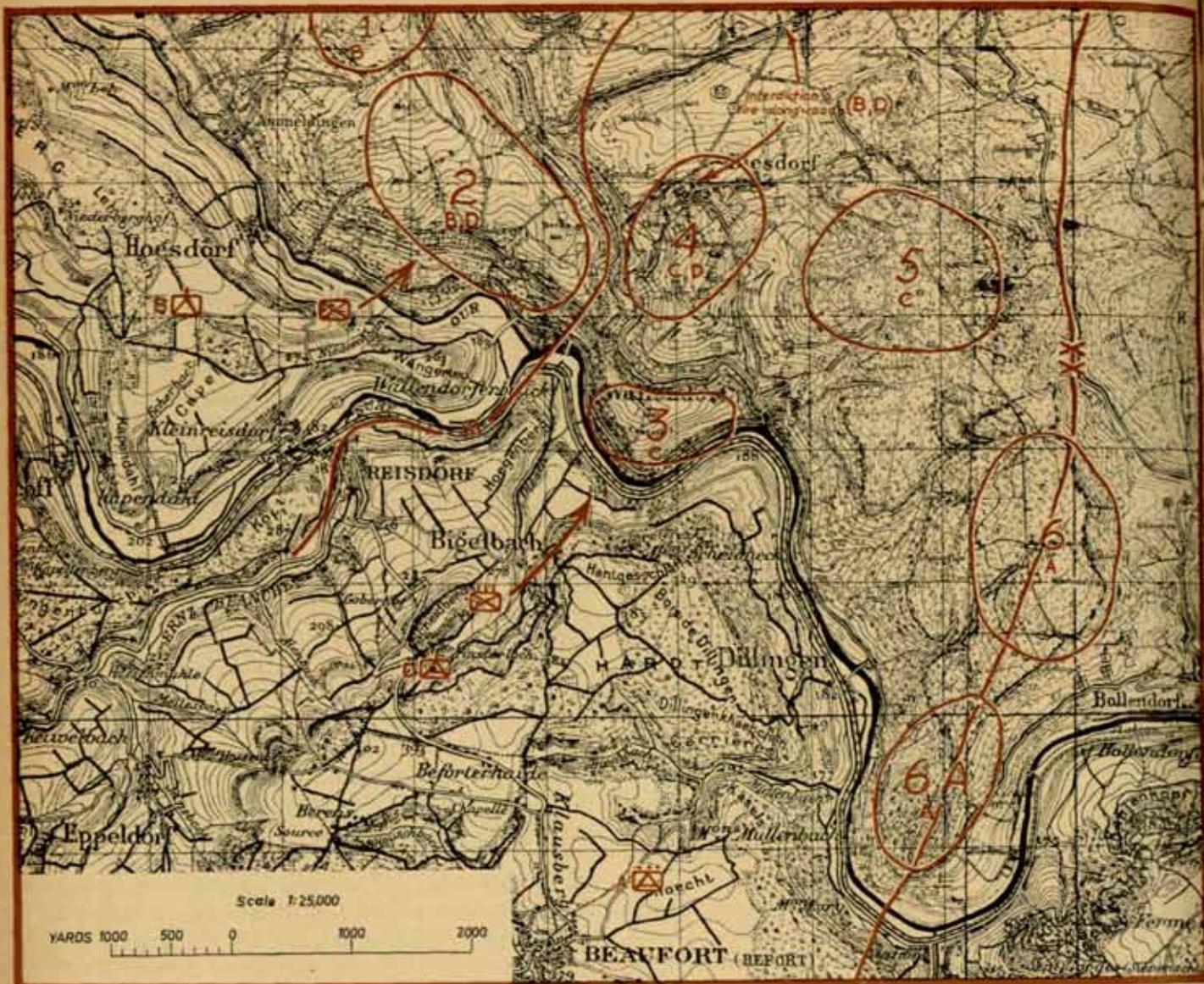
A Fire Control Center was established at Battery C's position because of its central location, under supervision of the Battalion Executive Officer. A switchboard was installed here, and lateral lines connecting all batteries, except A, were laid. In addition, lines were laid to the field artillery units controlling the fire. (See Traffic Diagram.) SCR 284's were installed at each position, including the field artillery battalion CP, for use as an alternate means of communication. Battery A was not included in this net, either wire or radio, since its mission was specialized, and its positions isolated. It operated directly under the Field Artillery battalion.

With such carefully laid plans and painstaking efforts now completed, the Battalion was ready to go. But it had failed to reckon with Old Man Weather who now stuck his ugly head into the picture. The weather had turned warm and a sudden thaw melted the snow and softened the ground. That term does not amply describe the condition since some of the approach routes had been used by tracked vehicles of the tank and tank-destroyer outfits.

Notwithstanding, the guns moved up under the cover of darkness on the night of D-1. The areas of Batteries B and C had been subjected to heavy intermittent artillery and mortar fire. Even the Battalion Commander and the Executive on their last-minute inspections were pinned down for long periods. Battery B nevertheless attempted to emplace its weapons. Regardless of the shelling, they toiled incessantly through the night, finally having to abandon all attempts when the vehicles hopelessly bogged down, blocking the approaches. The remainder of the equipment was withdrawn from the shelled area, but nevertheless three trucks were lost as a result of the shelling and one mount bogged down so deeply that it took three days to extricate it, due both to the mud and to the fire. In their heroic attempt to complete their mission, the battery lost one man and had several wounded. Out of this action also came two feats of gallantry in the rescue and evacuation of the wounded by their comrades.

TRAFFIC DIAGRAM M-51 IN GROUND ROLE





Battery A also ran afoul of the thawing ground. Their positions were on the reverse slope of a gentle hill, reached only across an open field. They too tried, but unsuccessfully, all night long. The mud was too much. A request to shoot their mission from the road was denied, due to the great risk of firing in a spot as open as was their position. So they too, were forced to withdraw. Fortunately, no enemy fire was directed at A and they suffered no loss except their great disappointment.

Batteries C and D were able, not without difficulty, to emplace all their M-51 mounts. The story from here on relates to the achievement of these two batteries. They fired their mission that night on areas 2, 3, and 4, delivering 50,000 rounds of cal. .50 ammunition on their objectives.

The infantry met fierce, determined resistance in their crossing. It was therefore determined that the mounts remain in position for further support. At the request of the division G-3, the road between _____ and _____ was interdicted from dark to 0900 hours D day and from 0300 to dawn on D plus 1. This commitment seriously interrupted the enemy supply procedures. A total of 95,000 rounds of ammunition was fired on this mission. On D + 2, enemy resistance still being strong, another mission of one-half hour was fired on Targets 4 and 5, with

23,000 rounds expended. The weapons remained in position for several days after D day as a protective measure against any possible enemy counterattack. Frequent shifts of personnel were arranged and hot food and drink was brought up regularly. While the area occupied by Battery C was under almost constant hostile shell fire, Battery D did not draw a single round of counterbattery.

As the attack progressed, and the bridgehead firmly established, the Division commander desired that some mounts be emplaced across the river to fire on CRUCHTEN (on North edge of accompanying sketch), and the high ground to the North of it. After reconnaissance, no suitable position across the river could be found in the South area of the division, but some, which were accessible, were found in the Northern sector. Batteries A and B were selected for this mission, A to take position in the vicinity of BIGGLEBACH, and B on the reverse slope of a hill North of the upper crossing. The selection and preparation was completed during daylight hours of D + 7 and the positions occupied that night. A covered the town, and B, the high ground North of it.

Fire was requested on the town that night, and since there had been no opportunity to "zero in" the weapons a problem arose. Elevation could be applied by gunner

adrants, but direction was a doubtful factor. To solve this dilemma, the Field Artillery fired two rounds of white phosphorus on the target and the gunners sighted on the burst and fire. This worked, and Battery A fired bursts of 50 rounds every half hour from 0430 to light, placing 22,000 rounds on the target.

This long period of emplacement in a ground rôle did not handicap the AA defenses since the almost negative efforts of the Luftwaffe were still further handicapped by poor flying weather. The same weather hindered our own fighter-bombers, so the extra fire power added by the use of AA weapons was more than appreciated by the Infantry. The tracers were again left in the belts, for two reasons: the tremendous morale uplift to our troops, who are heartened by the volume of fire they can see in their support, and conversely, by the breakdown of the Krauts' stamina, each man thinking that each tracer was named for him. The PW's stated that the volume of M-51 fire was so great that their battle positions were made untenable, and they were forced to surrender. They were so completely pinned to the ground that they could only point their small-arms fire in the general direction of the advancing infantry units.

There is no doubt that the results of the employment of the M-51 mounts in support rôles are well worth the risk involved in such use. However, this experience well illustrates that their use is confined to almost ideal conditions due to the poor maneuverability of the heavy trailer type M-51 mount. Steps are being taken to have this type mount replaced by the M-16 which for all-around purposes is better adapted to AW battalions attached to Divisions. This Battalion's experiences have borne out this contention and recommendation so made.

Communications represents another difficulty. Their importance cannot be overlooked, the prime reason being the ability to direct fire according to the progress of the

operation. Wire, no matter how carefully laid, is constantly disrupted by shell fire and movement of track laying vehicles cross country. Extreme difficulty is encountered in wire maintenance. Radio, as a primary means of communication is recommended to obviate this difficulty and will be the standard for future operations.

Considerable difficulty was experienced with "old" ammunition. Due to the infrequent appearances of the Luftwaffe, much of the .50 cal. ammunition had been retained for almost a year from original issue. It was decided to expend this so it could be replaced by new. While every precaution had been taken in its care, metal links were found deformed, cartridges split, projectiles loosened from shell casings, and there was excessive corroding of cartridges in sealed cases. The causes for the faulty ammunition are attributed to excessive road movement, jarring the chests and cases and causing links and ammo to become loose; and the extreme condition of weather, leading to corrosion in the sealed cases. It is interesting to note that ammunition placed in chests which could and did receive daily maintenance, functioned properly. This observation applies equally well to both types of ammunition, .50 cal. and 40mm alike. There is no doubt that where the normal expenditures of ammunition is low, periodic inspection must be made and faulty and "worn" ammunition exchanged for new. While these comments do not specifically apply to ground rôles, it was the large expenditure in this rôle that brought these faults to light.

Each succeeding use of AA weapons in other than primary rôles, brings forth new ideas, new methods of approach, and new difficulties which are all corrected and the lessons applied to the next employment. But there is no doubt that the splendid results and the volume of fire produced leads one to believe that this rôle is "here to stay"—at least in this division.

The Inner Ring

By Private First Class Martin Fass

We had been soldiers in name only until that first morning on Morotai. Training, lectures and books were vague memories. Our work had usually been done in an easy-going, good-humored fashion. The bombings were not for us. Strafing was mere fiction. The army was chow, inspection and "snafu." Soldiering had been a lark and a gripe. The stars pin-pointed the sky as on other early mornings. At 0300 the same full-moon rose to partially illuminate the strip and gun position to enemy planes—if any dared to be brave enough to come. The island lay quietly asleep. "Red Alert!" the high-pitched warning of the guards was just another formality. We crawled from our cots mechanically, grumbling, and never heard the faint hum of the motors and propellers overhead. The roar of the 90's was just another "dry run."

Then, in quick succession, three thermites burst overhead. The white molten metal burst into blossoms of silver

and then streamed to the ground. At the whirl of the "daisy cutters" we hit the ground instinctively, then laughed and joked about it in the dark. There was nothing to it we thought. The Jap pilots would never dare to fly in low. The 90's and the Air Force would take care of those high babies. They do not concern us.

The all-clear ended just another disagreeable army hour. We hurried back to our cots for more sleep.

That first raid had been an exhibition of bursting flashes and fireworks. It had been a Fourth of July celebration. We learned that we could stick to our positions. We felt no fear—only the tension of excitement with the thought of action. It was exhilarating but still somewhat unreal.

Then the sun rose. The pageantry was lost in the daylight. The jokes were hollow. Huge chunks of iron imbedded in the earth just a few yards away were not quite so funny. The burned and blackened coral was no everyday



Alert in New Guinea.

Signal Corps Photo

spectacle. Those jagged slivers of steel thrust into our shallow revetment were meant for us.

Sure, we could still joke about it. "That chunk of iron is the Sixth Avenue 'El.' Here is the piece of girder I scratched my initials on when I was a kid." Inside, however, there was a change. History and fiction were real. The news was of our making. We were the bulletins of "Air Raid On Morotai—Damage Slight."

We learned many things in the month following that first morning on Morotai. When our Automatic Weapons Battalion landed, one crushed coral runway was nearing completion. In a matter of days the strip was in use and another under construction. Dispersal areas were cleared. The airfields were in operation when our second platoon moved into position on the inner ring.

In a tangle of jungle vegetation and torn-up trees between one of the strips and a dispersal area, we cleared out our positions. Bulldozers had piled earth and coral into ten-foot mounds. In order to clear parked planes, our guns were set atop these hillocks. A further safety insurance was iron stops on the elevation racks to prevent depressing the guns below 10 degrees. However, that order should not have been uniform. Some guns could have safely depressed to five and six degrees, thus increasing their effective field of fire.

In a line, from the east corner of the strip to the west, each section approximately 500 yards apart, the second platoon composed one-half of the ring. On the opposite side of the strips, a platoon of another battalion similarly situated completed the inner ring. It was advisable that each

position be prepared beforehand so that a section could quickly set up a hasty revetment for protection on the dangerous inner perimeter. Airstrips are a primary objective of the enemy. Preparation may prevent unnecessary casualties.

In setting up we broke many of the strict rules learned in training. The M51 Mount was not emplaced in the dead area of the 40. Each gun was set parallel to the strip. Enemy planes seldom flew down the runways. They attacked in sharp stabs, cutting across the airfield. Our guns, therefore, had the greatest fire power when set in a straight line. Under these conditions the 10-degree stop not only protected planes on the ground but also allowed each gun to fire over its companion piece. Thus each gun had a dead area and could range over a 360-degree arc. Firing over the director was the rule and not the exception.

Although the director is more accurate than forward-area sights, we never had an opportunity to use aided sighting. To prepare for any eventuality, however, we pointed as soon as we were in position.

While training in the clear desert air of Texas, we had always been able to orient on a distant point. The unbroken expanse of the Pacific presented no fixed point in azimuth. The mountain peaks were always shrouded in a romantic but impractical mist. We used an alternate method. Our pointing point was on an extension of the gun, with the director line in the rear of the director. We placed the tube in a direct line with the azimuth scope and dropped a plumb line from the small hole in the scope. A long porter bar was held upright about 100 yards behind the director. We sighted through the barrel to align the plumb line with the porter bar, meanwhile shifting the bar in order to obtain a straight line of the three points. When the scope on the bar and the cross hairs affixed on the tube are aligned with the plumb and the bar, the gun is oriented in azimuth. We then matched the indices on the blackout dial. The horizon was then utilized to orient in elevation.

When our revetments were built, cats pushed coral and gravel to the top layer of sandbags. Each position thus resembled a tiny volcanic mountain, with our gun and director set in the mouth. In effect, we were a controlled volcano which belched forth accurate lead and flame.

We were ready for the enemy! Except for one strafing attack at dawn, the Japs always came over at night—concentrating their raids when the moon was full and high. Enemy aircraft followed a pattern of flight based on the terrain. Our airstrips ran east to west on a flat segment of ground between the sea on the south and the mountainous jungles at our back. Although our mission was to destroy low fliers and dive bombers, we, on the inner ring, were vitally interested in the defensive plan of the Air Corps and the 90mm battalions.

High-altitude bombers consistently made the crossing of the strip from their initial points in the south, southeast and southwest. Four or five two-motored bombers, at altitudes of 10,000 to 20,000 feet, attacked simultaneously. They were often accompanied by harassing strafers. The high-altitude bombers being out of range of the 40's, we could only seek cover from the falling bombs and flak. Yet, as soon as the first bomb fell, we resumed our positions on the guns quickly to watch for the low fliers.

The flak was so heavy on every raid that we built an extension pit covered with logs and sandbags. We were thus secured from the sharp fragments of our own 90mm shells and the thermite bombs, which the Japs fused to burst about fifty feet from the ground. This addition also served usefully as a storehouse for our tools and spare ammo boxes.

The gun pits were soon put to a test of durability. A B-24, loaded with 1,000-pounders, was set aflame during an air raid. The Liberator was parked a scant fifty yards away. Exploding heavies scattered the burning skeleton for more than 100 yards around us. One motor hurtled over our head. Our sturdy fortress was unshaken but we inside were anything but serene. Nevertheless, we knew that what we had built was secure from any but a direct hit.

During the first night raid a "Betty" was trapped in the lights. The 90's opened up. We could see the silently exploding shells burst in a pattern. Seconds later the sound of the booming explosion curved to earth as though the flash and thunder were terrors apart. The Japs had guts! This pilot, with a job to do, stuck it out where another might have fled. He flew a straight course to the north. The lights held him fast and every high-altitude gun on the island tried to bring him down.

There is no greater temptation than to open up on a plane imprisoned in a beam of light. It is a white silhouette. As he approaches your position, every nerve in your body urges you to fire. Some tracers did go off and they were 1,000 feet too short. After that initial lesson we held our fire and were content to watch the show as spectators.

At the start of the campaign, night fighters were not too effective, although many raiders were slipping through our air and antiaircraft defenses. As a result, antiaircraft, in cooperation with the Air Corps, devised an excellent plan. Nineties kept firing until the enemy was flicked by the searchlights. The fighter sector then ordered AA to hold fire. P-38's patrolling above the 90's ceiling swooped in for the kill. This cooperation spelled sure death for high fliers.

Meanwhile, Jap Zeros and low-flying bombers were in action. Moreover they were not duck soup for AW. They were tricky and fast. Sneak raids were their specialty. Flying low and fast at treetop level, they were an elusive and shadowy target. There was no opportunity for director control. They tore in at top speed and on only one occasion was one flicked by the lights—momentarily. Sometimes we could spot them by their exhaust flames and sometimes by their yellow tracers. For the most part we pointed our guns ahead of the roar of the motors. When the moon was high we could pick him up as he raced over the fringe of trees beyond the dispersal areas.

At night even sights are useless except for initial pointing. All firing was by tracer control. However, our record of enemy planes destroyed and damaged was testimony of the effectiveness of our shooting as controlled by the gun pointers on the 40's and the machine guns.

Few low fliers returned to their home bases. Troops in training, however, would do well to devote more time to firing with forward area sights, and at night with tracer control. Substitutions are frequently necessary. Every man on the crew ought to be well qualified in the three key

positions—loader and firing, lateral and vertical gun pointers.

No matter what the skill of your gun crew, close liaison between AA and the fighter sector is the key to an unbreakable defense. Communications strung a hot-loop to all sections. The battery CP received complete data as transmitted from the fighter sector to battalion headquarters. Every friendly plane within a prescribed area was indicated on a plotting board. Information was continuously disseminated to all AA so that each gun section knew the location and course of all aircraft. We in the gun sections forwarded our observable information via telephone to the fighter sector. The platoon on the inner ring reported every plane taking off and landing, so the fighter sector and outlying crews had a double check. Thus every plane in the area was accounted for.

All messages were given a simple code. For example, a gun crew would report: "Section 14 reports one bogey traveling from west to east, medium altitude." The report was acknowledged and relayed to the fighter sector. Soon an identification was returned. This return message simply stated that the previously unidentified craft was a B-24 coming in for a landing. In the same manner we learned the direction and altitude of all hostile craft. To trust in the information of the fighter sector is absolutely necessary to prevent shooting down our own planes.

The Japs repeatedly tried to follow our bombers into the field or sneak in with their running lights on. On a few occasions they succeeded, but usually they made the fatal error of coming in from the North. Very few low raiders ran our barrage of fire successfully. If they did pass the outer defense of guns, the inner ring brought them down or turned them from their course—their mission unsuccessful.

When a low flier did penetrate to the airfield, he seldom bombed on a straight course. The Japs preferred to use a

sweep method of bombing. They usually carried a load of 33 antipersonnel bombs which were jettied in clusters. Moving in over the target, they veered sharply to the right or left to drop their 10-inch eggs as they curved off to escape our tracers. Although this method brought inaccurate results, they presented a very elusive target. Despite all their tricks, we exacted a heavy toll. To those Automatic Weapons Battalions still in training, the fundamentals we learned will stand repetition.

The Japs seem to favor night attacks over established airdromes. For gun sections who will have to rely on tracer control for fast-moving, low-flying targets, there cannot be too much emphasis laid on practice firing at night by means of tracer control. Trackers should be drilled in the necessity of giving a target plenty of lead. At night the speed of a target is deceptive. There is little time for correction, so if an error is made let it be ahead of the plane. Once the stream of fire falls behind the plane there is no catching him again. If a stream of tracers is thrown in front of an attacker, he is often hesitant about running into our hot lead. Many planes were driven off in this manner.

There should be more training in firing at night targets. Perhaps by using an OQ controlled plane on moonlight nights, conditions might nearly simulate battle conditions as we faced them. In locating a plane at night by the sound of its motors, remember that on a crossing course the plane is well ahead of the sound. Unless a barrage is ordered, do not use automatic fire. The flash of powder and smoke completely obscures the shadowy target. A few well-aimed rounds ahead of the target are worth more than a ton of lead thrown up blindly.

Your guns are effective! We know! There is no reason why an outfit should not come into battle with confidence and with the sure knowledge that they, too, can knock down enemy planes.



Artificial Moonlight

The "Moonlight Cavalry," long cherished by AA and airmen for its illuminating rôle in modern warfare, now competes with Old Man Moon to give American ground fighters in France, Italy and Germany a 24-hour day—a round-the-clock opportunity to bash the Boche.

"Artificial Moonlight," it's called; and the illumination of vast areas of the fighting lines by the searchlight team enables the doughboy to crack through on the offensive and cover the advance with light mortar fire, and the supply groups and medical detachments to function with near daytime precision and effectiveness. All this accomplished

without preventing the searchlights from carrying out their primary mission of fingering the airborne targets.

The British first utilized artificial moonlight on the desert wastes in the African campaign, and they have been using it very effectively ever since. We took it up in Italy, experimented, used it with perimeter defense at Torokina in the Pacific, and it is now SOP with our armies driving into the heart of Germany.

What is it? Well, technically speaking, we use our 60-inch, 800 million candlepower searchlight with a focussed beam, elevated about five degrees and pointed in the direction of the enemy. Thus, we create a condition with

each light, which, under favorable conditions, approximates three-quarters full moonlight in the illuminated area. The nature of the terrain will alter the degree of elevation and depth of lights between the fighting lines.

Why use Artificial Moonlight? Properly employed, searchlights can point out the enemy installations and personnel on the "near" side of buildings, and "spotlight" fortifications and trees in a recognizable relief, while our men on the "far" side of such masks are in the shadows—it's harder for the Jerry to see 'em.

In addition, all those millions of little candles:

1. Throw some dazzle into Jerry's eyes.
2. Help us avoid mine fields and trip wires.
3. Help engineers unload supplies, lay and cover mine fields and build bridges.
4. Help us see enemy patrol action on our front.
5. Greatly aid our messengers driving along roads and help vehicles bringing up supplies.
6. Lessen the effectiveness of flares by giving us vision in the pitch darkness that follows.
7. Speed up artillery fire by helping ammunition handlers to see what they're doing.
8. When they are kept pointing in the same direction, orient moving men without the use of a compass.
9. Enable us to set up mortars, machine guns and AT guns at night with ease.
10. Assist our patrolling in difficult country and permit attack against enemy in depth.
11. In a bridging operation, they can be turned off during the assault crossing, and on after our infantry has established a bridgehead.

12. Can be used for deception, and to draw the enemy's attention from a proposed area of operations.
13. Assist organizations after attack; for when the lights are switched off, the total blackness tends to discourage the enemy from launching any counter-attack.

German prisoners have added a few more advantages to our two-figured score: "We can't see! We can't move! We can't desert!"

Our own troops didn't like it very much at first, either. They said they felt naked and exposed to enemy observation. When searchlights were first turned on the Western Front, a regimental commander angrily approached the searchlight controller and demanded that the lights be doused "before all his troops became casualties due to sudden exposure." Half an hour later, however, he returned sheepishly with the plea, "Turn them back on, they all want 'em!"

During the first few nights of trial, the lights operated usually for only an hour. Now, ground force commanders are requesting that they blaze away all night. Which is an indication that artificial moonlight has passed the experimental stage and is now being accepted by battle-tryed commanders as one of the more beneficial discoveries in Anti-aircraft Artillery during World War II.

This latest front-line assignment emphasizes the flexibility and aggressive use of Antiaircraft Artillery; so when our armies storm into the city of Berlin, and blast their way into the heart of Tokyo, American Antiaircraft Artillery will be up there with them!

AW in Europe

By Lieutenant Colonel William R. Kintner, Coast Artillery Corps

In spite of Ernie Pyle's statement that the fighter planes keep the *Luftwaffe* hiding during the day time, AW units in Europe have shot down their proportional share of over 1,000 German planes dropped by AA since D-Day, and individual AW battalions have enjoyed some of the best hunting over there. Every division has its AW battalion, each Corps has two or more, each Army a half a dozen in addition to the large number of battalions protecting installations under the IX Air Defense Command. These battalions have protected supply installations and airfields in the rear and critical bridges and field artillery in the forward lines. They have been in the thick of it and have won AA an accepted place in the esteem of the combat troops.

Protection of the field artillery was the normal mission of Corps and Division battalions. Under policies set up by the V Corps, this was usually accomplished by attaching batteries or platoons directly to Field Artillery battalions. The size of the unit attached depended upon the number of Field Artillery battalions assigned to a battalion for AA protection. It might range from one to three platoons. This number of Field Artillery battalions protected by one AA

battalion varied from four to eight. The commander of the attached AW unit became the AA Officer of the Field Artillery. His unit received its class I and III supplies from the Field Artillery battalions as well as all movement orders, except for detachment. The AW unit became part of the Field Artillery family. These attachments were always firm in divisions and likewise in Corps unless drastic changes were made in assignment of corps Field Artillery battalions. The function of the AA battalion Headquarters in this set-up was to see that the batteries and platoons maintained a high level of efficiency and readiness by means of frequent technical and tactical inspections. This system required great flexibility, but it preserved as much as possible the team work that results from units working intimately with each other. It required great decentralization of command and acceptance of responsibilities by junior officers.

In the XIX Corps this system of protecting F.A. was modified to a partial area defense. In situations where F.A. was massed for an attack, excessive concentration of AW would result. To alleviate this condition, direct attachments to Field Artillery were cut to a minimum and the remain-

ing AA was distributed to give an even scale of protection over the entire critical area. This solution required that extremely close liaison be maintained with the F.A. This procedure was followed after an Army directive released AW from attachments to divisions and placed them directly under Corps Groups who in turn placed them in support of the divisions. It might be mentioned that this directive was not always implemented as such a solution eliminated the many concrete advantages accruing to a battalion from a division attachment.

At several times during the campaign units had to operate on greatly reduced transportation and personnel. This was true of battalions that came in early in the Normandy campaign whose complement had to be cut for shipping, as well as others which later on had to furnish trucking companies of some thirty to thirty-five vehicles to speed the movement of supplies and infantry across France, at the same time carrying out their tactical mission. In addition Corps battalions furnished a forty-man military government detachment actually to run occupied German towns for the civil office sections. The ability to carry on in spite of these losses was made possible through the early elimination of power plants and directors, which made it possible for each section to roll with and on one 2½-ton truck. Each truck carried a load of over five tons. When operating in this manner, it was customary to set up an advance tactical rear administrative echelon with the rear echelon of each battery under battalion control. Rear echelons were leap-frogged after every three or four tactical moves of the forward, when the situation was stable enough to take away section trucks for the move.

Specialized training had been given in England to a considerable number of AW units in British deployment procedure. This procedure reduced movement to a basic drill. Each unit was divided into component sections of command, reconnaissance and main body. Reconnaissance and movement could be carried on simultaneously through the medium of a report center. This system worked out very well in combat. Units working with the F.A. had to modify this procedure as all movement had to be tied in with them. Movement normally started by the F.A. battalion C.O. warning the AAA B.C. of an impending reconnaissance and move. The AAA B.C. would then alert his battery, choose a R.C. and brief the Battery Executive. The AA B.C. would accompany F.A. Bn. C.O.'s and reconnaissance to determine new Field Artillery locations. Platoon or detachment C.O.'s would next make AA reconnaissance coordinated by the AA B.C. and return to the R.C. The AAA Battery Executive brought up Battery Headquarters and 40mm guns at the tail of the F.A. column while the M-16's would take up temporary positions close to F.A. guns while they were being set up. The section guides would pick up 40mm guns at report center and lead them to positions. Platoon commanders would check 40mm positions and then lead M-16's from temporary to selected locations. This system provided for protection en route. Many battalions modified the 40mm carriage by limiting the movement of the outrigger so that the gun could be fired on wheels . . . in case of attack the gun could be used quickly. In one of the few reported instances of enemy aircraft strafing moving F.A. columns in



German ground targets feel the weight of an AA "40."

Europe, the crew was able to jump off their trucks, to get their guns in action and knock down three out of six of the attacking planes.

Actual siting of weapons was accomplished by the section chief, as in rapid movements of the platoon the leader had time only to indicate general areas in which he wanted the guns placed. Terrain and field of fire were the main factors in determining his choice and most experienced section chiefs chose excellent positions. Small gun pits were stressed with sufficient revetment to offer individual protection. Camouflage was fully employed, but never to the sacrifice of field of fire. No overhead camouflage of guns was permitted but the other impedimenta of the crew, such as truck and cooking equipment, was covered as much as possible. After cold weather set in, sections that were in place for a few days would construct weather shelters to keep down frostbite and trenchfoot.

There was a marked preference for on-carriage sight fire control. In one Army the Army AAO required that directors be carried, and where possible, used.

In some Corps the M-16's were equipped with improvised speed-ring sights in place of the M-9 optical sight. This was done to increase the field of view and to give some reference for leading fast-moving targets. The water-cooled machine guns were fired by tracer. All types of machine guns have been responsible for a high portion of daytime kills. On Jan. 1st one gun battery knocked down seven planes in a few minutes with its M-51's. The .50 has an established reputation for being a lot of gun.

During daylight hours AW sections in some Corps were required to have a full four-man crew on the guns at all times plus one man on the .50 cal. machine gun. Two men, a spotter and a man in the bucket, were on duty on the M-16. In some other Corps and some Army brigades only three men were required to be on the Bofors. Full time manning was the only way in which AA could carry out its mission over there. It was believed that in forward AA the seat of the gun was the AA equivalent of the doughboy foxhole. The men had to be on it. With the onset of



A "Fifty" stands guard at an airstrip in France.

Signal Corps

Winter, weather conditions often prevented flying. Battalions were then authorized to have crews off the guns, but were required to maintain an air guard at each position. This relief was effected on a platoon basis under specific battalion orders. Security Guard at night depended upon the situation. Never less than two men were on guard. In hand, uncertain situations, half the section would be up.

Maintaining operating efficiency of an AW Battalion during periods of aerial inactivity requires a great deal of conscientious devotion to duty on the part of all officers. Without exception, the best battalions over there were commanded by men who, along with their battery commanders, spent most of their time visiting their sections. Battery officers were required to visit their sections at least three times a day. Only by going out to the gun sections could battalion staff officers know what was going on. The morale effect of obvious interest shown by officers to the men's problems cannot be overrated. Staff officers would specialize in their functions in these visits and inspections. The MTO officer would take along with him a traveling repair mechanic from the motor section; the S-3, the fire-control sergeant (to check orientation and maintenance); and the S-2, the intelligence sergeant (to check on fire unit observers and platoon OP's). When winter struck battalion maintenance shops were set up in buildings by a number of units to meet the added maintenance problems. An entire section would bring gun and truck there and stay there until complete overhaul had been effected. The battalion staff was there to do the leg work for the B.C.'s and had no

difficulty keeping busy. There are administrative difficulties for each staff member to work on. The S-1 had to compete with an inflexible replacement system, the S-4 had to try to find extra rations to compensate for the excessive breakdown of the normal issue and keep a close tab on gasoline when it was rationed. The surgeon normally had a hard time keeping busy.

What are some of the difficulties that beset our AW units in Europe in performing their everlastingly vigilant task? When snow and ice hit the Western Front it brought attendant maintenance problems. Anti-freeze was hard to come by item except for division troops. Some outfits got wood alcohol from the medics for the job, others were forced to drain vehicle radiators nightly and substitute oil for water in their single machine guns. All sights over there would freeze up and demand careful attention to keep them operating. None of them were too sturdy. Deflection tubes on Bofors guns were a catch-all for ice and snow and had to be watched. It was necessary always to set wood underneath wheels and half tracks to keep them from freezing to the ground. Under the strain of heavy snow and the concentrated weight of the M-45 turret the M-16's had a habit of snapping their rear axles. The Theater requirements for tires and tubes far exceeded supply. Consequently inspection teams were organized by General Eisenhower to check on unit maintenance with powers to fine on the spot any individual found guilty of laxity in taking care of his equipment. Replacement on vehicles and equipment lost in the breakthrough and other actions took about three

weeks. Replacement was on a priority basis with front line divisions units getting top rating.

What about some of the human factors? Individual replacements were ahead of demand until the break-through and then were short for some time. In spite of the fact that many AA units have been converted to Infantry both in the states and overseas many battalions received Infantry-trained replacements after the Bulge battle. There are still a lot of turbulent waters in the replacement pools. Starting in November a system of passing and leaves was set up permitting personnel to visit Brussels, Antwerp, and of course, Paris. Thirty days rotational leaves to the States have been inaugurated for officers and men who have been overseas for more than two years. The establishment of a fixed policy in this respect in a Theater in which rotation was pretty much of a myth has been a shot in the arm to the man over there. Morale, defined as the will to stay in there until a victorious finish, is high. On the other hand a great number of cases of combat exhaustion have showed up. The relentless strain on the men of the gun sections tells. Six to eight hours a day at the gun, two to four hours a day on guard, slit trenches month after month, monotonous food, lack of new faces, artillery shelling from Jerry and the pounding of our own guns: all these have made their mark on the men. The Field Artillery may have some intense firing to do and then sit idly by for days; even when the division is sent to rest areas the AA still stands guard at each daybreak. Individual AA men have been under combat longer than most of the Infantry for the simple reason that the high Infantry casualty rate enforces a definite rotation system either on this earth or beyond. The only solution of this problem is wholesale rotation of units from the forward zones to the rear but this has not been attempted as it would break up the team work that results from long association between one AA battalion and other outfits. An orientation program, designed to show each man the necessity for his rôle in the war, and to keep him acquainted with its progress, has accomplished a great deal in making philosophers out of our soldiers.

There have been many instances of superior performance by AW units. An interesting over-all comparison is the record of the Ninth U. S. Air Forces against German flak—the most experienced AA in the world. The Ninth has lost one plane per 250 sorties. The *Luftwaffe* in contrast has lost an estimated one plane per fifteen sorties against

U. S. AA. Several battalions have knocked down fifteen or more planes in a day's shoot when the *Luftwaffe* pressed home attacks on particular positions. The *Luftwaffe* has made large-scale area attacks when cloud cover grounded our own fighters. Without exception, these attacks have cost them heavily. In a 45-minute attack made against First Army positions on the 3d of December about 200 planes strafed in small groups taking full advantage of heavy cloud cover and employing all evasive actions. AW units accounted for some forty of these planes. On the New Year's Day raid, out of 800 aircraft over 300 planes were knocked out of the sky by AA; the air force got 160 the same day. This was the greatest single AA action of the war. Captured *Luftwaffe* pilots have said, "I have never seen anything like it" or "I'd rather jettison my plane than face light American AA fire."

Jet-propelled planes have been difficult targets but AW has hit them too. In December when Jerry was sending around one hundred Buzz Bombs a day over the front lines, AW helped to achieve the creditable 25% over-all score against these newcomers to the air war. In addition AW battalions have had their share of ground support rôles. Many of these have arisen in defensive situations or when AW had seized the initiative to hit a confused enemy. One battalion held a vital bridge which permitted a bruised armored combat command to escape from a German trap in the Siegfried Line. A platoon of a battalion operating with a division while the Germans were streaming east through Belgium caught a German motorized column in the flank and eliminated 300 faithful Nazis from the war. In addition there have been many planned infantry support rôles. To mention a few, AW battalions have helped the 29th Division cross the Vire in Normandy, the 90th assault the Fortress of Metz, and the 4th fight through its bloody forests in the Ardennes. The employment of AW in this rôle has become an accepted feature of warfare on the Western Front. The Infantry has learned to appreciate the tremendous fire power of the M-16 as well as the pin-point accuracy of the Bofors in silencing enemy positions. Even armored divisions have asked for AW to blanket an area prior to an attack to keep enemy Bezooks and antitank men under cover. In this brief summary we can only touch the high lights; suffice to say that AW units have done their job against difficult targets in the sky and a tough *Wehrmacht* on the ground.

The AA Defense of Remagen Bridgehead

By Captain E. Hamlin Turner, Coast Artillery Corps

The point of attack for the once-arrogant remnants of the *Luftwaffe* was the Remagen Bridge and Bridgehead, over which vital men and equipment were pouring into the heart of Germany. Here was no last-ditch assault of des-

peration, but a determined and vicious attack which showed the former flash and intensity of the German air attack upon Poland, Czechoslovakia, France and Belgium, when the German air force was in its glory.

But this bridgehead was no undefended inner crossing, crowded with refugees and dispirited troops. This was Remagen—and here were some of the top-notch Antiaircraft Artillerymen, battle-wise and tough, only too anxious to add extra Swastikas to the scores already painted on their gun barrels. These antiaircraftmen had arrived with the troops who took the bridge, and they had dug in their guns, and built their revetments under the hail of enemy artillery fire which greeted their arrival at the Rhine River.

The *Luftwaffe* threw everything they had against the Remagen Bridgehead. FW 190's swung in through the river fogs and mists; Me 109's screamed down out of the darkness to the attack; the once-vaunted Ju 87's thrust and lunged at the bridge. Heinkel 111's stormed in for attack; and in one day the new Ar 234's, Germany's newest jet-propelled aircraft, made their bid to penetrate the AA defense, sending seventy-five of their numbers in to add their weird sound to the roar of motors and crash of antiaircraft fire. Me 110's swept in from low-hanging clouds, hoping to escape the curtain of steel which sprang to meet them. The jet-propelled Ar 234's "hush-hushed" out of nowhere—to be driven off as suddenly as they appeared. All these were virtual-suicide attempts to cut off this vital passage to Germany and to disrupt our advance, for they all were shot down, or driven off.

The enemy was determined to knock out the bridge. They came in pairs. They swept in singly. Formations were attempted; and the weird sound of the jet-propelled aircraft added their tone of desperation; for they hoped, with each attack, that the bridge would be shattered.

The importance of the bridge in the minds of the Hun was attested to by the number and variety of enemy aircraft used, and by the determination with which the Nazi thugs of the *Luftwaffe* pressed home their attack. They threw the book at us; everything was used. Just as determined as was the *Luftwaffe* in its attempt to lay the bridge in ruins—just so determined were our Antiaircraftmen waiting for them below at both ends of the bridge, that our traffic of advancing troops and matériel flowing across the Rhine to Germany should not be interrupted.

The *Luftwaffe* Kommandant thought, apparently, that the morning hours would be best for knocking out the bridge. All night enemy artillery had been plastering AA positions around the bridge as positions were prepared; and Infantry and AA together shared this hail of fire, as they dug in to protect the bridge. The morning air attack on the bridge failed miserably. Three Stukas and one Me 109 swept in, singly, using fast and evasive action. Four planes, trailing each other, eager for the kill—and shortly thereafter, the pieces of three Stukas and one Me 109 drifted to earth, or crashed into the waters of the Rhine River, last great defense against the invasion of Germany.

The Kommandant of the local *Luftwaffe* group must have thought this an unpleasant accident; for that afternoon, eight additional Stukas were dispatched to make short work of the bridge. The Stukas swung into their dive from about 3,000 feet, bridge in their bomb-sights, with nothing to stop them from shattering the bridge except the determined Antiaircraftmen who had waited, and trained, and fought their way up from the beachheads of Normandy. Eight Stukas disappeared in midair, their

bombs exploding harmlessly under the hail of AA fire!

That night, braving the probing fingers of the searchlights, the enemy tried again. Heinkel 111's swept in, diving and ducking like skilled boxers, trying to avoid the knock-out fire of the antiaircraftmen waiting below; but the men on the ground, tired and battle-weary from incessant close-range German artillery fire, still had the punch, and seemed to glory in the long shots that outguessed the enemy, and sent them spinning to the ground. Four out of six Heinkel 111's disappeared in a burst of flame and trailing debris.

Still they flew at the bridge. Early the next morning, three FW 190's and two Me 109's attempted to bomb and strafe, but the withering AA fire cut short their threat to the bridge. Three more Stukas swung in. German reports probably read, "Three Stukas dispatched to knock out Remagen Bridge. Three Stukas Missing." (The AA on the ground could add to this, "Three Stukas definitely destroyed. Three more Swastikas painted on the barrel of "Orphan Annie," or "Stuttering Suzie").

In midafternoon, seventeen raiders roared in, singly and in pairs, trying to get to the bridge in a bold daylight raid. In this attack, they used more evasive action, more maneuvering, more dodging. Again the desperation of the *Luftwaffe* was indicated in the variety of aircraft they used. FW 190's, Me 109's, Heinkel 111's, Me 262's, and more of the Ar 234's were reported during the attack with seventy-five of the ninety aircraft over the target being jet-propelled—the cream of the *Luftwaffe*. The high light of this day's action came when one 90mm gun section spotted a fast-flying Me 210 diving toward the bridge. With a single pre-cut round of ammunition, this 90mm gun section blew the Me 210 into the Valhalla of the *Luftwaffe*!

In late afternoon, two more FW 190's plunged toward the bridge, followed by three other enemy aircraft. The FW 190's were destroyed before they got within range of anything—and the three planes following them decided immediately that they had urgent business elsewhere, and departed hastily, after they had harmlessly jettisoned their bombs.

The skies over and around the bridge were, for the most part, protected by Antiaircraft, for poor weather conditions kept the U. S. Air Forces at a distance, where they intercepted and engaged enemy aircraft heading for the bridge area. Fog, clouds and river mists did not deter the Antiaircraftmen from getting their "limit" of enemy aircraft, however.

All the time the Antiaircraft Artillery was firing at air targets, they were subjected to heavy ground fire from the enemy, along with our Infantry troops who had dug in along the bridgehead with them. In spite of this, the volume of fire they put up, and the deadly marksmanship of these gunners will long be remembered—especially by the German Air Force!

The *Luftwaffe* appeared less and less frequently over the Remagen bridge. They did some strafing—from a distance. They attempted more bombings—from a distance. They used night and day attacks, with diversified formations, using the cover of low-hanging clouds and river fogs. Each cut and thrust was met by the Antiaircraftmen on the

ground, each raid was met at the point of attack, and met instantly, as soon as the enemy aircraft came within range.

Enemy aircraft definitely destroyed in the first two days firing at Remagen bridge include twelve Stukas, one Me 109, two FW 190's, one Me 210, and four Heinkel 111's. Raiders driven off, and damaged, cannot be counted in this score, of course; but ninety enemy aircraft made at-

tempts to reach the bridge on the first day of its use by U. S. Army troops—and all of them failed. The defense of the Remagen bridge was a classic in the history of Anti-aircraft Artillery.

A complete list of the AA units participating in the Remagen defense, with their "box scores," will be published when security considerations permit.

AA Weapons Support the Infantry

By Captain Edwin D. Philbrick, Jr., Coast Artillery Corps

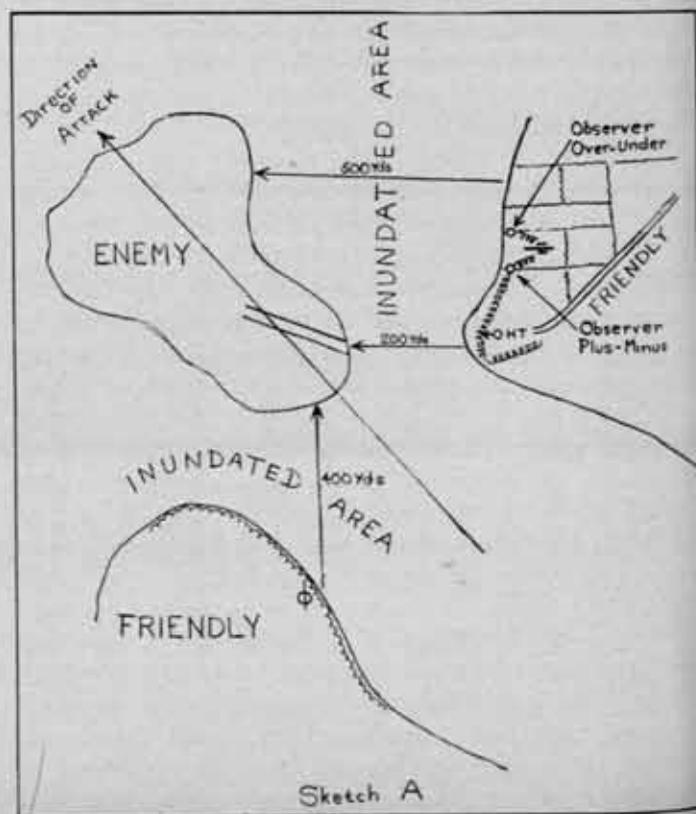
The tremendous fire power inherent in the Antiaircraft Automatic Weapons Battalion can be of invaluable assistance to advancing infantry troops. The "Famous Fourth" Infantry Division, which came ashore on H-hour of D-day, has certainly found this to be true. The 377th AAA Automatic Weapons Battalion, commanded by Lieutenant Colonel George W. Fisher, had been attached to the division in England prior to the invasion. The battalion rejoined the division in France on D plus 7, and less than a month later had been employed in an anti-personnel rôle in support of the combat teams advancing in the heartbreaking hedge row country of Normandy.

Ironically enough it was Jerry who awakened us to the potentialities of antiaircraft weapons employed against ground troops. In a conference of Unit Commanders held on July 1st, it was stated that the enemy had been employing 20mm and 40mm antiaircraft weapons with great effectiveness against our infantry. Included among the casualties were both regimental and battalion commanders. The super-sensitive fuze of the AA ammunition, detonating upon contact with the hedges, was taking a heavy toll of our infantry seeking cover in the ditches below the hedges. Colonel Fisher explained the capabilities of the 40mm gun and the M16, and it was decided then and there to give the enemy a taste of his own medicine on the next jump-off. Of necessity, the tactics employed would be of a trial-and-error nature. Initially, one platoon of each of three batteries, consisting of four 40mm guns and two M16's (quadruply mounted .50-caliber machine guns on the M-2 half track), were attached to each of the three regimental combat teams. The remaining platoon of each AA battery continued in its normal rôle of providing AA protection for the Division Artillery.

The first mission assigned to a platoon called for indirect fire upon a strong point which had been holding up the advance of our infantry. After careful reconnaissance, the AA platoon officer was forced to report that the mission was impossible because of the terrain involved. There was no possibility of getting the 40mm guns close enough to the strong point to bring direct fire to bear upon it. The flat trajectory of this gun, combined with intervening trees and

hedge rows, would have detonated the projectile above the heads of friendly troops if indirect fire had been used.

However, on July 8th, the platoon attached to the 8th Regimental Combat Team was given a mission calling for direct fire upon an enemy strong point. The Battery Commander reconnoitered the ground and found suitable firing points for one 40mm and one M16, as well as alternate positions. The time and length of firing was predetermined and coordinated with mortar fire. The weapons were placed in position, fired for three minutes, then moved to alternate positions to fire again. The gun was on wheels when fired and both weapons were entirely out of the area ten minutes after fire was opened. Within three minutes of the 40mm gun's departure from the second position the area was placed



under 88mm fire by the enemy. Four thousand rounds of .50 caliber and eighty-seven rounds of 40mm were expended in this first experiment with ground firing. (See Sketch "A.")

On July 12th and 13th a much more ambitious plan was put into execution. The two regiments, the 12th and 22nd, were to attack abreast with Highway N171 to Periers as the regimental dividing line. A provisional battery consisting of eight M16's was assembled. Its mission was to place a heavy concentration of .50 caliber fire on the area immediately in front of the line of departure. The weapons were deployed along a line approximately 800 yards in length on the right flank of the attacking regimental combat team. With this end in view, the area in front of the line of departure was divided into four zones: A, B, C and D, and each area further subdivided numerically. (See Sketch "B.")

The provisional platoon leaders, using .50 caliber firing tables, a 1/25,000 map and a compass, positioned each M16 and marked by stakes the fields of fire for the four zones. Each M16 had a gunner's quadrant, and detailed instructions were given as to the necessary elevation for each zone.

A complete system of wire communication, emanating from a regimental forward fire control point, was installed prior to the attack. A direct line was laid from this FCP to the provisional battery commander, and he in turn was in communication with the eight M16's by a "hot loop." The officer in command at the FCP was to issue orders by telephone for fire to be placed in certain zones in certain time concentrations as requested by the attacking battalions. The plan was to lay a heavy concentration in the forward zone, lift it, and let the infantry advance and take it.

The plan worked to perfection. The provisional battery, using this system of fire control, fired for two days. Each day, the infantry, supported by this heavy concentration of fire, moved upon and took its objectives. A total of 74,500 rounds of .50 caliber was expended.

It was during the second day of this attack that a Bofors

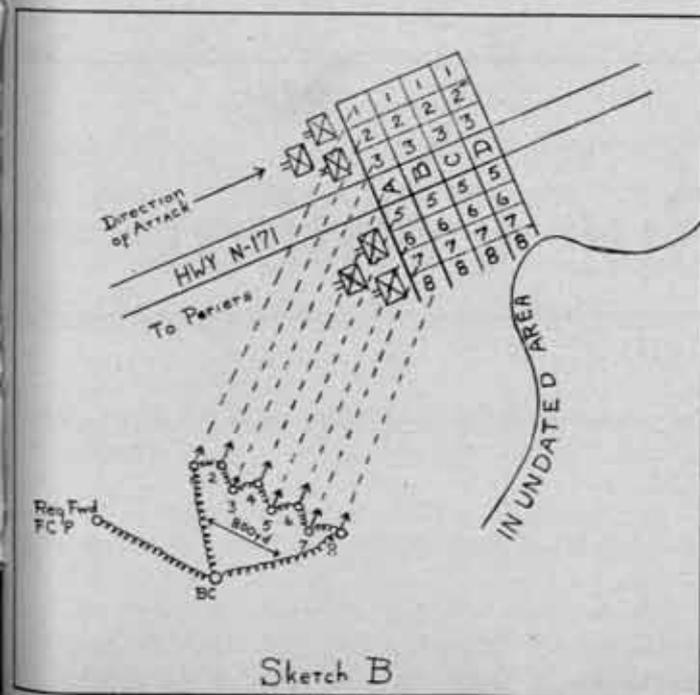
40mm gun mounted on an M2 half track was employed in this Theater for the first time. The weapon was issued to this battalion by the VII Corps AA Officer for experimental purposes. The mount proved highly satisfactory in every way for employment in an anti-personnel rôle. Its mobility proved particularly useful, and both forward area sights and indirect laying were used. One hundred fourteen rounds of 40mm were fired in a very short time and the gun functioned perfectly in every way. It is a much more practical weapon than the present truck-towed 40mm gun when employed for anti-personnel work.

In river crossings, antiaircraft weapons can frequently be of great assistance to the infantry. On 25 August 1944, the battalion was attached to the 22d Combat Team to furnish close support to the 22d infantry in crossing the Seine River south of Paris. Seven M16's and four 40mm guns were employed in the first attempt which took place at 1630 hours. The situation was ideal for the use of the weapons. The river was only 150 yards in width at the proposed place of crossing. A railroad embankment, running parallel to the river, provided protection and concealment for the M16's, and a road with a three-foot stone fence of sturdy construction, facing the enemy side of the river and about 800 yards from the river bank, sheltered the Bofors to some extent.

The infantry commander elected to make the 1630 attempt at crossing without a preliminary barrage by the AA weapons although this was contrary to the advice of the AA officer. No enemy had disclosed his presence on the opposite bank, and it was thought that a crossing might be made without opposition. Consequently, no firing was to occur unless hostile fire was received from the opposite bank. At 1630 a boat-load of infantry attempted the crossing. When this boat reached midstream it met a hail of small-arms and machine-gun fire, resulting in four casualties. The enemy was well concealed and there had been no indication of his presence until the moment of firing. As the boat turned back, the AA weapons opened up and continued firing for approximately fifteen minutes. Casualties inflicted upon the enemy as a result of this firing are not known, but civilians stated that the enemy took wounded with them as they withdrew. Four dead were found.

A second attempt at crossing was planned for 2000 hours. Fourteen boats were to be used and a preparatory fire of five minutes duration was to proceed the jump-off. During the crossing, fire was to switch to the flanks unless the infantry called for additional fire to its front. The preparatory barrage was fired on schedule but the infantry made no attempt to cross since it was learned at that time that a crossing had been made by other infantry directly to the north. A total of 10,025 rounds of .50 caliber and 272 rounds of 40mm was expended on both firings. It is reasonable to assume that a crossing could have been made successfully and without casualties at 1630 had fire been opened before or during the attempted crossing.

Many harassing fire missions have been accomplished by this battalion against strongly fortified towns in the Siegfried Line. A notable example of this type of fire was directed against the town of Udenbreth, Germany. This town is an integral part of the Siegfried defenses, surrounded by dragons' teeth, barbed wire and reinforced con-



Sketch B

crete strong points. Early in October 1944, the division was committed in a holding rôle, and much enemy patrolling, small-arms and mortar fire was originating from this town. An observation post was established on the edge of the woods overlooking the town, and a direct telephone line was installed from this OP to the guns which were moved into position approximately 3,000 yards to the rear. At this extreme range it was expected that air bursts over the town would occur occasionally, as the self-destructing feature of the 40mm projectile becomes effective after a seven-second time of flight. The 40mm was fired in bursts of four. All rounds were observed. Approximately one round in eight burst above the town, while the remainder burst on impact. M16's were fired on the same target from the same location in bursts of 100-500 rounds. It was seldom possible to see the .50 caliber fall on the target because the tracer element would burn out before reaching the 3,500 yard range. The incendiary ammunition soon had the wooden houses of the town ablaze. On the first day, 200 rounds of 40mm and 7,000 rounds of .50 caliber were expended. This type of harassing fire was continued on succeeding days with gratifying results.

This battalion has fired many missions in support of the infantry in addition to those described. Each mission presents a different problem which must be solved on the ground, but as a result of personal observation and from reports of officers with the firing weapons, the following general conclusions were reached:

1. 40mm and M16 AA weapons can render valuable assistance to the infantry—under proper conditions.

These proper conditions are essential, however, if the weapons are to be used successfully. Probably the most essential condition is proper terrain. Open or rolling country is the ideal. With the flat trajectory of the 40mm gun, it is practically impossible to employ it in a ground rôle in hedge-row country or thickly wooded areas. The danger is almost as great to our own troops as it is to the enemy, unless the weapons are actually deployed in advance of the most forward friendly elements. The high silhouette of the weapon and the lack of maneuverability of the towed 40mm gun make this obviously impractical.

2. When used in open country, the weapons must of

necessity be deployed under cover of darkness. They must be thoroughly dug in as a minimum precaution against loss of equipment and personnel to enemy mortar and artillery fire. Cross fire from the flanks, at ranges from 1,000-1,500 yards, is the ideal to be sought in emplacing the AA weapons. The siting of AA weapons in their normal defensive rôle is a relatively simple matter, but when used for the support of attacking infantry, very careful and detailed reconnaissance is necessary. Direct fire and observation is absolutely necessary with the one exception of harassing fire at a known range.

3. When AA weapons are to be used in direct support of the infantry, the closest liaison with the Infantry Battalion Commander is advisable. Experience has shown that the location of the most advanced troops is difficult to obtain at regimental level and liaison direct with companies is inadvisable since the entire personnel of the company is frequently pinned down and this usually happens at the time that information is urgently needed. There is a natural lack of understanding on the part of infantry commanders as to the capabilities and limitations of AA weapons. They have the utmost respect for the tremendous fire power of the weapons but their tendency to regard them as assault weapons to spearhead the infantry attack sometimes has to be discouraged. The AA Officer must be prepared to state that a particular mission is impossible of performance by his weapon. On the other hand, however, an aggressive AA Officer can frequently recommend missions for his weapons which the infantry commander will overlook. This requires a thorough knowledge of the infantry situation at all times and involves the making of continuous reconnaissance by the AA Officer.

It is undoubtedly true that the secondary antitank rôle of AAA has been almost totally eliminated by the great amount of TD available. The anti-personnel rôle has provided a very satisfactory and gratifying substitute. Besides creating an essential job for antiaircraft, this work has done a world of good for the morale of the doughboy. When that tremendous weight of fire power opens up with its tracer display and awe-inspiring noise, the Joe standing there with the M-1 feels a lot less lonesome. Furthermore—and this is important—Jerry doesn't like it a bit.

Everything But Combat

By Sergeant Kenneth Schomborg

This article is not one of dramatic episodes. *Terry and the Pirates* is a much better source of thrills. For artillery technicalities, I refer you to your FM's and TM's.

For your personal problems overseas, I refer you to this story of a Coast Artillery outfit in the South and Southwest Pacific.

THE FIRST YEAR

Typewriters clicked, memos were jotted, salutes were exchanged, orders were given, inspections were made, feet

moved on the double, trains blew their last whistle, trucks started their motors, and we arrived at Fort Screven, Georgia.

We were a classy lot, gathered from some of the finest Coast Artillery units on the East Coast of our beautiful states.

Ah, Fort Screven! It's a beautiful little post with white palms and a large grassy parade field. Perhaps the greatest advantage of this post is its proximity to Savannah Beach where southern hospitality reaches the height of its tra-

factory. We hope the last cherry has not dried in the glass, for Savannah Beach was arrayed with some of the finest bars thirsty lips could find.

TO'd and TE'd and immune to everything but a hangover, we bid farewell to Fort Screven and wound our way to the West Coast by a circuitous route designed by some man long afflicted with St. Vitus' Dance. It is amazing that when the train finally halted, we were in the right place, Camp Stoneman, California. This was one of those dry places in which it is a pleasure just to breathe. And the Stoneman chow—a gourmet's Shangri-la! (Even more delightful in retrospect when sitting over a carefully camouflaged portion of Spam.)

Again the train whistles blew, and we tingled with the excitement of unknown adventure. We walked up on to a pier and saw, for the first time, the ship which was to take us into the night. Someone called a last name, someone answered with his first, and we boarded.

The sun began to go down, and the gangplank went up. Two stevedores lifted their weary hands, whether to their noses or their foreheads, we shall never know. We passed Alcatraz and the Golden Gate.

How casually we said Goodbye! We were not then at the stage of looking back. We were *Superman*, or *Terry and the Pirates*. We were the men at Bunker Hill or the Alamo, San Juan Hill or Chateau Thierry. We were heroes, or maybe martyrs, and we were also a bunch of naive men who had been taught many names, dates and places which were no more than a means of passing a Regent's Exam.

The ship was a homey little vessel, and we had an opportunity to become acquainted with the men with whom we were going to live for an indefinite length of time. Passing over the equator, we were appropriately initiated. Our C.O., then Major John J. Holst, was very amusing behind a pair of binoculars made of Coca-Cola bottles. The officers made expert police details, and we all were much improved by the reckless abandon of a mangy looking haircut and of a fish in the face. We were all together and full of pep.

The entrance, for the first time, into the harbor of a tropical island is an experience to be long remembered. For us, that first vision was of Suva, Fiji, one of the most colorful spots in the South Pacific. We docked that night but did not get off of the ship. Rain did not keep us from donning raincoats and lining the rails to see our new home. Tall, well-formed natives with tremendous bushy hair-dos threw all types of tropical fruits up to us, and we reciprocated with cigarettes.

In place of a jungle, there was a city. In place of the enemy, we found friends.

This all sounds like a Cook's Tour, doesn't it? Well, it was—up until then.

We relieved New Zealand troops of their Seacoast Mission and soon found there was work enough for a regiment. We were spread out all over the coastline of the island. There were many guns, but fire control equipment boiled down to a few Field Artillery scopes and a couple of CRFs. We were ill-equipped and understrength, and Hojo had announced he would have his Christmas dinner in Fiji.

To strengthen our forces, native troops of the Fiji Defense Force were combined with American soldiers for the first time. These Fijians are damned fine soldiers, and their training is second to none. It was interesting to work with them. We learned a lot from them and taught them a few things. We often think back and wish we could follow the old Fijian philosophy: "It's such a beautiful day, why spend it working?"

One night the siren sounded. Everyone scurried from his bed, and raced to his battle station. We were informed that a Jap task force was headed for Fiji. The B.C. station was still except for the constant drone of mosquitoes. Fijians at the guns began a continuous chant of one of their native songs. Men at our outposts froze at their positions—*anxious, alert*. There was nothing to say. You didn't need to feel your cartridge belt to know it was almost empty. No one had to hear an ammo report, for everyone knew there was not enough for a half hour. No one asked why one battery pointed its guns toward the airport. Everyone knew why we had plans for an organized retreat into the hills.

Everyone was quiet for there was nothing to be said.

Suddenly history came out of the books and lived. We knew how those men felt at the Alamo. We could feel like those soldiers who had stood with Custer and died with Custer. They were men like us. They were men like us; and the same emotions they felt, we felt. They were not heroes—just a group of men faced with a fight against terrific odds. They too, were silent, and afraid.

As tension reached a peak, Father Heindl, whose name has been loudly sung throughout the Pacific War, came in and passed out cigarettes. He gave out something else too, something called "courage."

Brilliant strategy on the part of our Navy spared us the need of that ammunition.

The alert over, we began to fortify Fiji. Time was everything. It was then we learned that overseas you have no one special job. You are not just an artilleryman.

Two six-inch naval guns had to be emplaced, and we did the job. We mixed concrete until it seemed we had enough to pave a dual traffic highway to the States. We dug an ammo pit over fifty feet straight down into the side of a mountain, then put back the mountain. Under a blistering sun, we constructed the metal housing. Who said afternoon in the tropics is for siesta? The hell it is. You shovel, you pick, you mix your concrete and pray it sets before the rains come. You stagger back to your bunk and find you can't relax.

There was one telephone line, a trunk line for the entire island. It was used for anything from a target assignment to an order for Morris Hedstrom Ltd. New, main trunks had to be put into places twenty-five miles apart. Telegraph poles were hauled seventy miles. We know—we did it.

There was no Fire Control equipment, so we made it. The guns needed range drums, so we made them.

As we worked on, the tactical situation was changing. Fiji was becoming more and more secure. Life was beginning to get humdrum. We were beginning to feel unnecessary.

By this time, our entire outfit was on one side of the island. As things quieted down, it became necessary to



155 on Rendova.

Signal Corps Photo

find an outlet. Three-day passes were arranged to Suva. Though the road was comparable to the Burma Road, the all-day trip was worthwhile. In Suva, you could get a good meal, buy a few drinks, and go out with a half-caste girl, if you liked.

On our deserted side of the island, we turned to swimming as a chief source of recreation. It also relaxed us after a long day. Many of us had horses, and there was a corral built on the post. About twice a week we could see a movie. Someone once said, "Morale is a lot of little things." That is true. It was these momentary freedoms, this little release from the daily grind that kept our spirits high that first six months.

Toward the end of that first year we became restless, ready to move—anywhere. We had overstayed our time.

Then we had our first real morale problem. Replacements came in, and were they in grade? Our slim TO had already denied many deserving men of well-earned ratings. Now we were flooded with stripes, and there was no chance at all.

The situation reaching a peak, we were alerted. These problems became lost in the shuffle. There were hikes, inspections, issues, secret orders, last minute repairs to our T/O and T/E, and we were off to the front.

The ship left Lautoka Harbor. Someone else was tracking in the Command Post. Someone else was guarding the passage through which we were passing.

One year and one hour ago, we had arrived. Now, we were leaving, a little wiser in many ways.

SECOND YEAR

One afternoon we noticed some little specks on the horizon. As they came into focus, we had our first vision of the Lower Solomons. The land and sea seemed in complete unity here. The dense foliage of jungle seemed unafraid of the sea and roamed recklessly near to the ocean. The ocean, unoffended, lapped gently at the shore. All was one here—sky, sea, and jungle. These were the Lower Solomons—from a distance.

Loaded on our barges, we anxiously anticipated the island which was to be ours. It was a small island—Bungana. We landed on a white beach. Immediately pup tents were pitched, and our personal gear was covered. Evening found us unloading our equipment.

Night fell. It fell heavily. This friendly island became a field sable—strange, foreboding, crawling. The whole island crawled: lizards, centipedes, scorpions, snakes, ants, mosquitoes. Plants were growing. You could hear them in the night.

It sounds very peaceful, doesn't it? It was. Then sirens began to blow. Barges quickened their pace. Weary feet took wings. Barges hit the beach and we hit the barges. Exploding bombs were heard on all sides. The ships were the targets. Speed was essential. A still ship is a dead duck. Fatigue was forgotten.

Then, as is customary in these islands, the rains came. Torrents of water teemed down upon us drenching our bodies. We worked almost completely blinded by the rain. Trucks found their way along slimy roads.

Deep into the night the last barge touched the beach, vomited its cargo and vanished into the black sea. Our tents finally located, we collapsed on a mattress of deep mud.

Somebody must have turned up the thermostat, for at dawn the sun was hot enough to bake biscuits. A look around told the story of the night before. The whole island looked like the wake of a terrific Bowery brawl. We repaired.

Orders arrived. Men and equipment were barged hither and yon. One detachment was sent to the metropolis of Tulagi which seemed to be the best spot in the group. Others were less fortunate. Some stayed on the small island on which we had landed. A group went to Olevuga which was large by comparison but very rural even for the Solomon Islands. Some of us went to Nugu. This island was the subject of a song entitled, *Nightmare in Nugu*. This is unusual and surprising, for whoever went to Nugu and why? Nugu was composed of Big Nugu (one mile in diameter) and Little Nugu. You could walk around Little

Nugu in ten minutes. For tactical reasons, it was necessary for us to live on the small island leaving administration, mess, supply and motor pool on Big Nugu.

We started to swing bolos and to chop coconut trees to build our camp. We saved the coconuts, for drinking water was not obtainable for the first few days.

The two islands were joined by a narrow coral strip. At low tide it was all one island. We kept mental tide tables. If you missed the tide, you had to swim home from chow.

Being completely cut off from everything, it was necessary to find some diversion. A large combination mess hall and recreation room was built. There was a radio. The Mess Sergeant, the finest in this area, prepared coffee for the evening gathering. Supplies were scarce. Sometimes the coffee was mostly chicory, and we were denied the camouflage of milk and sugar. Yet, this little barn served us well. You may say "How does your coffee klatch concern me?"

This is a long tedious war, fought under conditions which are tough. It is necessary to keep soldiers in lousy, pest-ridden holes for too long a period. Something must be done to keep these men alert. A coffee klatch in a crude shack is as necessary to the execution of this war as a gun. There is dubbin for shoes, oil for rifles and saddle soap for slings, but I've never seen anything called Mental Ointment M1. This is our problem—collectively and individually.

With the exception of Nugu, a picture of our life in the Solomons would be incomplete without a description of a Solomon Glamour Girl—and life was not any more complete with them. By our standards the average lady with or without grass skirt would suffer by comparison with anything we had ever seen in human form. A girl of twelve may have sculptured breasts, solid and beautifully formed. By the time she is twenty they look like punctured footballs. Tiny in feature and usually thin, their bloated bellies and worn breasts are grotesquely disproportionate. Maybe the Fijian women would have been far more attractive than they had appeared when we were stationed in Fiji.

Our major weapons were divided between 155 GPF and fixed six-inch naval guns.

From time to time we were transplanted from one island to another. This gave us the necessary change of scenery since a small island all too quickly becomes a prison. We added a few names to our list of islands. There was Savo and Cape Esperance. Fiji had accustomed us to having too many guns to man. It's surprising how few men you can use and still have the situation under control. Again for awhile, it was emergency methods. The fire control was varied, and it was interesting to improvise instruments commensurate with our needs.

Months later, when the situation was well in hand and our guns were still as cold as the sun would allow, we were organized into complete 155 batteries with all of the trimmings. The instruments were strange after the many crude improvisations. We took to them as to new toys. New toys grow old, and life became a dismal series of "ready-read's" and target practice analyses.

As had been usual with us, relief came just at the breaking point. Key men were sent to Guadalcanal to attend Field Artillery School. We took to the direct modern methods of F.A. like ducks to water. The Marines gave us

well-organized training under the supervision of competent alert instructors.

Immediately all of our camps were alive. We were going into F.A. Returning to camp pepped up and alive, our battery was given its first beachhead assignment. We invaded Savo—almost two years too late.

The feeling of being unnecessary is one of the most disastrous defeats an outfit can suffer. In wars long past, men went about their tasks blindly, knowing they could not understand the situation as a whole. Now, that is not the case. A private in today's army should know why he is doing his job. Our army excels in the ability of the soldier to assume a great amount of individual responsibility. This advantage brings problems. A man has to feel necessary. He has to feel he is an integral part of a position of positive action.

Tell your men, not only what they are doing, but why. True, this is impossible under many conditions; however, if this practice is followed and concrete reasoning is established, your men will learn to respect your orders, not because they come from a higher authority but because they have confidence that the order is right.

Some release was found in converting our grass shacks into places with many makeshift conveniences. Our Fire Control well in hand, we lost, for a time, all thought of war. We thought of ourselves and having as comfortable a life as was possible under the circumstances. We were bitter, cynical and disgusted.

Then, the entire battalion was educated in F.A. methods at Guadalcanal. A well revised mobile T/O and T/E together with the implications derived therefrom, gave us new vigor. Our training complete, we hiked and drilled and went through the routine inspections preliminary to our leaving the Lower Solomons.

The ship arrived and again an old home blended with the wake of our transport. Was this finally our opportunity to do or die? We had been overseas two years now. This seemed our last opportunity. We won't stay over much longer now. They're probably going to let us get into the fight, and then we'll go home. Wonder where it will be?

It shouldn't be seen by a dog. Having heard many Australians and New Zealanders say the same thing, we can take the liberty of running New Guinea into the mud. It poured enough of it in our faces.

Coming into the harbor of a tropical island was no longer a novelty. Our only interest was to get the hell off that cattle car as soon as possible.

We promptly moved into an area already built up. There were pyramidal tents with wooden forms and floors. There was a huge theater and well equipped PX. There was a beautiful chapel—the first we had seen at such close range. Had our luck changed? We were a suspicious lot by now, and our nature was justified.

Immediately we started working on the docks as dock wallopers. Although this was a terrific comedown from being an artilleryman, we knew it wouldn't last, and it was a novelty for awhile.

Our men had become too introverted. Here there were many people—people with whom to talk—men from ships from foreign ports, ports in the U. S.

Then something happened which was a bit confusing.

We learned to do stevedoring work, operate winches, signal, and stow cargo. We became familiar with terms such as "taking it up on the inshore" and "slacking off on the offshore" and "up on the boom, down on the purchase." We learned to handle cables, snatchblocks, chimes, hooks and all of the rigging.

Dark days came. Our outfit was sick. It was down. The pep was gone. We became moody and fickle. Nothing and nobody pleased us. We were at the most critical stage in the history of our outfit. The only pride we had up to this point was in that we could have done the job if we had received an active tactical assignment. Now, we were being put out to pasture. We were offended, yet we were in such a rut we were in no condition to do much but just take it.

We threw boxes. We threw them fast. We were irritated and bitter. We loaded ships in record time. We turned in tonnage reports which were a credit to anyone. Renewed vigor? A positive spurt of life? Out of the rut? No, it wasn't that, and higher headquarters knew it. It was an outlet for pent-up emotions. It was a pathetic shell to shelter crushed pride. Nervous energy raced our human motors, and we were racing at a terrific pitch. If we could not be there to get off the ship, we would see that the ships

were prepared for those who would make that beachhead.

Our job complete, we were moved to a Coast Artillery Training Center where we got back to our guns. Morale didn't pick up immediately. We were sulky at first. Then, gradually, we found our place. Every able man was essential to the firing. A gun went off, and you had some part in it. So they wanted to put us in pasture, did they? Well, we'd show them who has washed up. It was a peculiar attitude for men whose only thought now was to get home—see civilization again, lights, music, a bar rail, and a girl.

After such a long time of being away from our guns, we did a good job. Many of our key men had disappeared during the black days. We fired C.A. with Horizontal Base at 20,000 yards. We fired Gun Commander's Action and the New Graphical Range Computer. We went into F.A., firing Axial, small and large T, as well as Forward Observation methods. We received many compliments on a fine job.

Toward the end of this training, we went out on a small-arms range. As the rapid fire targets were raised, somewhere a wheel was turning, a typewriter was clicking, memos were jotted, plans were made, salutes were exchanged, orders were given. The targets went down, and we kept our eyes on the butts.

Training Chinese Troops

By Captain D. L. Ducey, Coast Artillery Corps

(EDITOR'S NOTE: Capt. Ducey was the first AA officer to train Chinese AA Troops at the Chinese-American Training Center in India. Upon completion of training in the initial battalion, he was their liaison officer in the field. He returned to the USA early in 1945.)

I arrived in India in July, 1942, as a second lieutenant in an Airborne AA MG Battery. After training for a short period in the rear areas, we were sent up to the combat zone to protect an airfield.

We had been in that area about three months when a notification came through from the AA officer in the 10th AF staff that one officer from the AA units in the area was needed to train Chinese AA troops. I asked for the assignment and shortly afterwards the order came through transferring me to the Chinese-American Training Center in India.

At the Training Center I reported to Brigadier General McCabe, who gave me my instructions, and suggested that the training be instituted immediately.

General McCabe's instructions were first to draw up a T.O. and T.B.A. based on the 51 officers and the 475 men who were available. In drawing up the T.B.A. I was to work with the G-4 of the Headquarters, Chinese Army in India, which was a separate Headquarters commanded by Brigadier General Boatner. Further, I was informed that for armament of this AA battalion there were forty-eight caliber .50 water cooled MGs on M2A1 mounts available, but

that these machine guns were not available for training. We were to pick them up on our way to the combat zone.

However, the Infantry Section of the Training Center had some caliber .30 MGs that we could use. They did not have any AA mounts for the guns, but with the use of an adapter we could successfully employ the British Bren gun AA mounts with our own machine guns.

Another situation which presented a difficulty was the fact that our AA battalion was to be a "horse-drawn" unit. We were to have 100 horses and 45 British AT carts for our use in the jungles of North Burma during the coming campaign.

This horse-drawn situation brought new headaches to the training program, for there was no one in the battalion who had ever worked with horses to any great extent. Hence, horse-shoers, pack-masters and horse-handlers had to be instructed along with the regular training program.

As I had no one to assist me in the instruction, I decided that the best and only way to train the battalion was to run a training course for the Chinese officers, while they in turn, were to pass the instruction on to their men. A schedule was arranged, and three-week training programs instituted. The course covered matériel, gunnery, communications, identification of aircraft, emplacement of AA weapons, camouflage and tactics. They were apt students; and at the end of the course, in my opinion, fairly well qualified to assume their duties.

Since I was not able to speak Chinese at that time, the in-

struction was carried on through an interpreter. This translation created yet another training problem, inasmuch as the interpreter was a Chinese civilian and had no knowledge of military terms and the nomenclature of equipment. I could tell him the name of a part or express an idea in English, but he would naturally not know the Chinese name for it. As a result our instruction was slow and difficult until our interpreter learned the terms.

The officers proceeded with the training of their men; and after a month of hard work they were ready to go on the range. This presented another problem, however, as there were no planes available to tow a target for us. If we wished to practice antiaircraft firing, which was a prime necessity, we would have to provide our own methods.

To simulate this firing we used a sled target towed by a scout car. The guns were placed in a valley, and we built a road on top of a ridge about 400 yards slant range from the guns, for the target run.

The road was about two and one-half miles long and we could get our target speed up to sixty miles an hour. Of course, this make-shift target was very unsatisfactory, but it was the best we had available and the gun crews did derive some benefit from it.

After two months of training, we received orders to proceed to Ledo with the mission of providing AA protection for this area. I was then assigned to the battalion, to go with them as liaison officer in an advisory capacity.

Before we left the Training Center, we managed to get the T.B.A. changed to authorize us twelve $\frac{3}{4}$ -ton British trucks, in addition to our horses and carts. These trucks were later replaced with twelve U. S. $\frac{3}{4}$ -ton weapons-carriers.

As we were the first AA troops to arrive in Ledo, we proceeded to set up our own defense as quickly as possible, anticipating immediate action. Guns were not available when we arrived, so we had to beg, borrow and steal enough .50 caliber and .30 caliber machine guns to set up a defense. We borrowed some from the Engineers, some from the Ordnance, some from the Air Corps, and from any source available. (Our own guns arrived several months later. In those days transportation of matériel was an uncertain adventure.)

We were in Ledo about a year before we started down through North Burma. The supply bases, normally the objectives that we defended, required but one battery for defense. As a result, the battalion would sometimes be spread over a distance of a hundred miles or more; in such a situation, it was very difficult for the battalion commander to exercise proper control over his battalion.

At one time a battery of this AA battalion was called upon to set up a ground defense for a forward Headquarters. Here the enemy was at one point only 2,000 yards away, and we were subjected to intense artillery fire. With this exception, we made no contact with enemy on this mission.

This particular Chinese unit did not get much chance to show what they could do, for only twice were they able to fire on enemy aircraft. On one occasion they fired on a single plane, which they shot down; and the next time the enemy planes strafed at 1,000 yards altitude, which of course was too high for .50 caliber machine guns to reach effectively. They fired anyhow and did do some damage to

the enemy planes although none were seen to fall in our vicinity. Smoke and some falling debris indicated our hits.

In the first part of the article I have tried to give an outline of how we trained and worked with the Chinese troops. I do not claim to be an authority on the Chinese; but after living and working with them for two years, a person is bound to learn something of the character and the ways of the Chinese.

Obviously, anyone who has not associated with the Chinese will find them a different people from any he has known before. These differences lie not only in their language, customs and food, but in their entire philosophy and way of thinking. Anyone who realizes this, and tries to appreciate and understand them, will find the Chinese are a thoughtful and dignified people, modest and self-effacing, quick to make friends, and unquestioned in their loyalty.

The Chinese is an efficient fighter and a good soldier when properly trained and equipped. This was proved in the North Burma campaign.

They are not fanatics, but the Chinese Army will risk a greater number of casualties to accomplish their mission than the U. S. Army would usually care to risk. They do not seem to have a high regard for life, for when they are ordered to take an objective or hold a defensive position, they will do the job regardless of their toll of casualties.

The reason for this lies in the fact that during the past seven years of fighting against Japan, the only thing that the Chinese had to fight with in sufficient quantities was manpower. They had inadequate equipment and for the most part equipment of inferior quality. What they lacked in effective equipment, however, they made up in the viciousness of their attack; and human life was held cheap, as long as there were Japanese to knife, bayonet and ambush.

The discipline in the Chinese Army is very severe according to our standards. However, what might be a serious offense in the U. S. Army may be considered a minor infraction to the Chinese. An example of this is that desertion is sometimes not considered to be a serious offense if the soldier has a good reason for his actions, and does not take any equipment with him.

The pay scale of the Chinese Army in India is extremely low. A private receives five and one-half Rupees per month, less than two dollars, and a lieutenant colonel receives 165 Rupees, about fifty dollars, per month. The highest paid personnel were the technicians, who received 20 Rupees (less than seven dollars) per month. Anyone who has anything to do with anything mechanical in the Chinese Army is a "Technician." The scarcity of this type of trained personnel in the Chinese Army accounts for the higher pay.

When first we started training and equipping the Chinese, they were given more vehicles than the Chinese Army had ever had, and they did not have enough qualified drivers. Truck drivers had to be trained from men, who in some cases, had never driven a vehicle of any kind before. As might be expected, there was considerable difficulty on the roads for awhile! The main difficulty we found was trying to teach them to drive at moderate speeds. After they had been driving for a few months, however, they turned out to be good drivers.

Everyone has heard at some time that a Chinese can live on rice and tea and still maintain his health and efficiency.

This is, of course, untrue. A Chinese soldier must have meat and vegetables along with his rice, the same as any other soldier. In North China the main foods are derived from wheat products.

Normally, anyone confronted with learning the Chinese language usually throws up his hands in despair until he actually gets down to learning it, and then he finds out that it is not so difficult as he had imagined. I refer to speaking and understanding Chinese, and not reading and writing. It is a difficult task to learn to read and write Chinese, but if a person lives near the Chinese, he can soon learn to speak the language well enough to be understood. It took me about a year before I could conduct my business properly with them without an interpreter and know that I would not be misunderstood.

The Americans and the Chinese for the most part get along very well. In general, I believe that the Americans who did not approve of them were those who made no attempt to understand them. It is true that at times they will do things of which we do not approve and they will have the Americans throwing up their hands in disgust at some of their methods; but if we consider that they have been using these methods for several thousand years and have been getting along very well with them, it can be understood why we cannot get them to adopt *our* methods in a few weeks.

All in all, I think that the Chinese are a fine people, and that the more associations we have with them, the better we will be able to understand their problems, and realize that the Chinese soldier is doing a good job.

Service With Colored AAA Troops in New Guinea

By Lieutenants John H. Jemison, and James A. Taylor, Jr.
Coast Artillery Corps

(EDITOR'S NOTE: Both these colored officers served in New Guinea with different units. However, they collaborated in writing as if both were present at all places at the same time. Lieutenant Taylor has done quite a bit of traveling before the war, and took part in the Amelia Earhart search. They returned from overseas late in the fall of 1944.)

The twenty-six day trip to Australia on an old converted Danish freighter was a lonesome one. It was a slow journey on what seemed to us to be a deserted ocean, for we made the voyage without convoy and saw few ships.

We were a well-knit unit when we boarded ship. We found that our troops were from all parts of the country, and we wondered how they would get along together. It was quite amusing to hear a farmer from the South become annoyed with a mechanic from the North who had acted a trifle superior; and then to see both of them irritated because they did not understand someone from the West or from the East. The sectional feeling lasted but a short time for the men soon got to know each other well. We were a happy, well-knit official family long before we boarded ship.

In peacetime, following regular ocean lanes, we would have passed other ships, or have been overtaken by fast mail and passenger liners. But now, under war conditions, the huge and lonely expanse of the ocean in all its vastness brought about a constant sense of wonderment to our troops, particularly since some of them had never seen the ocean before.

Our voyage was more or less uneventful, although we

did have a wartime thrill. Toward the comfortable sleeping hour of 0130, the ship's alarm started jolting us from our slumbers. No sooner had we hit the deck with our life preservers on than the word was passed around to the officers to keep the men calm and ready to abandon ship, if necessary. Even if we had not been told, we would have guessed that there was a Japanese submarine in the vicinity, for I knew that the lookouts had been doubled and we could see, or rather sense in the dark, the alertness of the gun crews.

We were all proud of our men on this packed ship. There was no difficulty at all, and discipline was excellent. True, we might hear some sergeant say, "Man alive, don't you know enough to tie all those straps on that life preserver? You might need it!" Even though there was no order against normal talking, we felt the desire to talk in whispers.

Although the night was dark, we could tell from the way the ship now rolled, then changed its lurching about and did more pitching, that we were taking evasive action by constantly changing course. Eventually the "alert" condition was relaxed, and we turned again to our bunks, wondering if there would be another alert before morning. We were not awakened again, though we all slept lightly indeed!

By morning mess, the scare was past history. It gave the troops something to talk and think about, however, and greatly helped to pass the time of the journey.

As former full-fledged members of King Neptune's court, it was now our privilege to assist the crew and other initiates in the time honored ritual of introducing our "Polliwogs" to him as they crossed the Equator for the first time. There might be a war going on, but that was just a brief moment

Neptune's ageless rule. He always insists that proper honors be shown him.

When we learned we were going to Australia for a brief period of training before being assigned a mission our enthusiasm heightened. Like any soldiers, the more we moved around the more interested we became.

We landed in a little seaport town in North-East Australia where we were to undergo our training and practice firing, which was quite similar to that which we underwent in the States.

One of the most interesting sports in this area was kangaroo hunting. Where we got the dogs to help us hunt is one of those questions about which all soldiers became a trifle vague. The dogs "just happened to be there." This was a good sport, and it afforded plenty of exercise for it was conducted on foot. The dogs would flush the kangaroos in the brush, start the chase, and then bring them to bay and attempt to throw them. In the meantime, the hunters would be following along to catch up, and to be in on the capture.

After a short time, we were sent to New Guinea to protect an airport, a large Supply Base, and its Headquarters. As long as the Japs sent over photographic "Joos," it was easy to keep the troops on their toes. Even when they were out of range and we were not able to do any firing, their periodic visits kept us reminded that an enemy was around. Our spirits soared still further when some of our fighters brought down an occasional plane.

When the Marines landed on New Britain, however, these enemy reconnaissance flights ceased.

Someone asked us if there were a couple of seasons in New Guinea. That made us chuckle! There might have been a wet and a dry season—but the "dry" season had plenty of rain!

It was difficult to keep our clothes from molding. Our quarters were pyramidal tents with wooden floors, and there was insufficient shelter to make "dry rooms." One item of clothing which we all liked, and which, for some unknown reason was not bothered by the mold, was our herringbone drill fatigue suit. This mold wasn't too much of an annoyance, though it was almost impossible to keep one suit of khakis free of it, for dress.

We hunted and fished quite a bit at first, but cautioned the men not to eat any of their catches as some of the fish and animals were dangerous to eat. This was corrected later by courses given by especially trained officers. We had an opportunity to put this training into practice when our fresh items of rations became scanty. This scarcity was quite understandable to us at the time, for a big push was underway, and we realized that all available shipping was being used for the attack.

We did a lot of hunting for the wild boar which made an excellent barbecue. There is one thing about wild pig killed for food in any place in the world—it is best to cook it long and thoroughly!

The fish were beautiful, and we caught all varieties. However, most of them were inedible. The best ones were the fresh water mountain trout; and fishing for them was a most exciting sport, for the streams rushed through rugged mountain country, and the trout seemed to gather in the deep pools under numberless waterfalls.

A few of the natives taught us to spear them with the pronged spears which they helped us make, but this took lots

of practice. Many were the times we watched a native shaking his head at our poor technique—even before we had finished jabbing into the water and missing the fish!

Someone had the excellent idea before we left the states of bringing a lot of vegetable seeds with us. This foresighted person contended that seeds of vines and vegetables would help us in camouflaging our positions. We did not feel it necessary, however, to experiment with this type of camouflage because the seeds were invaluable in starting our "victory gardens."

Tomatoes and radishes were the favorites, probably because we had more success with them. Since our return to the States, we have read where other troops have started these gardens, some of them on a large scale.

We had a colored correspondent with us, Enoch P. Waters, from the *Chicago Defender*, and we were indebted to him for favors such as bringing extra vegetable seed, radios, and making small purchases for us in Australia, as he had to make occasional flying business trips there.

We met the American Missionary and his wife who were rescued from the Japanese after Hollandia was taken, and they told us of their numerous experiences, and how the Japs had treated them. These people had a very large and successful chicken farm, but when the Japs landed, they started to use the chickens for target practice and knife throwing. A short time later, however, we started tightening up that area. No more Jap convoys were able to get through our blockade, and the Jap forces in Hollandia began to feel the pinch of hunger. The chicken ranch was no more and it gave these missionaries quite a bit of amusement to see the Japs feeling "so sorry" because they had used the chickens for targets!

Manning guns in fixed locations for days on end when there are no enemy planes presented quite a morale problem; but the chaplain proved to be a good friend in this respect with his Sunday devotions; and our other services, with plenty of singing, helped keep down the number of cases of "jungle jitters."

The monotony was also relieved by target practices. It was not thought safe to move batteries inland to target ranges, so those ranges located near the seacoast were used for this work.

The more experienced soldiers we became, the more the troops started trying to make "jungle juice" in lieu of the absent beer. We have been asked for a recipe and all we can say is that the formula depends solely on the individual! No two formulae are alike.

One thing about our troops which impressed us and made us feel proud of them was their thriftiness. They sent allotments home, took out insurance, made bond purchases and used other means of saving. They felt that they should have some kind of a "stake" after the war is over when they could go home to civilian life. This feeling was accentuated by the strong desire to better themselves, realizing that they will need the money to build a home, further their education, buy farms, and do other things to which men and family heads must plan and look forward. They knew they wouldn't have an opportunity to do this if they returned flat broke. Working with these men was an experience we shall remember with pride. They were good and loyal soldiers, fully aware of their responsibilities, and determined to do their respective jobs with faithfulness and enthusiasm.

The Muzzle Brake

By Oscar Schwager*

INTRODUCTION

Each new propaganda publication of the fighting nations contains many descriptions of new weapons and of improvements to old ones. The particular merits of the muzzle brake are often emphasized and not without good reason for, like the invention of autofrettage and of recoil systems, muzzle brakes are a fundamental feature in basic gun design. It will be seen below that the muzzle brake is a method in the hand of a weapon engineer which enables him to build a gun with the following advantages:

- (i) High muzzle velocity.
- (ii) High rate of fire.
- (iii) Increased accuracy.
- (iv) Greater mobility.
- (v) Decreased dead weight.

HISTORICAL OUTLINE

The Frenchman Colonel Chevalier Treuille de Beaulieu is generally considered to be the inventor of the muzzle brake. In 1842 he invented the muzzle end of a rifle barrel perforated with holes having axes (in the surface of the barrel) inclined to the rear. Even now we can meet muzzle brakes having this same primitive principle of construction. (Fig. 2 shows the Italian 75mm tank gun with perforations at the muzzle having the appearance of a strainer.)

Twenty years later, in 1862, Beaulieu succeeded in persuading the military authorities of his country to undertake trials on a heavy 160mm naval gun which had, according to data published by the inventor, 36 holes each of diameter 60mm, inclined at an angle of 45° to the axis of the bore. This gun is today one of the showpieces in the Hôtel des Invalides in Paris to commemorate the discovery and its inventor.

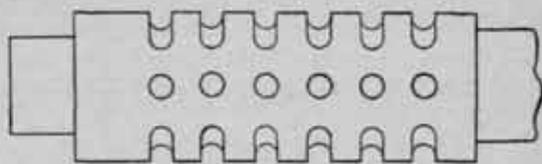
Trial shootings gave the following results:

- (i) Doubled accuracy of fire.
 - (ii) Reduction of recoil to 1/4 of its former value.
 - (iii) Reduction of muzzle velocity by only 1/16
- thus confirming the importance of the invention; nevertheless, no application of the muzzle brake has been made in France. De Beaulieu ironically wrote "I introduced an idea too new for a world unprepared to receive it."

In 1885 another Frenchman, Captain de Place, studied the muzzle brake on an 80mm gun calling it a "gas brake." A pamphlet published by him details his studies and remarks. He mentions also the experiments of M. Canet, manager of the Artillerie aux Forges et Chantier de la Méditerranée who experimented on muzzle brakes applied to a 155mm railway gun. Neither of them was more successful than Beaulieu. The reason for this indifference was that all attention of the artillery authorities in France had

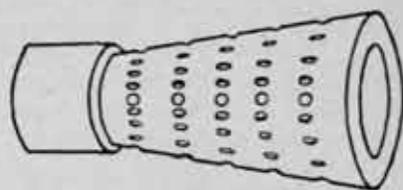
been concentrated on the practical realization of another most important invention in the field of gun construction—the recoil system, the invention of a German engineer—Hausner, dating from 1888.

FIG. 1.



M.B. OF RUSSIAN DEGTIAREW RIFLE. [PLAN]

FIG. 2.



M.B. OF ITALIAN 75-MM. TANK GUN.

THE RECOIL SYSTEM

A field gun of pre-1888 construction has the following features: the jacket of the gun and the trunnions are in one piece, the trunnion bearings lodged in the transom of the mounting. The piece, being loose in the jacket, an adjustable "cushion" reduces the play between barrel and jacket, rendering impossible any axial displacement of these relative to the mounting. The mounting itself takes all the resulting "kick" of recoil and the very high stresses involved lead to considerable difficulties. On firing, the gun and carriage jump like a spurred horse and travel a considerable distance to the rear. The gun has to be relaid after each round.

Hausner's invention overcame all these disadvantages and at the same time his arrangement was quite simple. He put the barrel in a cradle which allowed longitudinal movement of the piece, by interposing a brake and a spring between the piece and the cradle. The purpose of the brake or buffer is to transform the energy of recoil into heat and to dissipate it. The spring or recuperator is compressed during recoil, reasserting itself after firing (during which time the carriage remains stationary) to run out the piece into the firing position.

The forces of recoil, created by the combustion of the

*Translation of an article which appeared in the *Neue Zürcher Zeitung* of 29th September, 1943, made by Joseph Glikzman, Polish Army. Reprinted from *The Journal of the Royal Artillery*.

propellant charge, are considerable and act dynamically on the breech of the gun. With the recoil system arrangement the recoil forces act upon the piece alone; the mounting has to withstand only the forces of the buffer and recuperator. The latter, by convenient choice of the length of recoil, can be kept low enough to keep the carriage stationary on firing. The German armament manufacturer Krupp rejected the invention and Haussner sought better fortune in South America. His French patents lost their legality and became the property of the French State. On account of the high standard of scientific and technical education of the artillery officers, the French military authorities recognized at once the value of Haussner's invention. In 1894 the first 75mm field gun with the new arrangement was undergoing trials and proved capable of satisfying the most exacting artillery expert of the time. As early as 1897 the 75mm appeared in the service of the French Army, the first in the world to employ this invention, and from which its fame is sprung. Since the beginning of the Great War in 1914 all fighting armies have used guns with a similar recoil system.

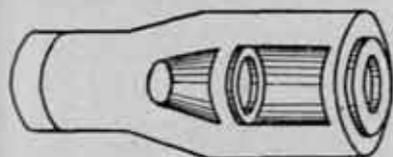
DEVELOPMENT OF THE MUZZLE BRAKE

After the widespread adoption of this recoil arrangement an interesting period of research began (especially intensive in France) to improve the efficiency of firing weapons. The buffer-recuperator system enables the recoil stresses to be kept within reasonable limits but it has to be paid for by a great length of recoil, which in turn presents some difficulties and inconvenience. The weapon engineers therefore returned to the idea of the muzzle brake to remedy the position.

The first steps were carried out during the Great War and in France the following brakes, to include only the most successful, were on trial: Galliot, Bory, Czarnecki, and Schneider. At this time also, Rateau, the famous French scientist, engineer, and turbine designer published his *Théorie des freins de Bouche*. Moreover, in other countries interest was shown in this subject. The Italian Ravelli undertook advanced experiments without publishing the results; his published contribution is a theoretical work *Studio per la teoria del freno di Bocca*. In the U. S. A., Cutts produced a very neat design of muzzle brake. (Fig. 10 shows the Cutts muzzle brake for the Thompson 12mm submachine gun.) The Russian design reminds one very much of this (Fig. 1 shows the muzzle brake of a Russian self-loader (Degtiarew) rifle seen from above).

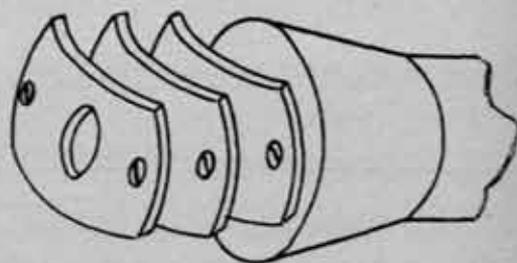
In Germany, the study and experiments were under-

FIG. 3



M.B. OF GERMAN 50-MM GUN

FIG. 4



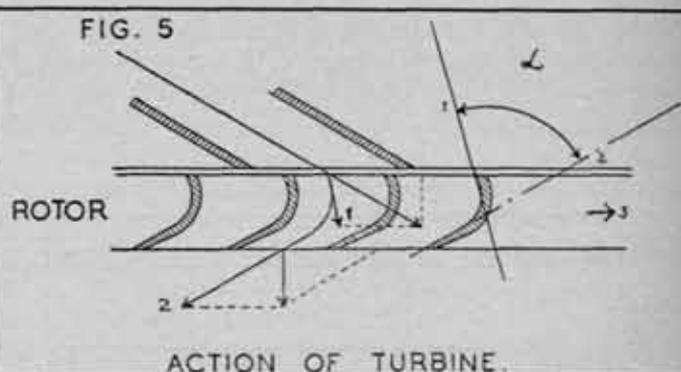
M.B. OF SWISS A.A. GUN.

taken by Ehrhardt, an armament manufacturer and associate of Haussner in the research on recoil systems, but the results were not very successful and muzzle brake design in Germany was left idle for a long time. From the publication of patents and advertising pamphlets it can be deduced that this country has made up for the lost time and that original designs have been developed. In the Swiss Army the idea has been thoroughly worked out and applied in the manufacture of all weapons.

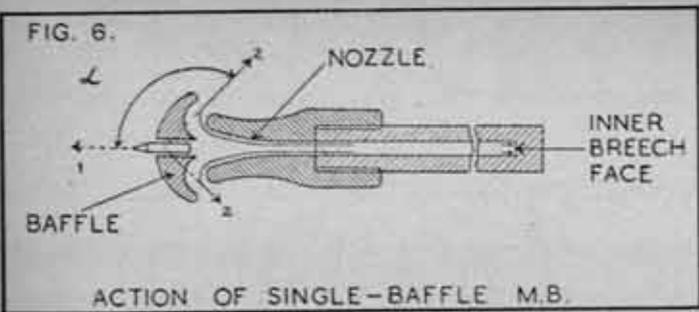
PRINCIPLE OF MUZZLE BRAKE ACTION

The muzzle brake functions on the same principle as the water, steam or gas turbine. Fig. 5 shows this action. The flow of the medium is deflected by the paddles of the rotor

FIG. 5



from direction 1 through an angle α to direction 2 and pressure is thereby exerted on the paddles which move in direction 3. Similarly (see Fig. 6) the charge gases immediately following the projectile along the bore are deflected by the baffle through the angle α . Since the gases are deflected toward the rear (breech) the forces exerted upon the baffle act in a forward direction. The resultant force is a pull, longitudinal by virtue of symmetry, which has the effect of reducing the total dynamic force exerted on the breech face or the inner base of the cartridge case and which decreases the velocity of recoil at the moment when the projectile leaves the bore. Consequently the energy of recoil, i.e., energy to be dissipated by the buffer is reduced, which results in a lower buffer pressure and smaller length of recoil. As stated above, the forward pull originates in the muzzle brake and is applied to the piece.



PULL AS A FUNCTION OF TIME

Rateau considered the relation between the amount of pull and time for the 75mm field gun and Fig. 7 shows the relationship in the form of a graph. The pull rises violently at first; in 0.18 milliseconds it reaches the value of 66 tons at the moment the projectile leaves the bore and then falls abruptly to 40 tons after 0.46 milliseconds. Subsequently it decreases slowly but at a constant rate, falling to zero after 51 milliseconds.

The area under this curve measures the product of force and time, *i.e.*, the impulse or the change of momentum.

The shaded area represents only 3% of the whole area and implies that the maximum pull, by reason of its short duration, has only a slight moderating influence upon the velocity of recoil, whilst having the disadvantage of increasing the tractional stresses in muzzle brake and gun by 50%. Equally worthy of attention is the fact that the 60% reduction effected in velocity of recoil corresponds to a time of 5 milliseconds, the total time for which the muzzle brake pull acts being 51 milliseconds.

EFFICIENCY OF A MUZZLE BRAKE

The measure of efficiency of a muzzle brake is clearly shown by comparing the reduction in energy of free recoil on fitting a brake to a gun without a recoil system to the energy of free recoil of the same gun without the muzzle brake.

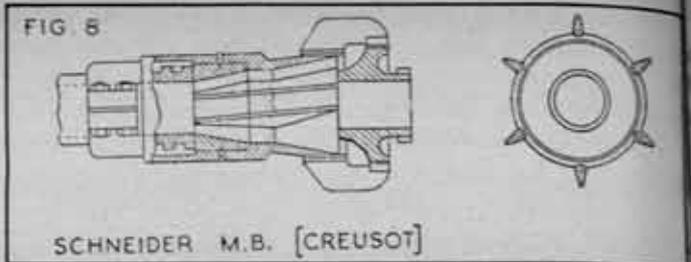
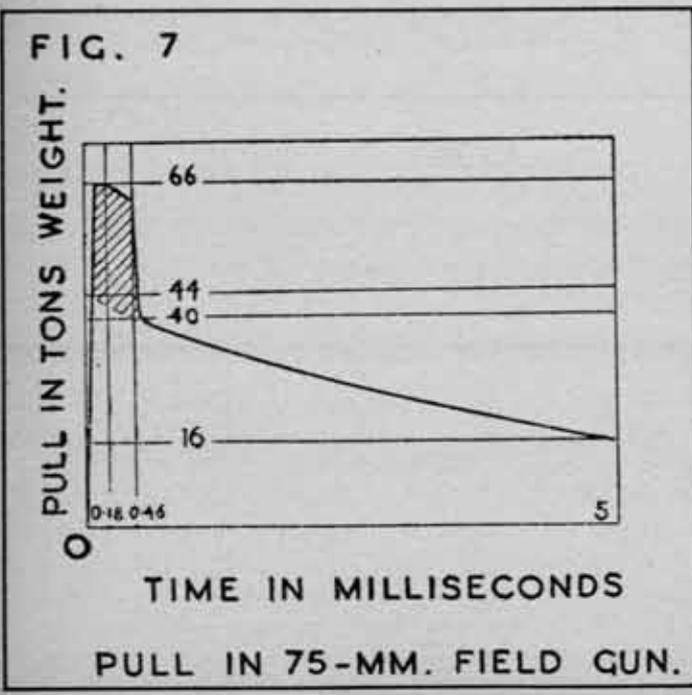


FIG. 8

SCHNEIDER M.B. [CREUSOT]

Thus

$$\eta = \frac{E_0 - E}{E_0}$$

where η = efficiency of the muzzle brake.
 E_0 = energy of free recoil without muzzle brake.
 E = energy of free recoil with muzzle brake.

For a given propellant charge, η varies with

1. angle of deflection α
2. mass of deflected gases
3. velocity of emergent gases.

1. α has by far the greatest influence on η . Theoretically, η should be a maximum for $\alpha = 180^\circ$, but in practice this occurs for α about 135° as a result of a high loss of efficiency with greater values of α . This loss is due to vortices which

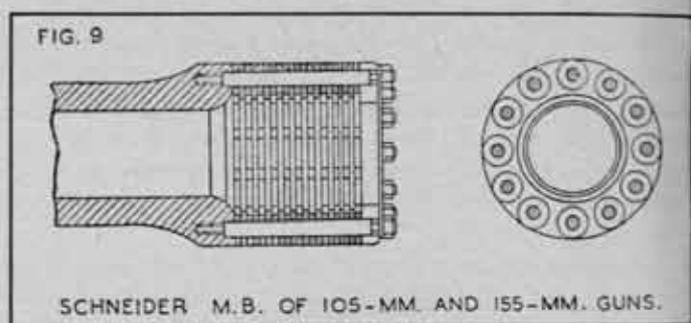


FIG. 9

SCHNEIDER M.B. OF 105-MM. AND 155-MM. GUNS.

with increasing α , outweigh the advantages of larger angles. Moreover, for $\alpha = 180^\circ$, the gases will clearly inconvenience the gunners and interfere with the sighting instruments.

This angle of deflection is often confined to 90° , for which value of α , η no longer depends upon the outlet velocity of the gases deflected to the rear. This has the advantage of allowing for the design of convenient sizes of apertures in the muzzle brake and the associated relatively compact construction.

Various examples of muzzle brake construction having $\alpha = 90^\circ$ are shown in Figs. 8, 9, 10 and 11.

The Italian tank gun shown in Fig. 2 can also be put in this category since the center lines of the holes are only slightly inclined to the axis of the bore.

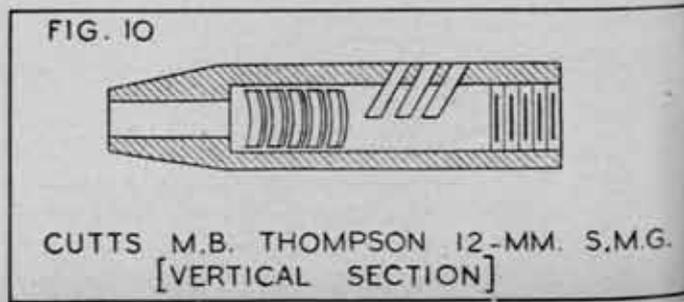


FIG. 10

CUTTS M.B. THOMPSON 12-MM. S.M.G. [VERTICAL SECTION]

The Cutts brake of Fig. 10 has another peculiarity: the upper row of apertures serves to counterbalance the jump. With the same object the apertures of the Russian muzzle brake (Fig. 1) are put slightly above the axis of the bore.

2. The mass of the deflected gases depends upon the ratio

$$\frac{\text{area of lateral apertures of muzzle brake.}}{\text{area of bore at the muzzle.}}$$

and increases with this ratio. A high value for this ratio can be attained in two different ways, firstly, by drilling many small holes very close to each other, so that they come into operation almost simultaneously (as in Figs. 1, 2, 9 and 10) or alternatively, by grouping the apertures in steps working consecutively. Muzzle brakes of the one-step type are simple and inexpensive to construct but those of the multistep type are the more efficient. Fig. 6 shows the principle of action of a one-step or single-baffle muzzle brake and Fig. 8 indicates the manner of its construction. The main features shown in Fig. 6 are the nozzle, which allows the gases to expand and to reach the required velocity of flow and the baffle which guides and deflects the gases sideways and to the rear. Fig. 3 shows the muzzle brake of the Germans 5.0cm gun which is similar to the one on the long 8.8cm gun. The multistep muzzle brake consists of a series of successive nozzles and baffles, Fig. 4 showing an example of the 3-baffle muzzle brake of a Swiss AA gun. The number of baffles is kept to two or three, for increasing the number of steps increases the weight which disadvantage outweighs the improved efficiency of additional steps.

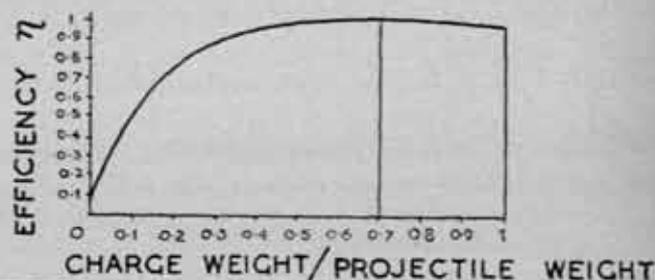
3. The velocity of the gases flowing through the apertures of the muzzle brake depends upon the degree of expansion reached in the nozzle before deflection by the baffle. Complete expansion down to atmospheric pressure would necessitate a very long nozzle of large end cross section which, in turn, would result in a considerable increase in weight of the muzzle brake: for this reason, the nozzle length is limited in practice, but the gases expand in lateral escape channels. This may be compared to the difference between action and reaction turbines.

The efficiency of a muzzle brake depends also upon the ratio

$$\frac{\text{propellant charge weight}}{\text{weight of projectile}}$$

Fig. 12 shows efficiency plotted as a function of this loading ratio. η increases rapidly at first, then more slowly attaining a maximum for a ratio of 0.7, thereafter slowly and slightly decreasing. It is notable that for values of the ratio between 0.4 and 1.0, η is almost constant, the greatest differences

FIG. 12



representing only a small percentage of its mean value.

Muzzle velocity also increases with this ratio of course, as the following figures for a 20mm MG show.

Ratio	0.1	0.4	1.0
M.V.	600	1,000	1,400 meters/sec.

It can be stated that the muzzle brake achieves its maximum efficiency with maximum muzzle velocity and fully accounts for the velocity of recoil of the piece. Incidentally, the recoil velocity at shot ejection is only a small percentage of its initial value. For muzzle velocity between 730 and 850 m/sec. (corresponding to the weight ratios 0.2 - 0.3), the muzzle brake accounts for 80 to 90% of the energy of recoil. Only for weapons of moderate muzzle velocity, e.g., gun-hows, firing high angle trajectories, does its efficiency fall as low as 30%.

ADVANTAGES OF THE MUZZLE BRAKE

1. The main advantage lies in the absorption of recoil energy, i.e., for a fixed length of recoil a reduction of buffer pressure or for a fixed buffer pressure a diminution of recoil length.

The weapon designer has therefore four choices at his disposal:

- (i) increased stability of gun with the same mounting,
- (ii) the same stability with a far lighter mounting,
- (iii) a more efficient gun on the same mounting, i.e., greater range for a smaller dead weight of gun,
- or (iv) increased rate of fire for a given buffer pressure and length of recoil.

2. In a gun without muzzle brake the outlet wave of gases flowing through the muzzle immediately behind the projectile, by reason of the lateral points of maximum and of zero pressure imparts an irregular kick to the projectile which has the following consequence:

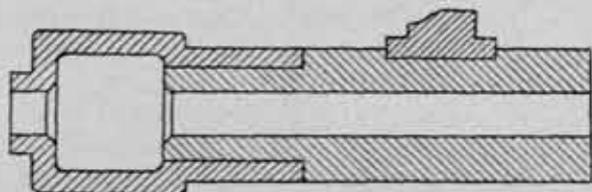
- (i) deviation from initial direction, i.e., initial yaw,
- (ii) increased air resistance throughout the trajectory, i.e., reduction in range and striking velocity.

The muzzle brake, by drawing a large part of the outlet gases immediately in front of the muzzle, efficiently reduces this cause of precession and improves the accuracy and range of fire.

3. By combining a muzzle brake with a flash and noise eliminator it is possible to render the weapon more immune to visual and acoustic detection so that its tactical value is increased.

4. The muzzle brake, by making partial use of the energy of the outlet gases which is normally dissipated and

FIG. 11



M.B. MADE BY BRUNN A.G.

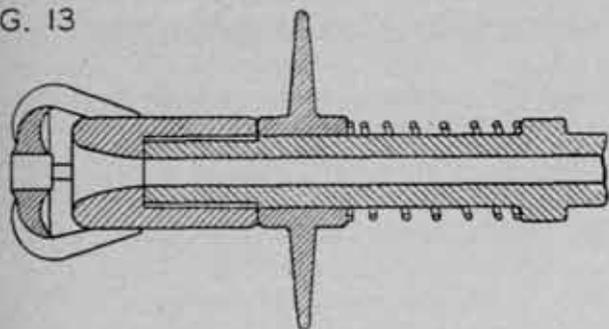
wasted, is a relatively simple and light means of increasing gun performance with a given propellant charge.

DISADVANTAGES OF THE MUZZLE BRAKE

1. The main disadvantage arises from the inconvenience suffered by the firer or gun crew when the charge gases are deflected backwards toward them, possibly sending up a cloud of dust. In armored vehicles, tanks, gunboats and guns provided with protection plates, this is not very important. In other cases the remedy is to limit α to 90° although the muzzle brake efficiency is thereby impaired.

The arrangement shown in Fig. 13, using a spring-loaded protection plate, serves the same purpose.

FIG. 13



MB. WITH BLAST PROTECTION PLATE.

This solution is also used in weapons made by Skoda, Pantoflicek and some U.S.A. manufacturers but it has the same detrimental effect on efficiency.

The solution used by some French designers, Galliot, Czarniecki and others is an important one. It consists of a tangential fan arrangement of apertures which result in a whirling movement of the outlet gases and their rapid dissipation into the air.

2. Dirt and dust from partially burned propellant grains are deposited on the sights. The remedy is as above.

3. The pull arising from the muzzle brake results in additional tractional stresses in the gun which have to be allowed for in design calculations.

4. As in a gas turbine, the metal of a muzzle brake is subjected to very exacting working conditions. Gases under high pressure and temperature, moving with high velocity and carrying abrasive and burning particles have a rapid corroding effect on muzzle brake walls. The high grade steels used in gun construction should also be used for muzzle brakes; as distinct from the turbine, a muzzle brake works for brief periods with long interruptions.

5. The additional propulsion which the projectile receives from the escaping gases outside a gun without muzzle brake vanishes when a muzzle brake is used, but this, small in itself, is largely compensated as mentioned above by the influence of the muzzle brake on precessional movement.

6. A muzzle brake with its extra weight and the pull it

exerts on the piece, changes the vibration conditions of the gun. It influences the transverse vibrations as well as the axial and torsional. This is particularly noticeable in the case of asymmetric and fan arrangements of outlet apertures. This can cause inaccuracy in shooting; to avoid this, the weight of the muzzle brake must be kept within low limits and the cantilever portion of the gun has to have increased rigidity and reduced length.

7. A fundamental disadvantage of the muzzle brake is that its action starts very late; i.e., when the projectile is about to leave the gun, and the piece has already attained its maximum velocity of recoil and recoiled a considerable amount.

This accounts for the lack of advantage of the muzzle brake as a means to reduce stresses in a pre-1888 gun (without recoil system) and also why the recoil system of a gun with muzzle brake has to be carefully adjusted. The forces of recoil are far more considerable during the travel of the projectile down the bore than in the last moments before shot ejection.

The reason for the failure of the muzzle brake and of its inventor before 1888 now appears clear, with the reasons for the development of muzzle brakes after the general introduction and thorough improvements of the buffer-recuperator systems.

This fundamental disadvantage of muzzle brakes can be overcome by capturing and deflecting the propellant gases not at the muzzle, but direct from the chamber in the very moment of their generation by ignition of the propellant grains *in statu nascendi*. This idea has been worked out by the famous French engineer Delamare-Maze, the inventor of the "turbine" or "recoilless" gun. The practical solution of the problem, as far as the author's knowledge goes, has not yet passed the experimental stages and many difficulties remain to be overcome.

CONCLUSION

Finally therefore, it can be said that muzzle brakes allow for the design and construction of weapons

- (i) of reduced dead weight,
- (ii) making better use of the resistive qualities of the metals used,
- (iii) of greater mobility,
- (iv) of greater efficiency,
- (v) of greater range,
- (vi) of greater stability,
- (vii) of improved accuracy,
- and (viii) with higher rate of fire.

Muzzle brakes will be best used in high velocity guns i.e., for muzzle velocities between 1,000–1,400 m/sec.

Applied to rifles, they give

- (i) improved accuracy,
 - (ii) reduced "kick,"
 - (iii) reduced weight,
- and greater efficiency.



got out of the jeeps and began to wonder if the clothes we had on were enough to keep us warm. It was overcast and cold and it had begun to rain. We were wet before we had really gotten started. A couple of hundred yards away we ran into the group who had the boats ready to take us across.

"We were awfully careful about reaching the dike because a lot depended on these first few minutes. We knew that a couple of other patrols had been knocked off before they had gotten to the water. Our main hope was that the Jerries weren't on the alert because we were going over a little earlier than the other patrols. We started to go down toward the bank when a whisper from Lieutenant Sims halted us in our tracks. He thought he had heard a sound from the other side. After a couple of minutes of shaky waiting we decided to take a chance. Edging down the bank, we came to the two rubber assault boats. Lieutenant Sims and two of the boys carefully slid into one and the rest of us crouched low at the bank and waited with our guns ready in case Jerry should open fire as they crossed. It seemed to take them hours to get across and we could hear every dip of their paddles in the water. We were certain they would be heard and the whole deal would be off, but they weren't. They made the opposite side and crouched low to wait for us.

"Finally we landed. Arrangements were made with the men with the boats so we could signal them by flashlight when we came back. They wondered if we had any idea when it would be and we told them that we hoped it wouldn't be until the next night. We hunched down and told the boatmen to be quiet going back. We could just barely see them as they hit the opposite shore."

Pfc. Robert O. Nicolai, a former member of the Merchant Marine who comes from Midlothian, Ill., now broke into the story. He was given the Bronze Star for his part in the Normandy campaign and is the cocky member of the group.

"All of us started up the bank to the top of the dike, Lieutenant Sims in the lead. Nothing ahead looked like a Kraut, but there was something that we hadn't expected. A little way ahead there was a big pond directly across the route we had planned to take. We decided that it would be better to go around and change our route a little.

"We skirted the edge of the water but found we still had to do some wading in the dark. By the time we passed the pond our feet were slogging wet. Lieutenant Sims seemed to have on a pair of boots about ten sizes too large and they squished with every step he took. Someone said, 'Dammit, pick up your feet.'

"Suddenly the first of our mortar flares lit up the sky and we were all flat on the ground. We cautiously looked around the countryside but there wasn't a Jerry in sight. It was now 8 p.m. and the flares were working just as we had planned. As soon as the flare died out we got up again. About 200 yards ahead we saw a light and a few shadows moving. We held a confab and decided that because we didn't want to take prisoners too early we would alter our course again. We by-passed the light and circled around to the right. Then we heard the unmistakable sound of Germans digging in for the night. It was the sound of folding shovels digging into the earth and

the clunking noise they made as they were tapped on the ground to loosen the mud. We now turned left again as we did someone stumbled into the brush in the darkness. Immediately we stood still as statues and waited. Then we heard the zip of a German flare going up. We hit the ground and froze as more of the flares lit up the countryside. To either side of us we could hear Germans moving around. Now and then one of them shouted to ask what the flares were for. They had heard something and had whole batches of flares ready to shoot off. Each time a flare burned out we crept forward between the two enemy groups. In a half hour, when our own flare next went up, we had covered less than 300 yards.

"Then we crossed a road and found ourselves within twenty yards of a lighted tent. I was all for going in and taking whoever was there a prisoner. I thought it might be a Jerry officer and a good bag but once again we decided that it was best to skirt the area. We went one way and then the other through the fields. Every time we heard a tivity we edged in the other direction."

Cpl. William R. Canfield of Selman, Okla., now interrupted the story. "I was a little to one side of the group and suddenly I heard someone blowing his nose. I moved over to the left and saw a group of Jerries stopped for a minute on the road. I asked Lieutenant Sims if I might capture them and take them along but he said no. I was sure feeling cocky.

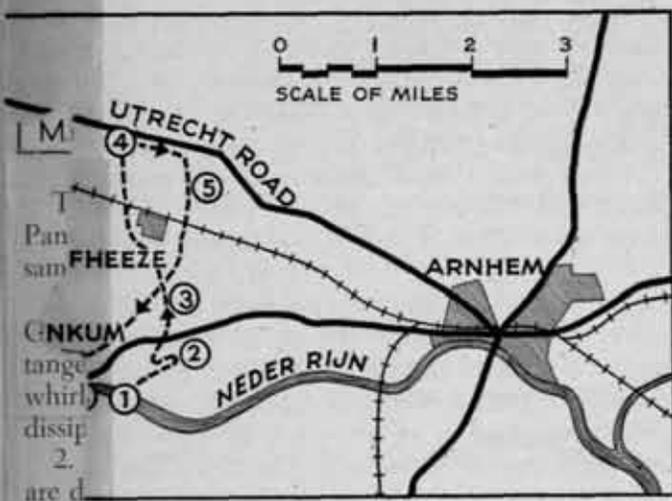
"A little later I heard Becker make a noise and glanced at him he began to pull himself out of a slit he had slipped into. I walked over to him and saw a fat Jerry snoring away in the hole. For a moment I thought he might waken and looked down ready to pop on him if he made a noise. When he remained asleep I went on and joined the rest up ahead. Now we were in a wooded area and we had to be careful of every step. In clearing in the woods we came to a small road and a few yards away we saw a couple of Jerries walking down the road with something on their shoulders. Nicolai reported that they were carrying a mattress. A little farther down the road we saw them walk into a house with their mattress. We waited but they didn't come out so we figured they must have turned in for the night.

"Farther on we crossed the road and stumbled right into an ammunition dump. Sergeant Frank, the interpreter went over to check the writing on the boxes. He found they were shells for a heavy 150mm infantry gun which Lieutenant Sims marked down in a little book he was carrying. He also marked the position of the ammo dump and the location of the mattress house. Just as we were starting to make a more thorough inspection around the ammo dump we heard the unmistakable sound of a German Schmeisser gun belt being snapped back. In a second there came another. We stood rooted to the spot, afraid to breathe. The things seemed to come from just across the road. There wasn't much else for us to do but to go sneaking back through the area of the sleeping men."

Sergeant Frank now pointed out that he hadn't been too scared when the belts snapped back. He had a story all ready for the situation. Every time they came to a new emergency he would review in his mind a story that might

rk the patrol out of it. This time he was ready to raise l with the Jerries for making so much noise with ir machine-gun belts. Frank continued: "Now we cut ight across the fields for about two miles. Nicolai was ting hungry and he simply reached down and grabbed andful of carrots from a vegetable patch and began to them. Soon we had enough of the fields and decided it we were deep enough in the enemy territory to brazen out on the road. When we came to a good paved road walked right down the middle of it. Just ahead we ard the clank and rumble of a Jerry horse-drawn vehicle. e crawled into the ditch along the road and waited for to pass. In a couple of minutes we were on the road in.

"Farther on we checked our compass course and started to the right. We hadn't gone more than twenty yards en I saw Becker throw his hands in the air. Right in nt of us was a huge German gun emplacement. The n and pits for the ammunition were there but there n't seem to be any Jerries. About a hundred yards ther on we came to a strange collection of silhouettes.



oute of the patrol, with the exception of a few zigzags to oid contact with Germans, crossed two and a half miles of utch countryside west of Arnhem. Main locations are 1) st crossing of the Rijn, 2) ammunition dump, 3) motor ol, 4) house where patrol spent the day, 5) woods where truck was abandoned, 6) return crossing.

We couldn't be sure what they were and kept on going until we made them out. It was a Jerry motor pool with all types of vehicles parked for the night. We were all for taking one of the cars but Lieutenant Sims again turned thumbs down. He pulled out his map and noted the exact location. Soon we were on the edge of the town of Wolfseeze and decided that it would be best to work around it. As it later turned out, this was a good thing. The place was lousy with SS troops.

THE GERMANS WERE OFTEN CLOSE

"We skirted the town pretty closely and could even smell the smoke from stinking German cigarettes. We now crossed the railroad which we knew marked the two-thirds point on our trip. We were some distance behind the enemy lines and had the feeling we would be able to bluff our way out of almost any situation that might arise.

The last three miles of rushing through the fields was pretty hard. The tall grass slowed us down but it also sheltered us from observation. Nicolai was in the lead, eating carrots again. When he heard the rush of a car going by he whispered to Sims that this must be the road we had crossed so much country to reach. Within a few hundred yards we came out on the road."

Nicolai broke in again: "We all waited a few minutes at the side of the road while Lieutenant Sims brought out a map and checked our location. We were right behind a house that marked the exact spot where we had planned to hit the road. This was only luck but it made us feel as if everything was going according to plan. Lieutenant Sims, looking over the house and the area, decided we might as well occupy the house for cover. We sneaked up carefully, listening for the slightest sound. Becker and Canfield now went through a window and a minute or so later came back to whisper that all was clear inside. But after a conference we decided that this was not so good after all. If Jerry were to see any activity around a house which he knew to be empty he would become suspicious. Becker and Canfield climbed back out and we headed down on the road again. In front Sergeant Frank was carrying on a monolog with Becker in German. This was funny because Becker didn't understand a word of it. We all fell into the spirit of it, feeling we could fool any Germans who came along. Soon one of the boys was singing *Lili Marlene* and we all joined in.

"After about a mile of walking along the road without meeting a single German we came to a couple of houses. One of them had a Red Cross marking on the front. It was a small cross and the place hardly looked as if it were a hospital. At any rate it looked like the better of the two houses. Sergeant Frank and myself edged close we could hear what sounded like snoring inside. We walked to the back door and found it open. In the front room of the house we found two Germans sleeping on piles of straw. They wore big, shiny boots and I was sure they were officers. Sergeant Frank said they were cavalrymen. Leaving Frank on guard I went back outside and reported to Lieutenant Sims. He said we would take the men prisoners and stay at this house. I told Frank the plan and he began to shake the Germans. One of them finally began to rub his eyes. He stared at us and Frank kept telling him over and over that he was a prisoner. They just couldn't believe it."

After the dazed Germans had been thoroughly awakened they were questioned by Sergeant Frank. He got all the information he could from them and relayed it to Lieutenant Sims. Sims was now up in the attic setting up the radio with another man. In about ten minutes the men heard him saying into the radio. "This is Sims, Sims, Sims. We have two prisoners. We have two prisoners." They knew the radio was working and everyone felt swell. Soon Sims was sending information about the things he had noted along the way.

After questioning the prisoners Sergeant Frank told them to go back to sleep but they just sat and stared. Frank asked them if they expected any more soldiers in the area. They said that another man was supposed to pick them up at about 5:30 in the morning.

After the radio had been set up everything was quiet

until daybreak. The men took turns watching the road while the others tried to get a little sleep. At about 7 a.m., Nicolai reported the arrival of a young civilian at the front door. The civilian proved to be a boy of about sixteen in knee pants. He was both surprised and pleased to be taken captive by the "Tommys." The men took some time to explain to him that they were not Tommys but airborne GI's. When this had been taken care of Sergeant Frank was allowed to go ahead with his questioning. The boy explained that the house belonged to some friends of his and he had just come over for some preserves. He knew the people had been evacuated and said they might not be back for some time.

The boy went on to say that his older brother, who was a member of the local underground, would also be along shortly. Almost immediately the brother was brought in by Nicolai. He was a slick-haired, effeminate young man and the patrol had doubts about him. He spoke a little English and produced papers to prove that he was a member of the Dutch underground. He began to tell the men about the various enemy installations in the area. He gave them artillery positions and unit numbers and all this was immediately relayed back over the radio.

In the following hour six more civilians were guests of the patrol. They all seemed to know that there was no one home and all wanted something from the house. They were told they would have to stay until after the patrol had left. The civilians were happy to see the men, but they didn't like the idea of having to stay. One of the captives, a very pretty Dutch girl accompanied by what appeared to be her boy friend, wouldn't take no for an answer. The men said she was not averse to using all of her charms to get out, either, but they were firm.

At noon the traffic on the road began to increase. Convoys of big trucks appeared to be heading from the Utrecht area toward Arnhem. The men observed all kinds of vehicles and guns. Presently an unsuspecting Jerry entered the courtyard for a drink of water. Opening the front door a little, one of the men pointed his Tommy gun at the German and commanded him to come in. The German came in laughing, apparently not quite convinced that the whole thing wasn't a joke. He turned out to be a mail orderly who had lost his way after taking mail to a near-by town. He seemed to be an intellectual type and was very philosophical about being captured.

A PICNIC LUNCH IN HOLLAND

Shortly afterward the idea of food occurred to everyone in the house. The men in the patrol got out their K-ration chocolate and the civilians began to dig into the little bags they all carried. It began to look as if the civilians had been going to a picnic. They brought out bread and cheese and shared it with the Americans. An hour or so later the German who was supposed to meet the first two prisoners at 5:30 finally showed up with two horses and a cart. The men let him enter the courtyard and water the horses. Then they called out to him, "Put up your hands, you are a prisoner." He didn't seem to understand and it was necessary to repeat the order. Then he answered calmly, "I must feed my horses." Finally he raised one hand and came toward the house, muttering that it just couldn't be

true. Now the civilians helped in the questioning because the Germans were not too sure about the names of towns where their units were stationed.

Once the men watching from the windows were tempted to whistle at a passing car. It was driven by a pretty German WAC. The men said that the only thing that strained them was the fact that their lives depended on it. Because everything had gone so smoothly the men were feeling pretty cocky. They began to figure out their plan for the coming evening. They wanted to capture a train a couple of staff cars with German WAC's and drive back to Renkum. Along the way they would stop briefly to blow up the railroad.

At 4 p.m. two more Germans entered the courtyard and were immediately taken prisoner. They were very soft mainly because they had come along the road just to go brick away a little time. By this time a big fire had been built in the front room where the prisoners were kept. The prisoners kept the fire going and the men argued over who would stand guard in the warm room.

As darkness approached the men began to assemble their equipment. Becker was left on guard in the house with the prisoners and civilians while Lieutenant Sims and the others went out to look for a truck. The German mail orderly, who seemed the happiest to be captured, was chosen to help them. He agreed that as soon as Sergeant Frank told him he would help stop the truck by shouting "Halt Kamerad." As they waited the German said to Frank "I am happy because the war is over for us." Frank replied that it would all depend on the next few hours and that they would be able to say with more certainty the next day.

Becker reported that when the lieutenant and the others left the house the remaining prisoners looked a little scared. Finally one man came and asked Becker in pantomime if they would be shot. Becker told them that such things aren't done in the American Army. All of the Germans in the house wore the Iron Cross and had seen some ice against the Russians.

While the men were waiting along the road a whole German company passed on bicycles. As each German rode by he would shout "Guten Abend" to the men along the road and they shouted back the same. One man stopped and asked Sergeant Frank if this were the right road to the next town. Rather than become engaged in conversation Frank told him he didn't know.

THE PATROL STOPS A TRUCK

Getting impatient after an hour and a half, the men decided they would stop the next truck that came along no matter what kind it was. In the meantime a motorcy was stopped by the road and went into the courtyard of the house. Nicolai rushed across the road and grabbed it. It developed that he was checking up on the absence of the other men. When Nicolai brought him across the courtyard he saw the mail orderly and rushed up to shake his hand. They were old friends and had served together for years. A few minutes later the men heard a truck coming down the road and told the two Germans to step out and shout "Halt Kamerad!" When the truck came all the men shouted at once and the truck stopped. It turned out to be a big five-tonner carrying fifteen SS men. Nicolai jumped

the back and herded the Germans off, taking their weapons as they got down. They were all very surprised. At the driver refused to leave his seat, but after a number of strong threats, namely shooting, he finally got off. He was a tall man and very cocky. When asked to put his hands up he said, "Who says so?" When he was told that he was a prisoner of war he looked astonished and said that was impossible. As he spoke he put one hand up and with the other drew a pistol, but only to hide it in his jacket. Sergeant Frank took it away.

The driver was told to get back in the truck and pull it onto the road. He seemed reluctant and Frank had to hold a knife against his ear while he started the motor. He was unable to keep the motor from stalling every few seconds and when he moved into the courtyard he had trouble turning. It was obvious that he was stalling for good. He kept looking at Frank and saying in German, "Gott, I'm mad. This can't happen to me." He told Frank that he was on his way to meet the captain of his battalion. When he was told he was to drive the truck and the men of the Neder Rijn, he said there wasn't enough gas. He was told that if that were true then he would be shot, so he said that there was enough gas for twenty miles.

Now Becker and the prisoners in the house came out and got into the truck with the SS men. The Americans lined themselves around inside the truck so they could watch the guard. Lieutenant Sims and Sergeant Frank sat in the front with the driver. When they were on the road the truck stalled again. As the driver tried to start the motor an amphibious jeep pulled up and a tall SS officer got out to bawl him out for blocking the road. Canfield was told to get the truck in an instant and had brought the officer in. As it turned out, this was the captain the truck driver had been going to meet.

Again the sergeant concentrated on getting the driver to start the truck. He worked hard at stalling the motor until he had to be threatened before he would drive at all. When he got the truck under way and they set out on the main route they had mapped out before the patrol. Every few minutes and then the driver would get temperamental, folding his arms and saying, "Hab' ich eine Wut!" ("Am I mad!") For a prod or two with the gun muzzle he would go back to driving. Farther along the road toward Arnhem the driver was told to turn off to the right. Shortly the truck came to a muddy place in a woods and bogged down hub-deep. After a long amount of trying by the SS driver was able to move it. It was now 10 p.m. and the patrol decided they might as well try to make it back on foot.

Now the men regretted having so many prisoners. As they piled down from the truck the SS captain bolted to the side of the road in the darkness. In a flash he was in the woods. Nicolai shouted for him to stop and ran after him. In a moment the others heard two shots and Nicolai's last two words of German, "Hände hoch, you son of a bitch!" followed by a great crashing in the underbrush. The sergeant also ran into the woods to see if he might help. Hearing the noise he found Nicolai and the captain. Nicolai was still shouting, "Hände hoch," and with every

shout he would kick the captain in the seat of the pants. When they came back to the truck the captain was cowed and willing to go quietly.

Lining the Germans up in two columns, Sergeant Frank now gave them a little lecture. He said they could just as easily be shot as taken back and that all six Americans were risking their lives to get them back safely. He told them that if anyone tried to escape or made an unnecessary noise he would be shot immediately. Starting out again with the SS captain and Sergeant Frank in front, the column made its way along the road toward the river. As they walked the SS captain told Frank it was useless to try to cross the Neder Rijn with the prisoners. He said the Americans might as well turn over their guns because they would surely be caught by the Germans along the river.

The captain also asked if he might have a cigarette. He couldn't have one now, but that later he would have more and better cigarettes than there were in all of Germany. The captain said the Germans had nothing against the Americans and he couldn't see personally why the Germans and Americans didn't get together to fight the Russians and Japanese. We are both white races, he said. Sergeant Frank answered that the Russians were also white. Yes, replied the captain, but they are inferior. Finally the captain asked if it were not possible for them to rest a while, or at least to slow down. He was told that he had the misfortune to be a captive of American paratroops, who just didn't walk any slower. Now as they walked along they constantly heard German voices.

Arriving at the railroad crossing, the patrol decided finally that they didn't dare blow up the tracks with the two-and-a-half-minute fuse they carried. Reluctantly they crossed the tracks and ditched their demolition charges in bushes by the road. Along this last stretch of the road they passed countless houses with Germans inside.

When they came to the town of Renkum the patrol marched boldly down the center of the main street with a great clicking of German hobnailed shoes. It was obvious from the sound alone that they could be nothing but a group of marching Germans. They went through the town without incident and headed straight for the near-by dike. Everyone was feeling wonderfully lightheaded. Arriving at the dike, they had marched right down to the water when they saw a squad of Germans at a river outpost. As they came close Sergeant Frank called out to them in German that there was nothing to worry about. When they stopped two of the men rushed over and told the Jerries to put up their hands. The column moved on, cleaning out two more posts along the river. The six-man patrol now had a total of thirty-two prisoners.

On the dike Lieutenant Sims gave the prearranged flashlight signal to the other side. Soon the answer came—three blinks. The SS captain, his truck driver and one of the patrol were the first to get to the other side. Part of the patrol stayed behind to cover the crossing while the rest of the prisoners were ferried over. Finally the last three men touched the Allied side of the Neder Rijn. The incredible patrol was over.



KEEP 'EM FIRING

By Captain Richard M. Bleier,
Coast Artillery Corps

Have you ever watched 40mm firing from the down course position and seen successive tracers creep up closer and closer to the target until you were sure correct lead was about to be generated—only to have the gun falter in firing at the crucial moment? You had been concentrating on the gunnery factors involved and then suddenly felt a great wave of annoyance at your gun crew, particularly No. 7, your Loader and Firer—he let you down.

A uniform, rapid and controlled rate of fire is important for both on-carriage and off-carriage fire control, because correct lead is not generated continuously. The gun crew cannot tell when lead is correct nor when a fly-through will occur, until it has happened. In the case of the on-carriage types of fire control a uniform rate of fire is a prerequisite to steady tracking; while with off-carriage control a steady progression of shots is essential to a range setter's estimation of time for range adjustment.

The foot can fire the gun at a uniform cadence but the hands must feed a clip only once in four shots. This task requires a keen muscular coordination of hands, feet and eyes that can be rarely achieved without considerable practice. But, practice which merely involves stepping on a firing pedal, such as in our average drill period, is not realistic because the hands do not have to insert a clip carefully after every fourth round has been fired.

How can we expect to have a trained Loader and Firer in the firing line if he has never practiced his job? Obviously there is a need for a simple training aid which will simulate the actual conditions of feeding ammunition during firing.

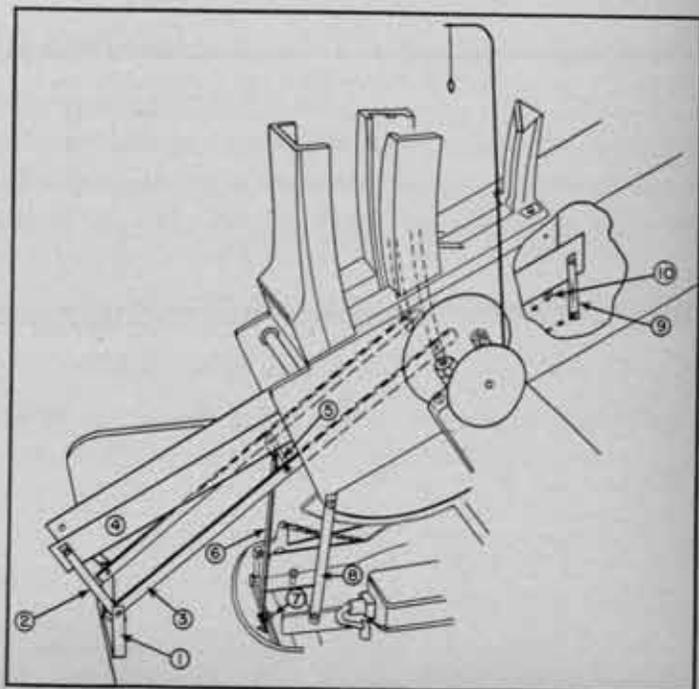
A device called a "40mm Loading and Firing Trainer" has been built at the Antiaircraft Artillery School which modifies the Bofors 40mm Gun so that dummy rounds do pass through the automatic loader without actually having been fired. In the following paragraphs are details for the construction and use of this device.

The parts necessary can be made without difficulty at any post ordnance shop. A good battalion motor pool could also handle the job with the assistance of the battery artillery mechanic. Exact dimensions of each of the necessary parts may be obtained, along with illustrations showing in detail how to construct the trainer, from the AAA School, Fort Bliss, Texas. In addition to the improvised parts an extra pair of feed rod rollers must be obtained.

The conversion of the 40mm gun to use with this trainer required about two hours. Reconversion to firing-line status is equally as fast. No permanent change is made in the gun. In this discussion of the procedure the 40mm SNL names and numbers are used; the numbers in parenthesis refer to figure 1. The gun is locked at 29° for use with this trainer by the metal elevation locking bar (8) attached between hole through which rear cover pin (A 222495) passes and the hole in angle C95620 through which the bolt passes that secures the front end of the stay B198401.

a. Remove the gun breech casing rear cover from gun.
b. Remove automatic loader from gun; disconnect the automatic loader base from the automatic loader frames.

- c. Replace the automatic loader into the gun breech casing (without the automatic loader tray assembly).
- d. Remove the rear cartridge chute and stay (B198401). Use is made of front bolt used in securing this stay.
- e. Set the gun to 29° with the trainer elevation locking bar (8) and secure nuts. (This angular height is critical.) An additional nut and bolt ½" x 2" is required.
- f. Disconnect the firing mechanism connecting link from the rear firing mechanism lever. Attach the firing mechanism rear lever spring to the rear firing mechanism lever pin.
- g. Install the trainer feed lever bracket (1).
- h. Install the trainer feed levers (3) so that the welded automatic loader feed rod rollers on the trainer feed levers are engaged on studs of the automatic loader feed rods. The slots will then be lined up with a bolt through parts (1), (2), (3). Tighten (1) and (2) securely but tighten (3) and (1) loosely by means of a lock nut to permit slant motion of feed levers (3).
- i. Install the trainer feed lever connector (5).
- j. Install the trainer firing lever link (6) and trainer firing lever clamps (7) so that the link is approximately vertical. Use lock washers on the nuts securing the link to the trainer feed lever connector.
- k. Install the trainer chute front brackets (9), (10) inside gun breech casing by using the two front screws on the elevating arc. (9) and (10) do not show on Figure 1, but are illustrated in plate F, which will be supplied by the AAA School.
- l. Install the trainer chute (4).
- m. (NOTE—if it is expected that the trainer will receive more than normal use it is recommended the trainer feed levers (3) be made of ¾" cold rolled steel instead of ¼" cold rolled steel.)



HOW TO USE THE TRAINER

The loading and firing procedures are the same using the trainer as they are during actual firing. The ammunition detail (No. 11) loads dummy rounds in clips and passes them to the ammunition relayer (No. 10). No. 10 passes the loaded clips, in the proper manner to the loader and firer (No. 7) as per FM 44-60 (revised FM 4-160). No. 7 receives the loaded clips from No. 10, places them in the automatic loader as required; presses the firing pedal for each shot at the rate desired. Additional personnel may be utilized to collect "Fired" rounds and clear the gunner's platform of these "Fired" rounds. Collection of "Fired" rounds is necessary because of small supply of dummy rounds, and in order to give the detail practice in loading clips and maintaining a steady flow of loaded clips. The lateral gun pointer may be used to traverse the gun to simulate firing conditions, and thereby increase the need for full coordination of personnel concerned.

The rate of fire can be controlled easily by employment of a pendulum arrangement. A weight on a 3½" string suspended from a rod attached to the azimuth gear box

will produce a frequency of 100 cycles per minute; a 5½" string produces a cycle of 80 per minute. The rate of fire must be slow during initial training, and steadily increase until the loader and firer is able to produce the rate of 100 rounds per minute required for best results. Only practice such as this will produce the consistently reliable 100 rounds per minute.

WHAT THE TRAINER TEACHES

The trainer teaches all that is demanded of No. 7, 10, and 11 of our 40mm gun crews.

- a. How to pass ammunition and load clips properly and quickly.
- b. How to drop clips in the automatic loader properly to prevent rounds from jamming.
- c. How to fire the gun and feed clips at the same time.
- d. How to maintain a desired rate of fire.
- e. How to keep a gun free of empty clips during firing.

Let's get that rate of fire, couple it with intelligent use of our fire control equipment and we'll get hits!



Gunners at Singapore

The whole Regiment must sympathize with those unfortunate men; indeed one can hardly imagine a more unpleasant position for Gunners to be in, highly trained as they were—and as the Japs no doubt knew they were. In fact, without firing a single round out to sea the Gunners achieved their primary rôle—they deterred the Jap fleet from venturing within range of their formidable guns.—LT.-COL. A. H. BURNE in *The Gunner*.

Alternate Methods of Fire Control for AMTB Batteries

By Lieutenant Gustave A. Peyer, Jr., Coast Artillery Corps

NECESSITY FOR ALTERNATE METHODS

Both two- and four-gun AMTB batteries are now in operation. It is proposed to divide some of the four-gun batteries into two separate firing units; one employing the M9 Director in conjunction with some ranging device, the other unit operating with some alternate means of fire control which includes a satisfactory source of range, such as SCR 584, SCR 545, SCR 547, or M1 height finder. If a battery is composed of a single two- or four-gun firing unit, some method must be devised to bring destructive fire on close-in targets which may detach themselves from the main attacking force. For such an occasion it is imperative that a definite procedure be established whereby the single firing unit may break down into two separate firing units so that effective fire can be brought to bear on these detached targets, which are relatively close but still outside the effective range of .50 caliber machine guns and 37mm or 40mm cannons. The Director unit would engage the main force; the other unit would fire on the decoy targets using alternate methods of fire control.

It is feasible to assume that under any determined bombardment preceding the attack, the M9 Director, more specifically the tracker, may be disrupted. Also the long cable lines between the various units of the Director and guns offer a very vulnerable target for near misses to rupture or cut the essential flow of data. The range finding equipment is just as vulnerable, but since the battery will be equipped with both the M1 height finder and other devices; it is anticipated at least one will be available for use. Some or all the forementioned emergencies may occur, and adequate preparation to meet the enemy demands that the possibility be recognized so that if the casualty occurs adequate means of continuing destructive fire are readily available.

THE PROBLEM

Since the AMTB question is so far removed from the normal seacoast problem, alternate methods of fire control advocated for use in SC actions are not applicable here. The seacoast problem involves targets which are relatively slow-moving with restricted maneuverability. Because of these characteristics, a 15- or 20-second firing interval and a 15- or 20-second dead time is not detrimental to delivering effective fire. Moreover, because of the size and ruggedness of the target, numerous hits must be obtained before total disability ensues.

On the other hand, the MTB embodies extremely high speeds for marine craft in conjunction with extreme maneuverability. To cope with such an elusive target, any method of fire control which will prove effective must have the absolute minimum of dead time. Furthermore, in order that the high rate of fire of the 90mm gun be pre-

served (and to do otherwise would be to discard one of the most desirable features of this gun) it is of utmost importance that a constant flow of firing data be supplied the guns. The fragility of the target makes it such that one hit or a near miss can render it entirely helpless or cause complete destruction. Alternate methods must embody:

1. Constant flow of data.
2. Minimum dead time.
3. Emphasis on fire power, sacrificing accuracy when the two are mutually exclusive.

Range

SOLUTION

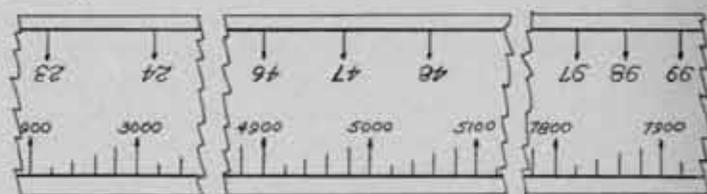
As mentioned before, it is entirely feasible to assume that the occasion might arise when the Director would suffer a disruption which would prohibit its use, when either the M1 height finder or other instrument could continue normal functioning. Also in instances of a battery consisting of two firing units, one ranging device may be used with the Director and the other with alternate methods. The two range-finding devices can be interchanged readily since both adequately accommodate continuous ranges to the target and sensing of the fall of shots.

With one or the other of these ranging devices, we must now provide some means of converting this range to elevation applicable to setting on the guns, also, some rapid means of correcting for abnormal ballistics and making range adjustments must be incorporated in the solution.

1. Conversion of range to elevation:

Make a uniform range tape with some convenient scale factor such as 1" = 100 yards. Graduating it every 20 yards and labeling every 100 yards should prove adequate. In order to accommodate targets from the minimum to the maximum ranges the tape should include ranges from two to eight thousand yards increasing from left to right. Such a scope should prove large enough in most cases. Against this uniform tape of ranges, elevations from FT 90 C3 are plotted. In instances where batteries have any appreciable height of site it probably will be found expedient to make a correction for this when plotting these elevations.

Example



Range-Elevation Tape.

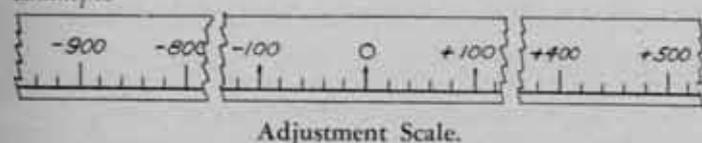
(Corrected for height of site when necessary).

2. Range adjustment:

For range adjustment a uniform scale is constructed hav-

ing the same scale factor as the range tape; i.e., 1" = 100 yards. Graduating it every 20 yards and labeling every 100 yards should prove sufficient. The zero is placed in the center of the scale; plus corrections to the right and minus corrections to the left. Graduation up to 1,000 yards on either side of the normal will prove ample in all cases.

Example

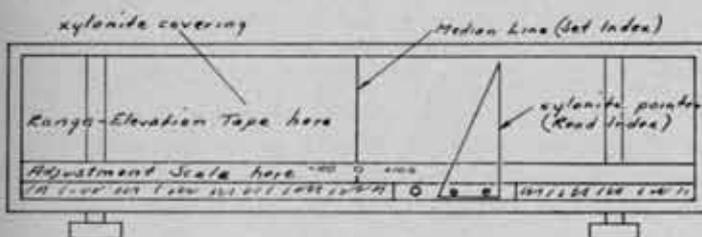


Adjustment Scale.

3. Mounting:

The Percentage Corrector Box M1 is readily adapted for use. The range tape is mounted on the rollers so that the ranges increase from left to right. The correction scale can be easily glued over the ballistic correction scale on the box so that the zero is opposite the median or index line on the xylonite window, plus corrections to the right, minus to the left. In order to eliminate possible chance of confusion the ballistic slide should be taped down, and the adjustment scale of the box should be covered. This leaves only one movable index (the long xylonite read pointer) free to be positioned, and only one scale (the affixed correction scale) to be used.

The following sketch illustrates how a range box can be constructed if a Percentage Corrector M1 is not available.



Range Box.

4. Operation:

The range box can be placed at the source of the range data or in the fire control tower where the officer conducting fire has it at his fingertips. Two men are required for operation; an input range setter and an output elevation reader. Range to the target is fed into the box continuously. The range finder operators should transmit this data every three or four seconds and it should be smoothed out as much as practical before transmission. The input operator endeavors to anticipate the next range which will be transmitted to him so that he will have it set under the median line (set index) when he actually receives it; i.e., he tries to establish the correct rate of range change. The output or elevation reader is located on the opposite side of the box and is connected by phone to the elevation setters at the guns. He transmits the elevation which appears under the long xylonite pointer, reading an elevation about every

three seconds. The elevation setters at the guns attempt to establish the correct rate of elevation change; i.e., they endeavor to have the elevation set on the elevation indicator as they hear it coming to them. In crossing courses, such as those normally experienced in target practice, this establishment of a rate of elevation change will be almost impossible because of the very slow range change. In those cases where the same elevation is on the guns anywhere from five to fifteen seconds, they will simply have to wait until they hear a new elevation before setting it. But actually under combat firing a much faster range change can be expected and training toward that end should receive ample consideration. If the range difference caused by the ranging equipment being offset from the guns is great enough, a correction can be applied to the box by offsetting the read pointer on the correction scale. In practically all cases a mean range correction will be adequate but if a battery finds its situation such that the range difference in various parts of the field of fire covers a large enough spread different corrections can be computed. In such cases range difference settings according to the azimuth of the target should be figured for various sectors of the field of fire and mounted on a chart affixed to the range box.

Range adjustment here should follow the same rules which apply when using the M9 Director. An officer should determine the correction necessary, based on the sensing of shots from the ranging device, or in rare cases from a flank spotter. He should know what the 4 mil fork amounts to at various ranges, and be familiar with the P.E. at various ranges. Once the correction has been determined the output operator applies it simply by positioning the read pointer at the proper place on the correction scale. Movement of this read index will necessitate an abrupt change in the elevation being sent to the guns. It is imperative that this change be made as soon as possible; to facilitate this it will be found advisable to have the output operator say "correction" over his phone. This will alert the elevation setters to the fact that an abrupt change in elevation is being made. They in turn should be trained to set this new elevation in as quickly as possible disregarding the rate of change they previously established. In so doing the time lag between the determination of an adjustment correction and its actual application to the laying of the guns is cut to a minimum.

Regarding range adjustment, it might be well to state here a method which I have found very successful. Since it is anticipated that no ballistic corrections will be determined beforehand, and if the M1 height finder is used, the range it gives is questionable at the best to ± 35 yards, a means of determining the actual range to the target by fall of shot is desirable. This is accomplished by opening fire with a ladder. This ladder of impacts may be achieved in two ways.

Assuming a two gun firing section: Just previous to the command to open fire the firing section commander has the elevation setters on both guns add 4 mils to the present elevation. Commence firing follows immediately and after each shot the elevation setters decrease the elevation 2 mils, disregarding any elevation which may come over the phone to them during the firing of this ladder. A ladder of five

salvos should prove adequate to bracket the target. Having fired the five-salvo burst, firing is suspended till the shots can be spotted. The ladder would normally be started over the target for ease in visual spotting.

Another method of achieving this ladder is to have the individual guns spread; i.e., to have one gun add 2 mils each shot and the other subtract 2 mils. Using this method the ladder would start in the center and move toward each end. This type could cover the same amount of water area as the one above in fewer shots and consequently faster. These advantages are weighed against the fact that normal dispersion may give a false sensing when based on only one shot. Whichever one is used, it must be remembered that the guns are fired at full rate and a normal five-stepped ladder is fired in 15 seconds maximum.

Having suspended fire to await the fall of shot, the range officer makes a flat angular correction in mils by moving the read index on the elevation tape when the sensings come in. In order to do this he must have an accurate knowledge of the elevations used on each shot. Knowing this he merely splits the 2-mil difference which resulted in an over and a short. As soon as he is satisfied that the corrected elevation is at the guns, firing is resumed. Groups of approximately four-salvo bursts have been found to be the best method of firing. Time between bursts should be held to a minimum by expedient determination of the adjustment and its rapid application to the range box and the guns. After the position of the target has been determined by the ladder, it has been found advantageous to use the following table for adjustment at normal ranges (5,000 to 8,000 yards):

Sensings	Correction
8 over 0 short	- 100 yards
7 over 1 short	- 100 yards
6 over 2 short	- 50 yards
5 over 3 short	- 50 yards
4 over 4 short	None
3 over 5 short	None
2 over 6 short	None
1 over 7 short	+ 50 yards
0 over 8 short	+ 100 yards

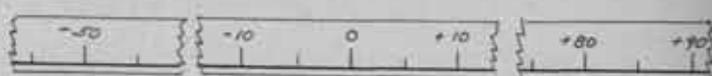
Azimuth

It will be conceded generally that Case-III pointing will take priority over Case II in all instances where applicable. Setting an azimuth on the dial of the gun involves no interference from excessive smoke prevalent during firing. Since the smoke is not detrimental to azimuth setting the rate of fire is not impaired as would be the situation in Case II pointing where visibility of the target is of paramount importance.

1. Case III: Since the target is capable of such high maneuverability, and this will undoubtedly be employed as part of its tactics, some means must be devised to facilitate abruptly changing azimuths to the set-forward point; i.e., azimuth leads which can be expected to change from right to left very quickly. From that it is obvious that throwing a B.C. scope or an azimuth instrument out of orientation in the proper direction of the angular lead will not suffice. Such would hold while the target was traveling in one direction but when, or if, it happened to change direction

the tracking instrument would have to be brought back to the orienting point and thrown out of adjustment in the opposite direction. It is readily apparent that such a procedure would fail miserably in tracking a fast-moving target.

The problem is solved by using a Percentage Corrector Box M1 or a box similar to that which was constructed for ranges. Mounted on the rollers is a uniform tape from 0 to 6,400 mils having some convenient scale factor, such as 1" = 10 mils. (This may be secured from the Coast Artillery Board or constructed locally.) A correction scale is constructed having the same scale factor as the tape with 0 in the center, plus to the right, minus to the left. One hundred mils plus and minus from the normal will be ample.



Azimuth Correction Tape.

This scale is mounted at the same place that the range scale was on the range box. The long read pointer can be positioned on this scale and will automatically add or subtract from the present azimuth of the target giving approximate azimuth to the set-forward point.

Normally an AMTB battery will be furnished a B.C. scope which reads in mils. This will prove ideal for tracking because of its wide field. A M1918 azimuth instrument which reads also in mils but has a smaller field can also be used. Where the above two are not available a M1910A1 azimuth instrument can be used. It reads in degrees and hundreds but this can readily be converted simply by having the azimuth tape made with degrees plotted against mils (available at the Coast Artillery Board). Using this instrument input data will be in degrees and hundreds, output data in mils.

A total of four men are required for operation, two men on the tracking instrument and two on the azimuth box. The tracking instrument is oriented on a datum point, usually 0 degrees (N), or whatever reference line the battery is using. Since the person tracking the target will also make lateral adjustments, it is deemed advisable to have an officer operate the instrument. Initial lead either plus or minus depending upon the direction of travel is based on the angle of approach factor and the estimated speed of the target. Using the following factors for the estimated angle approach or recession: $0^\circ - 30^\circ = \frac{1}{2}$, $30^\circ - 60^\circ = \frac{3}{4}$, and $60^\circ - 90^\circ = 1$; computing angular travel during time of flight for speeds up to 50 m.p.h.; and adding or subtracting drift effects the following chart was constructed. This chart should be affixed to the azimuth box for quick consultation:

Range	Travel		L to R Lead	R to L Lead
	Lead	Drift		
10 m.p.h.	yds.	mils		
2,000	12	6	-2	
3,000	18	6	-3	
4,000	25	6	-3	3 mils
5,000	33	6	-3	9 mils
6,000	43	7	-3	

Range	Travel		Drift	L to R Lead	R to L Lead
	Lead				
<i>20 m.p.h.</i>					
2,000	24	12	-2	10 mils	16 mils
3,000	36	12	-3		
4,000	50	13	-3		
5,000	66	13	-3		
6,000	86	15	-3		
<i>30 m.p.h.</i>					
2,000	36	18	-2	16 mils	22 mils
3,000	54	18	-3		
4,000	75	19	-3		
5,000	99	19	-3		
6,000	129	22	-3		
<i>40 m.p.h.</i>					
2,000	48	24	-2	22 mils	28 mils
3,000	72	24	-3		
4,000	100	25	-3		
5,000	138	26	-3		
6,000	172	29	-3		

The officer operating the azimuth instrument estimates the angle of approach and speed to the nearest 10 m.p.h. Entering the chart with this data an initial lead can be determined readily. This lead is then set by offsetting the read pointer on the correction scale. Here again as in the range problem success of the system depends upon the establishment of rates of azimuth changes. The reader of the tracking instrument anticipates what reading will appear under the index and endeavors to have it sent to the azimuth box as it appears opposite the index. He will read about every two or three seconds. The input operator on the box endeavors to have the azimuth set under the median line of the box as he hears it being read. The output operator, reading opposite the long xylonite pointer, endeavors to have the azimuth read as it appears under the reading index. He also should read every two or three seconds and the azimuth setters at the guns do likewise. Thus everyone in the system is establishing a rate of azimuth change.

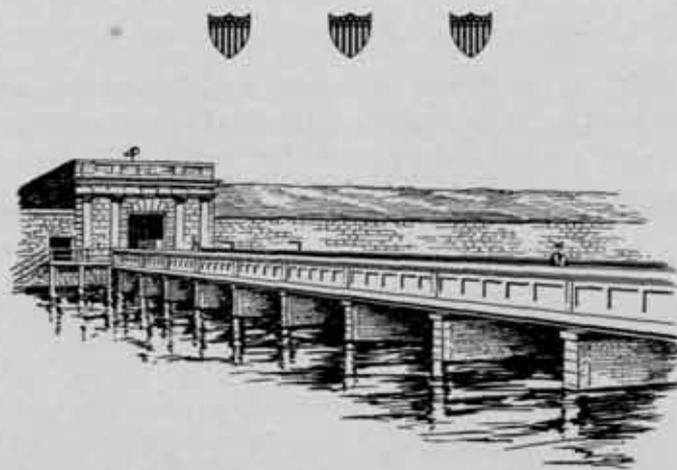
When the splashes from the first salvo occur the officer tracking the target makes a full correction simply by tracking the target with that part of the scope where the splash appeared. This will cause a disruption in the established rate of azimuth change; to insure that the azimuth setter get the correction in as soon as possible, the output operator of the box should say "correction" which will alert the men at the guns who have been trained to disregard the rate and set the new data quickly. After the initial adjustment is made, minor corrections will have to be made from time to time. They are accomplished simply by tracking the target with that part of the scope where the splashes occur. The tracker must be very cautious to insure that the correction he has made gets into the firing data before considering a new correction; otherwise a pyramiding effect will occur. When the target tracker notices that the splashes are creeping out of the scope (no more space remains to make adjustments) he notifies the output operator of the box to move the read pointer to the proper position of the correction scale. A correction of less than 20 mils on this basis should never be made, to do so increases the chance for error and increases confusion.

If the target changes course in the opposite direction the read pointer is displaced on the other side of the normal and the above described procedure is repeated.

Training should be very complete and is easily accomplished by use of any comparatively fast-moving boat.

Deflection

As mentioned Case II pointing will be reverted to only in instances where Case III is not applicable. Since the M24 sight is fixed and its scope is not wide enough for fast-moving targets, the M6A1 sight is replacing it. In lieu of the M6A1 sight a forward area gate type sight can be readily constructed by local ordnance. Distance between the wires should be computed for speeds of 20 m.p.h. The gun pointer adjusts laterally by jumping splashes. Rate of fire when using this method will be slowed down depending on the volume of smoke. When using this method the gun pointer should control the firing, as in normal Case II pointing.



Demonstration of Air Defense at the AAA School

By Lieutenant Archibald D. Eddy, Coast Artillery Corps

The teamwork necessary to defend an area from air attack is complicated. Aircraft Warning Service must be able to produce an adequate warning system while Antiaircraft Artillery firing must be coordinated with the air defense operations of friendly fighter aviation and the movements of other elements of friendly air forces.

To present this over-all picture within the scope of a student's ready comprehension, the Antiaircraft Artillery School, now at Fort Bliss, utilizes a full scale combined AAA-Wing Operations Room with certain training aids in addition.

SECTION I

On a tilted platform in the Combined Operations Room, a large area of rolling terrain is portrayed as sloping into the sea. It is an air view painted in perspective. Away in the distance nestles a modern industrial city. It represents the strategic sector that has to be defended from air attack. Models of detecting devices, relays, searchlights, and guns form several rings around it. They vary in size to fit into the scale of the perspective.

Orbit lights, each a different color, throw perpendicular beams of colored lights into the night sky. As soon as the Operations Officer scrambles his fighters the lights go into action. The fighters circle the orbit lights until the searchlights illuminate the enemy target by the intersection of at least two beams of light. To complete the set, gun and AW units and barrage balloons represent the antiaircraft artillery protection given to the most vital installations.

The lecturer stands beside a remote control panel studded with rows of toggle switches. During the progress of his lecture he illustrates the flow of action and data by snapping on small colored lights located at the mount of each piece of equipment. For example, the flashing on of white lights would indicate that the outer ring of searchlights has gone into action. This sequence is demonstrated from the moment the bomber comes within range of detecting devices used by the Aircraft Warning Service and until it is intercepted and shot down by our fighters. In other words, he shows his audience the basic principle in the tactics of the fighter-searchlight team.

To add to the realism of the set, appropriate commands are relayed over a concealed loudspeaker, and overhead, a model of an enemy bomber heads toward the city in a simulated daylight raid. At a designated point an interceptor synchronized by an ingenious mechanical and electrical device races forward in an encircling movement, attacks from the rear, and lets go a blast of machine-gun fire. Sound effects of both the bomber and an interceptor come in over the loudspeaker system, and at the point of firing contact the roar and zoom are amplified to sound like real machine-gun fire.

Attached to the Air Defense Demonstration Board is a small reference model of an operations center which includes (a) the Main Filter Room, where information relative to approach of enemy planes is received and plotted on a large table map of the defended territory, (b) the Ground Observers' Filter Room, where information from hundreds of observers as to the location of flights of planes is filtered and sent to the Main Filter Room, and (c) the Wing Operations Room.

SECTION II

The Wing Operations Room includes principally five maps. Each one represents the territory (or a segment of it) to be defended. All have the Air Defense Grid System marked over them; all except the Situation Board are painted on flat tables or combinations of tables.

The lecturer starts by explaining that the equipment is of standard Air Force issue. Certain identical items are used by the Antiaircraft Artillery and are also standard items of issue. The packing cases in which the equipment is transported unfold to form a platform, sometimes called "the bridge," on which the six or more officers who control the operations are stationed. These officers observe the progress of the raid and control fighters and antiaircraft artillery.

The Wing Controller, an Air Force officer, is in complete charge of the Wing Operations Room. He controls the tactical movement of our own Air Force. The AA Operations Officer sits on his right. Operations "A" and "B" sit on the left of the Wing Controller. "A" usually a sergeant, acts as his assistant, keeps the records, answers the telephone. "B" usually an officer, scrambles the planes



Lt. R. J. Nagel conducts an Air Defense demonstration.



Air Defense Operations Room.

(that is, orders them into the air), and keeps the aircraft status board, airdrome status, weather boards, etc., up to date at all times. The Identification Officer, who sits on the extreme left, maintains a record of all preflight plans of aircraft flying over this wing or area. He declares a plane or squadron as UNKNOWN, FRIENDLY, or ENEMY.

The flight of our own planes across the defended area is indicated on Wing Operations Board at all times by numbered raid stands supporting green flags. Raid plotters plot their paths of flight with colored plastic arrowheads. When a flight of friendly planes is landed or passes out of the area, the marker and arrowheads are removed.

As soon as the plotters receive telephone reports from the main filter room on the location of a new raid, the orderly makes up a new raid stand using the raid number

assigned in the filter room and adding the number of planes in the flight, number of motors, and altitude as soon as this information is relayed to the plotter. On top of the stand he designates the identity of the plane as *unknown* by a yellow flag with an "X." The Identification Officer thumbs through his preflight plans and orders the plotter to designate the new raid as hostile and changes the yellow flag to a red one.

Operations "B" officer receives his orders to scramble interceptors. He selects the flight that, according to his aircraft status board, has gas tanks full, motors warmed up and is otherwise ready for the hop.

The AA Operations sends out an alert to prepare all AA units for action.

The Fighter Intercept Board now comes into play. The Intercept officer, an Air Force officer, directs his fighters to the vicinity of the approaching enemy by radio-telephone and plots on his map the location of both the enemy raid and our own fighters.

Information as to the location of our fighters comes in continuously to the Intercept Board from the D/F (Direction Finding) Plotting Board. The D/F plotters determine the location of our interceptors by using a system of triangulation. These readings are taken in the field and reported by telephone by the men who operate the directional radios. When their readings are plotted on the D/F Board (by stretching strings from the points of location of the directional radios along the lines of the azimuth each one reports), the point of intersection of the three strings indicates the location of our interceptor planes.

At night the Intercept officer would observe the location



Searchlight Tactics Table.

of the enemy raid on the AA Operations Board, and order his fighters to an orbit light directly in line with the incoming raid. As soon as the searchlights get the enemy target in an intersection, the fighter will proceed, without further orders, to the intersection and press home the attack.

On the AA Operations Board, that part of the area defended by AAA is blown up to a much larger scale. The position of all gun batteries, controlled pickup lights, and orbit beacons are indicated on this board thus enabling the plot observer to warn the units concerned as to the probable approach of the hostile raid.

On the Situation Board, the location of flights appearing in areas adjacent to this Wing is plotted on a metal surfaced, vertical wall map by use of magnetic arrowheads and markers. This map is drawn to an even smaller scale than that of the Intercept Board.

SECTION III

A separate training aid, called the *Searchlight Tactics Table*, trains searchlight specialists in beam tactics. It is a relief model with half a battalion of lights set up on a typical searchlight defense pattern. Each searchlight is represented by a long cylindrical lucite beam. The operator controls it manually from a remote position, follows the flight of a plane model that flies various courses over the table, practices procedures of intersection, picking up the

target and carrying it in the beam of light all the way across the table.

In the same section, there is also T/Sergeant Edgar J. Babin's "*Plane-O-Scope*," a training aid consisting of a dozen slip rings, toggle switches labeled after the different plane models, and corresponding models of airplanes on a rotating arm. It is designed to test the accuracy of the operator's target identification. A light flashes on for one second as the plane is positioned in the viewing window. If the operator should push the incorrect toggle switch, the scope remains dark. The light will not flash on except when the operator matches up the switch with the corresponding plane model as it appears in the scope.

Credit for many of the ingenious mechanical devices goes to Technical Sergeant Edgar J. Babin. For his exceptional contribution to Air Defense instruction and the subsequent development of better understanding and teamwork between Antiaircraft Artillery and Air Force, he has been awarded recently the Legion of Merit. The citation reads: "For exceptional meritorious performance of outstanding service above and beyond the execution of normal duties. As technical adviser in planning and putting into operation improved methods for demonstrating the Air Defense Plan to students of the Antiaircraft Artillery School from 1st November 1943 to 24th April 1944, T/Sgt. Babin displayed outstanding initiative, superior tact, a high degree of technical skill, and extraordinary devotion to duty."



Oil Check

One of the critical problems in theaters of operation is that troops are using special oils, such as recoil oils and instrument oils, instead of preservative oils to take care of artillery pieces and small arms. This has two bad effects. First, the special oils have practically no preservative ability and will not protect weapons except possibly under the most ideal conditions. Secondly, the special oils are critically scarce and hard to get. In one theater, for example, many units ran out of recoil oil completely.

Using units should follow instructions in War Department Lubrication Orders and Technical Manuals not only so far as preservative oils are concerned, but also for all lubrication of weapons. Weapons will ultimately suffer if they don't, and they will interfere with supply by over-consuming critical oils.

Generally speaking, Oil, engine (SAE 30 above 32° and SAE 10 between 32° and 0°F) is the proper preservative to use for artillery. Oil, lubricating, preservative, *special* is the correct preservative for small arms. In extremely humid climates, Oil, lubricating, preservative, *medium* should be used for both artillery and small arms when the temperature is above 32°F. The engine oils and preservatives may leave a slightly stained appearance on metal surfaces, but this is normal and does no harm. The important thing is that the weapons are fully protected, and critical oils are not being misused and wasted.

Webfoot Artillery

By Lieutenant Colonel Bernard S. Waterman, Field Artillery

Spurred by necessity, our armed forces have developed amphibious warfare to a level beyond the wildest dreams of military men of a few generations ago.

Each operation has resulted in improvement of technique, until our early Pacific efforts seem very clumsy indeed when compared with the clocklike precision of the Okinawa landing. Nevertheless, the artilleryman's problem, especially insofar as medium and heavy artillery are concerned, has yet to be reduced to a formula which will fit all cases. The method which has been evolved for getting the dough-boy ashore seems irresistible in its awesome power and suited to almost all cases, since the Alligator with its load of infantrymen can go almost anywhere, and the terrible blanket of naval gunfire and air bombardment effectively stifles any countereffort on the enemy's part until the infantry is safely ashore. A good all-purpose solution for the rapid provision of light artillery for close support has been discovered.

My experience, however, has been entirely with medium and heavy artillery and here it is well to confess that no blanket solution is at hand since every landing in my limited experience has been entirely different from those preceding it.

In an earlier article we told the story of the landing of Long Toms at Saipan, but in the light of subsequent experience it seems well to go back beyond that effort to the beginning of our amphibious career on the shores of Hawaii.

Several very fine amphibious training centers have been established in the Hawaiian Islands. Their preoccupation has been with the landing of infantry, and to some extent the landing of artillery in small craft, and their observers have been present at each new operation to gather new ideas and seek solutions for old problems, but when our battalion began preparations for Saipan little doctrine was available in the Central Pacific on the landing of artillery from LSTs.

On a day in April, 1944, we received instructions to the following effect: "Here's an LST. Load 'er up and go on down to Maui and see what you can do." After much scholarly deliberation on what equipment we would like to have, and in what order we would like it to come off, we loaded a couple of batteries and sailed blithely off to Maui. Promptly on schedule the following morning we glided gently into a bright sandy beach, dropped the ramp almost on dry land, and proceeded to unload, with the usual minor bumbling to be expected on a first rehearsal. During the afternoon we reloaded, and the following morning repeated the maneuver. We came away confident that we knew all about landing from an LST.

Came Saipan, and we were confronted with a set of circumstances which we had not been able to rehearse. The landing beach was fenced off with a reef some three or four hundred yards from shore, with an intervening lagoon, varying in depth from a foot and a half to five feet. The



Unloading on the beach at Leyte.



Two batteries of 8-inch howitzers fire against the Japs at Carigara.

story of our tribulations has already been told. The points which impressed themselves most deeply on us were these: (1) Know your lagoon. Time spent in careful reconnaissance for the shallowest route across the lagoon and in waiting for the minimum tide will be a remunerative investment. (2) Do not attempt to drive the small vehicles ashore. Load the $\frac{3}{4}$ ton jeeps in Dukws or Alligators and tow the $\frac{3}{4}$ tonners behind bulldozers. (3) Service all vehicles which have been in the water at the earliest possible moment.

Another difficult aspect of the Saipan problem, and one which was later to prove equally as difficult on other beaches equally as renowned, was the unloading of large quantities of artillery ammunition, gasoline, water, rations and sundry other supplies. Both manpower and transportation were at a premium, since the T/O makes no provision for the large ship's platoon needed to accomplish the work, and no vehicles but Dukws and Alligators could make the run from ship to shore. Alligators were seldom available, and the Dukw company bore the brunt valiantly.

The Dukw is scarcely ideal as an ammunition carrier despite its inestimable value as an all-purpose amphibious vehicle because there is no tail gate, and every 95 lb. round of ammunition must be lifted high overhead to place it in the Dukw. Nor does palletizing solve this problem, for while a pallet can be lifted above the Dukw by a finger lift, there is no way to set it down inside the body. The Alligator with the drop seat appears to meet the requirements best, for when this rear ramp is lowered, a man can easily walk into the body and place a round of ammunition on the floor. These vehicles should be made available in large numbers to unload ammunition from LSTs.

To obtain maximum efficiency in the employment of amphibious vehicles under such circumstances a dump should be established just behind the beach, where the loads can be transferred to land transportation. This, of course, involves an extra handling, but unless you can

afford to have amphibious vehicles tied up on long overland runs it must be done. Furthermore, the current tendency is to bar Alligators from the roads as early as the situation permits because of their destructive effect on roadbeds.

After Saipan came Leyte, where we anticipated little difficulty because we were not in the assault, and there was no reef problem to face. This merely serves to illustrate the old cliché that things are never what they seem. To elucidate the point we will quote an observer who arrived at Leyte on an LST in the assault echelon: ". . . The LST lowered its ramp and the first bulldozer rolled out and disappeared in eight feet of water." Innocent though it appeared, this beach had a sandbar which stopped the incoming LSTs short of shallow water.

On our arrival at Leyte, we, too came up against this difficulty, plus the additional complication of heavy surf, a condition which may be expected on the eastern shore of most Pacific islands. The problem was partially overcome by persuading LST skippers to make a flank speed approach at maximum high water, thereby shoving themselves a bit higher up onto the shore, and then waiting until low tide to unload. This takes a good deal of persuasion because the paramount fear of LST skippers is that having once rammed themselves high up onto the beach they will not be able to pull off. This is not as serious as it seems since there are usually Navy tugs available to pull them off if they cannot do so under their own power.

Resorting to the above method we unloaded guns and vehicles, though not very rapidly, because every wheeled vehicle had to be hooked to a winch cable from a tractor ashore before starting out. Although the average depth of water at the end of the ramp was not very great at low tide, high rollers repeatedly washed up over engine hoods, and, waterproofing or no waterproofing, a vehicle will not continue to run under such conditions.

Another important little point is that where there is enough wave action to move the ship or the ramp, the end

of the ramp will soon wear a deep hole on the bottom. For this reason the ramp should be kept somewhat raised except when a vehicle is being run off.

The anticipated leisurely unloading and reconditioning of equipment did not materialize, for no sooner were a few guns ashore than orders were received to send a battery forward to relieve a Marine artillery unit in the lines. This involved a move some twenty miles north and ten miles inland. The road north was impassable, and the beach is cut every few miles by inlets which are too deep to traverse. These inlets were later bridged, but at the time there was no alternative but an amphibious move. The battery was therefore loaded in LCTs. This proved to be quite a task. The first LCT which attempted to beach ran afoul of the sand bar, broached, and was compelled to wait for the tide to lift her off. It was soon discovered that under the prevailing surf conditions the only way to get an LCT squarely on the beach and hold her there was to spot tractors on either flank of the beaching point, and run cables from them to the securing bolts on each side of the bow. The loading took nearly two days to complete.

One LST which we were charged with unloading contained a full tank deck load of gasoline in 55-gallon drums. A few futile attempts soon convinced us of the impracticability of using 2½-ton trucks between ship and shore in the high surf, and the job had to be continued with Dukws. The overhead clearance in the tank deck is insufficient to permit the use of an A-frame and barrel chimes to load the drums in Dukws. Our solution was to roll a number of drums onto the elevator, raise the elevator to the level of the Dukw body and roll the drums into the Dukw. This was necessarily very slow, and after several days the Navy became impatient to withdraw from the beach. We were finally compelled to roll all the remaining drums down the ramp and into the surf. This is not a recommended procedure. Men get hurt trying to get the heavy drums ashore and many drums are washed out to sea.

As the time approached for loading out for Okinawa every organization which expected to load LSTs began to formulate plans to facilitate loading. Beaches were reconnoitered to find those with the best slopes, and two divisions constructed loading piers a short distance out into the water. The piers were of pile construction, and seemed at first blush to be the A solution, but such are the vagaries of Nature that she seldom misses an opportunity to help the plans of men go astray. One division soon found that their piers were the least bit too long, and that LSTs which approached them remained afloat. The rise and fall of the ship in the surf would soon beat the bow ramp or the pier, or both, to pieces, and the idea was abandoned. Another division had more success, having constructed shorter piers, though whether by accident or design is not known. LSTs were able to ground at the proper point so that ramps could be lowered onto the piers, and loading was greatly speeded.

The delicate calculation involved can readily be seen, for if the LST grounds too soon its ramp will not reach the pier, and if it does not ground the condition described in the preceding paragraph will occur.

During the Leyte phase of our webfooted adventures the writer relinquished command of his Long Tom battalion, and was assigned to command a group consisting at that

time of three battalions of medium artillery. This broadened somewhat the scope of opportunity for observation of various loading problems, since we tried a number of schemes for loading our numerous ships. Nevertheless, the loading of the 155mm howitzer does not present the problems of the Long Tom, since it is much lighter and more maneuverable. It was noticed, however, that the new limber on the Long Tom has greatly improved the ease of loading and unloading as it gives the trails more road clearance and reduces the tendency of the gun to hang up astride the hump in the bow entrance.

First attempts to load the group were begun by beaching the ships off our bivouac area. We were assigned three LSTs and three LSMs to lift the group. The sand bar had apparently grown during the interim since unloading, and the first LSTs to approach, though running at full tilt, came to a very sudden halt so far off shore that they could be reached only by Dukw. A causeway was constructed to one LST, using two pontoons. Seas had been consistently heavy, and so violent was the wave action on these pontoons that vehicles could not be run across them. The pontoons were then filled with water and permitted to sink, and some equipment was loaded across them, but the continuous surf motion soon caused them to settle so deeply into the sand bottom that the water over them was too deep for further operations. The battalion commander was fortunate enough to obtain the use of a serviceable pier five miles south, and the loading was completed very rapidly.

Loading plans provided for covering the entire tank deck of each LST with artillery ammunition which was then decked over with dunnage to carry the usual vehicle load. Other battalions commenced loading ammunition, dunnage and other supplies using Dukws to traverse the wide expanse of water between beach and ship. The method was slow and difficult. Many times Dukws were compelled to make several approaches before they could mount the ramp of the LST, the heavy surf repeatedly swinging them away. The surf took a heavy toll of Dukws swamped or capsized.

During the Leyte interim we had lost the Dukw company which had been attached to the Corps Artillery. To compensate for this a number of Dukws were issued directly to the artillery units. The disadvantages of this procedure are readily apparent when it is considered that the T/O scarcely provides sufficient personnel to drive and maintain T/O and E vehicles. Worse still, some of the Dukws issued had been reclaimed from salvage, and should have been equipped with oarlocks and a tin can for bailing to insure efficient operation.

About eight miles north of our bivouac area there was an abrupt change in the character of the shoreline, and the slope of the beach was such that an LST can accomplish a nearly dry-ramp landing. It was finally decided that despite the eight-mile haul the loading could be completed there more rapidly than at our own beaches. The ships were moved north for completion of the loading. Even here, however, it was necessary to stop work for several hours at high tide.

Now a word for the LSM. This new little ship, which fits into the scale between the LST and LCT, proved ideal for lifting a battery. The space is just about adequate for the guns, prime movers, and vehicles of one battery, and



A Long Tom at Carigara blasts a Jap convoy.

the shallower draft permits good beaching under unfavorable conditions. Each battalion was furnished one of these ships, and their loading was accomplished with relative ease. The only real drawback noted in this operation was that most of the personnel aboard suffered acute seasickness as the tiny ships rolled through the rough seas between Leyte and Okinawa.

It will perhaps help to clarify the picture in the reader's mind if we pause now to summarize the results of our observation of loading operations at Leyte. It is apparent that the major obstacles were high seas and poor beaches. The former can be substantially overcome on most Pacific islands by conducting loading operations on the west shore. The construction of piers in the quiet protected waters of a lee shore will dispose of the latter. If good beaches can be found even at a distance from bivouac and dump areas their use will prove economical of time and equipment despite long hauls.

Okinawa showed us that the more we learn the more we have to learn. Again the beaching conditions were different from any we had previously experienced. This time, however, the differences were mostly for the better. The usual reef was there all right, but when the tide went out, lo and behold, it was completely dry. The principal difficulty was the inability of LSTs to approach close enough to the reef to lay the ramps on the shallowest part of the reef. A small gap existed in which the water was four and a half feet deep at high tide. Most vehicles were able to unload and roll across the reef at low tide, but we were forced to suspend the unloading of ammunition and supplies as the water rose, except when Dukws were available. A full speed approach at high tide might have permitted LSTs to reach a point where the ramp could reach the shallow reef shelf, but the

risk of staving in the bottom on the sharp coral was too great. The solution indicated was the use of a ponton causeway unit. One of these pontoons could have been pushed up onto the reef shelf and used as a bridge between ship and reef. It was noted that this was done at a near-by beach, and appeared to be working satisfactorily.

As is the usual case, ¼-ton jeeps were unable to negotiate the deep spot at the end of the ramp. This problem seldom causes much trouble, particularly when the water is shallow enough to permit a 2½ ton truck to operate. The truck can be backed up to the ramp and a jeep run directly into the body for the trip to shore.

LSMs proved very successful under these beaching conditions. The shallower draft permitted them to approach close enough to the reef so that every vehicle was able to proceed ashore under its own power.

As an interesting sidelight it may be well to mention that while unloading an LST one of our M-5 tractors drove into a pothole at the edge of the reef and vanished from sight. This serves to underscore the need for carefully marking out a path from the ramp to dry land.

Our plan for putting reconnaissance parties ashore has now become fairly well standardized. We load a ¼-ton jeep in a Dukw, together with such equipment as is needed by the reconnaissance party. This Dukw is launched as soon as the situation permits the landing of reconnaissance elements. This saves a good deal of time in many cases, because LST skippers will not beach their vessels until they have received orders from the group commander, and often not until they have received a signal from the beach control boat as well. With the large number of vessels in the transport area this may take a considerable time, and reconnaissance parties may gain half a day or more by landing with-

out waiting for their ships to beach. The Dukws must be equipped with A frames for removing jeeps ashore, and various battalion reconnaissance parties must plan to meet and lift each other's jeeps, because the A frame on a Dukw cannot be used to lift the jeep out of its own body.

At Okinawa we were fortunate enough to be equipped with Weasels. These added greatly to the mobility of the reconnaissance elements. Our ships were brought close inshore to launch the parties, and the water was very calm. We were thus able to bring the Weasels ashore at once. Under no circumstances should the Weasels be launched unless those conditions pertain, for they have so little freeboard that the least bit of surf will swamp them. Once ashore they are invaluable for traversing swamps and rice paddies, and laying wire cross-country in lowland areas, but they will not last long if used on rough and rocky terrain.

Little has been said about the use of small craft for landing artillery, but this is not a subject to be passed over lightly, in view of observed results. It was noted at Saipan that the first artillery ashore was put there, not by LSTs, but by small craft unloading the larger shipping. An LCT will carry approximately three 155 howitzers or two Long Toms

with prime movers, and an LCM will carry a howitzer and prime mover. These craft, particularly the LCM, will often be able to pass through a breach in a reef and place a gun on dry land. Since the writer has had no contact with the problems of unloading artillery from transports into small craft a detailed discussion of the subject is better left to someone more qualified.

An outstanding feature of modern amphibious warfare is the thoroughness of preliminary under-water reconnaissance. The methods by which this is accomplished are perhaps not open to discussion at this time, but it is sufficient to mention that on the evening of L-1, while we were still at sea off Okinawa, a courier vessel drew alongside and delivered to us a chart showing in greatest detail the reef outline and characteristics, and a complete verbal description of all beach approaches.

The subject matter herein has been presented as a narrative of the writer's experiences rather than as an itemized list of do's and don'ts because it is not desired to foist any opinions or conclusions on the reader, but rather to lay the facts before him and permit him to draw his own conclusions, tempered perhaps by the experiences of other writers in various theaters.



Field Manual 21-6

A good lawyer can't quote you all the law or remember too many decisions, but he can without hesitation reach up to the shelf and haul out the appropriate book dealing with a particular question.

So it is with a motor officer in regard to maintenance publications. He should know what technical manuals and bulletins are up to date. It has been learned that many officers are not familiar with authorized maintenance publications and War Department Lubrication Orders covering the equipment of their outfit.

A maintenance officer should be certain that his headquarters has on file the publications that cover equipment pertinent to his unit.

With the publishing monthly of FM 21-6, War Department Field Manual with lists of training publications, a commanding officer is given at least half a chance to know what is old and what is new in regard to technical manuals and bulletins. FM 21-6 lists Field Manuals, Firing Tables, Lubrication Orders, Mobilization Training Program, Technical Bulletins, Technical Manuals and Training Circulars. To be on the ball with up-to-the-minute manuals you should be sure that this monthly new FM 21-6 reaches you every month.

The purpose of FM 21-6 is to provide as complete as possible the list and index of War Department training publications.

It is noted in the FM 21-6 that the practice of issuing changes in the form of monthly supplements to this man-

ual has been discontinued. FM 21-6 is being published monthly as a recurring manual and includes all changes up to the time of publication. It is like a new telephone directory.

Publications issued during the previous months are indicated in the current FM 21-6 by an asterisk. Hence, it is easy to check your files. Commanders who are responsible for maintaining sets of publications are urged to have them checked periodically against the list of supersessions and recessions which are printed in each monthly issue of FM 21-6.

Maintenance of a file is required of a commander whether the unit is a company or higher echelon. Proper maintenance of a file means having the publications on hand which deal with particular equipment of your unit and keeping these files up to date. Missing manuals or other publications necessary for the upkeep of equipment of a command should be procured without delay from an Adjutant General Depot or other appropriate issuing point.

It is suggested that files be carefully checked and requisitions only for missing copies be sent out. Keeping too many copies of a particular manual will deprive another unit of that manual. Units have been known to selfishly order whole sets of files when they only needed a few copies.

A mechanized war is a fast changing war in physical position, in models of equipment and in procedures of administration. FM 21-6 in its latest form and with its monthly issue should be a great help in keeping abreast of changes in training publications.

A Graphical Method of AA Analysis

By Colonel C. H. Treat, Coast Artillery Corps

The analysis of antiaircraft gun target practices has always been a time-consuming job. When firing is continuous, computations often fall considerably behind the progress of firings. In order to speed up these analyses, a graphical method of analysis has been developed and successfully used in the Panama Command. The method is accurate and sufficiently speedy that when using visual target position data and deviations telephoned into the "plotting room" during the progress of a shoot, analysis is completed and deviations in yards for each burst are available for the critique immediately following the practice.

In the following discussion it is assumed that the reader is familiar with paragraph 40, TM 4-234 (Antiaircraft Artillery Target Practice). The graphical solution closely parallels the analytical solution described.

Target position data obtained from camera or visual records are plotted on a plotting board (see figure 1) from which O_1 and O_2 horizontal ranges are read directly. It may be noted in figure 1 that several holes are seen at the left end of the base line. The extreme left hole is the O_1 station whereas the others represent the several firing positions in use. It was found that when the O_1 station is about 200 yards from the guns, cameras give less mechanical trouble and visual details do more accurate work. Furthermore this permitted the use of a single O_1 detail regardless of the shift of firing from one firing position to another. No error was thus introduced as will be shown.

The plotting board is made of plywood on which linen-backed paper is cemented with linoleum cement. The

arms are $\frac{1}{4}$ " lucite, graduated to the scale 400 yards to the inch—the smallest division being 20 yards. The azimuth scale is centered around the O_2 station and on the board illustrated was divided into single mils by means of a Cloke plotting board. The one azimuth scale is used to set both the O_1 and O_2 arms. This is accomplished by means of a coupler on the O_1 arm. (See figure 1.) On the underside of the coupler are ink-filled marks which represent the true distances from O_2 to the various points at O_1 .

Figure 2 is the form used. Bursts are grouped to the nearest five seconds as explained in paragraph 40 *b.*, TM 4-234 and columns 1, 2, 3, 5, 8, 10, 11, 13 and 15 are filled out from appropriate records.

The process of analysis begins with the plotting board. The pivot of the O_1 arm is placed in the O_1 hole. The arms are set at the approximate azimuths as given in columns 2 and 3. A piece of 18" x 18" paper is slipped under the intersection of the O_1 and O_2 arms and the arms are then accurately set. Then the plotter draws the "T" angle and, using a targ reads and records the O_1 range. The setter then clears the O_1 arm and the plotter reads and records the O_2 range. These are the horizontal ranges and they are entered in columns 4 and 7. The O_2 arm and the targ are held in position while the O_1 pivot is moved to the firing position hole. The O_1 arm is now positioned against the targ and the gun-target line is drawn and labeled. An arrowhead indicating direction of fire is added to avoid possible confusion.

In practice, the form shown in figure 2 is printed on the

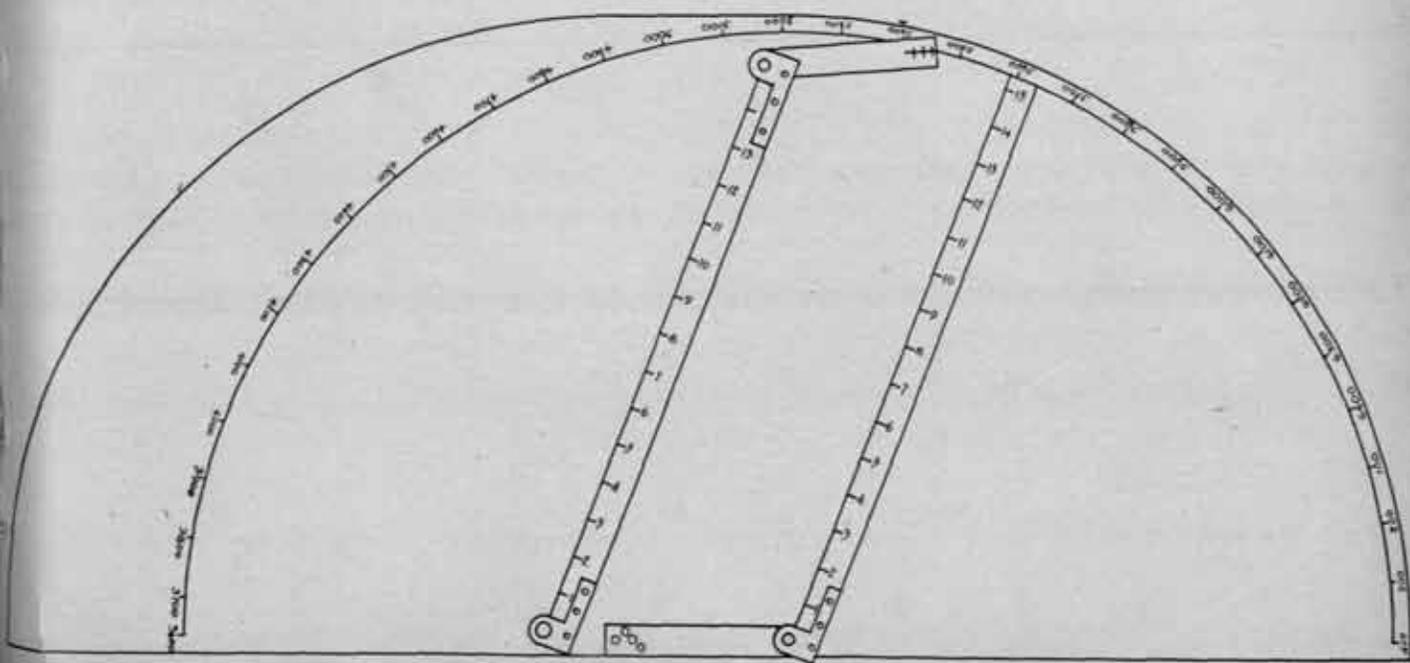


Figure 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Group No.	O, Azimuth	O, Azimuth	Horizontal Rng. from O _h	Angular Ht. from O _a	Slant Rng. from O _s	Horizontal Rng. from O _h	Angular Ht. from O _a	Slant Rng. from O _s	Burst No.	O, Deviation ϕ Rt. or L.	O, Deviation Yds. Rt. or L.	O, Deviation ϕ Above + Below -	O, Deviation Yds. Above + Below -	O, Deviation ϕ Over + Short -	O, Deviation Yds. Over + Short -	Lateral Dev Yds. Rt. or L.	Hor. Rng. Dev. Over + Short -	O, Comp. Rng. Dev. Above + Below -	O, Comp. Rng. Dev. Over + Short -	Range Deviation Algebraic Sum 19 and 20
25	5421	4730	5290	287	5510	6510	235	6690	1	L 8	L 44	+ 9	+ 50	- 28	- 189	L 58	- 242	+ 15	- 252	- 237
									2	L 10	L 56	+ 8	+ 44	- 32	- 216	L 72	- 269	+ 13	- 280	- 267
									3	L 15	L 84	+ 7	+ 38	- 34	- 229	L 99	- 254	+ 11	- 261	- 250
									4	L 30	L 167	+ 5	+ 28	- 31	- 209	L 174	- 115	+ 8	- 120	- 112

Figure 2

edge of the 18" x 18" paper mentioned above, and one such piece of paper is used for each group of bursts. Thus the graphical work and figures are never separated.

This form is removed from the plotting board and passed to the next man who operates a Crichlow slide rule obtaining the slant ranges which he enters in columns 6 and 9. The form then goes to the "mils to yards" board.

The "mils to yards" board is illustrated in figure 3.

Along the lower edge of the board there is a slant range scale (1" equals 400 yards). From the zero point at the lower left corner, lines representing mils deviation are drawn so that at 10,000 yards slant range they are 1/2 inch apart. The "T" square arm is inscribed (on the under side to eliminate parallax) with a line perpendicular to its head and divided into twentieths of inches. Each twentieth of an inch represents one yard. The "T" square index is slid

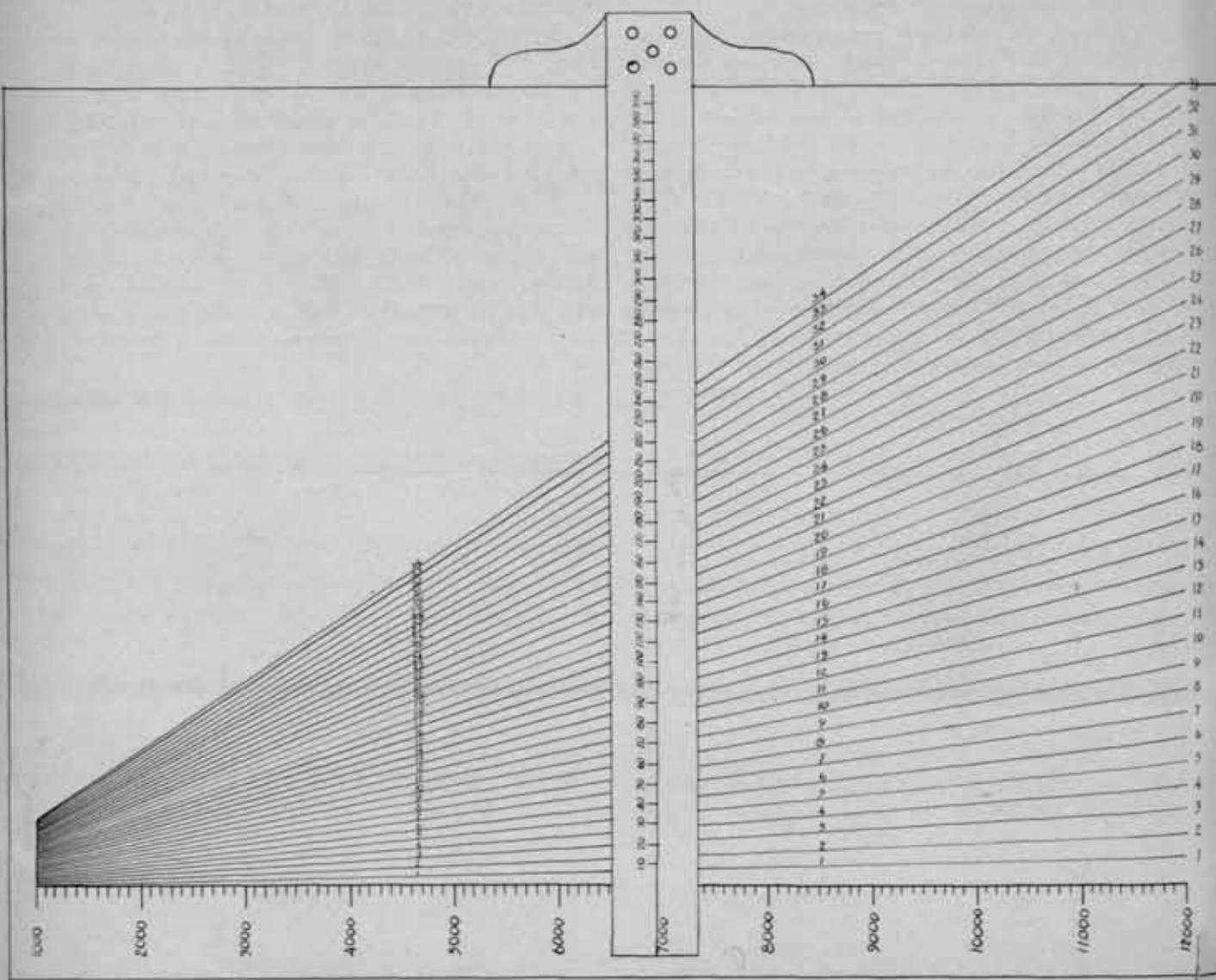


Figure 3

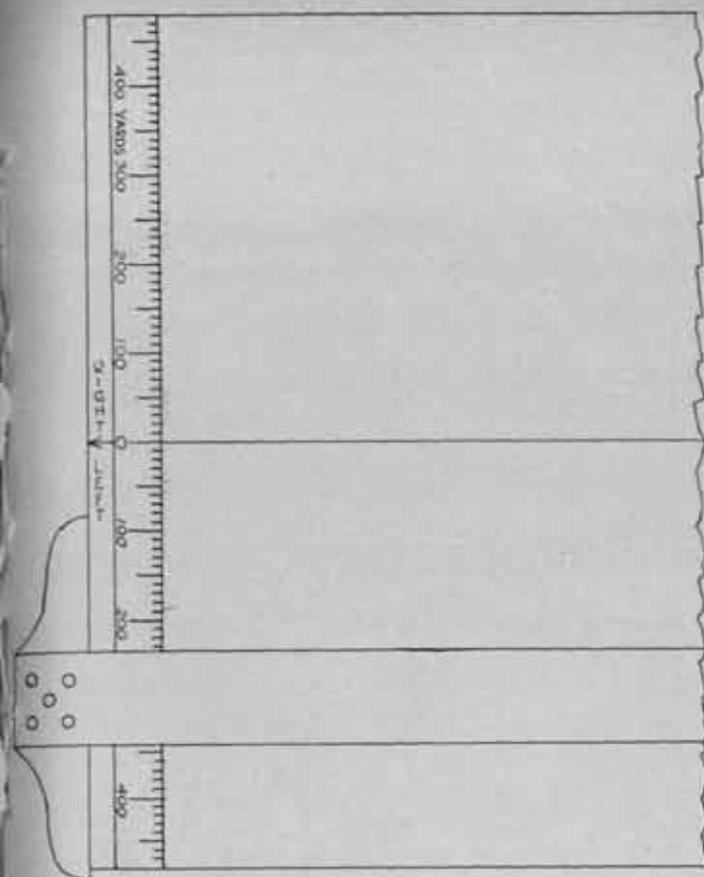


Figure 4

along the top of the board to the slant range as read from column 6. A deviation in mils is read from column 11, and the proper mil line selected on the board. At the point of intersection of this line with that of the "T" square line, the deviation in yards is read on the "T" square arm and the figure is entered in column 12. Without moving the "T" square, all O_1 deviations (above, below, right, and left) for the group are read and recorded in the proper columns. The "T" square is then moved to the slant range as read from O_2 (column 9) and the O_2 deviations converted to yards. These are entered in column 16.

The form next passes to the drawing board shown in figure 4. It consists of an ordinary "T" square and a board on which a heavy black line is drawn. At the left of the board, a scale representing yards deviation and divided 40 yards to the inch, extends above and below the heavy line. The form is placed on the board, the O_2 line coinciding with the heavy line on the board. The edge of the "T" square is set at the desired O_2 deviation as read from column 16 and a line drawn the length of the paper. The line is labeled with the proper burst number. This is done for each burst. In this case, O_2 is on the right with the result that when the direction of fire on the plot is toward the "T" square head, O_2 deviations to the right are plotted above the heavy line and those to the left below. The plot is now moved so that the O_1 line coincides with the heavy line. O_1 deviations to the right are above the line and those to the left are below. The "T" square edge is set for the first burst, and the intersection with the proper O deviation line is marked. This is done for each burst in the group.

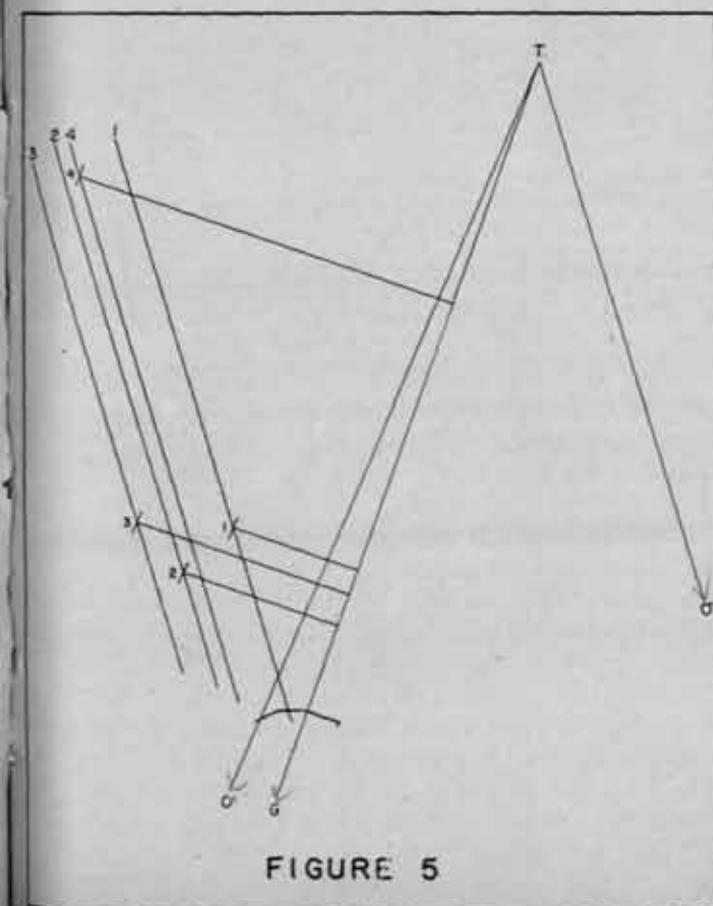


FIGURE 5

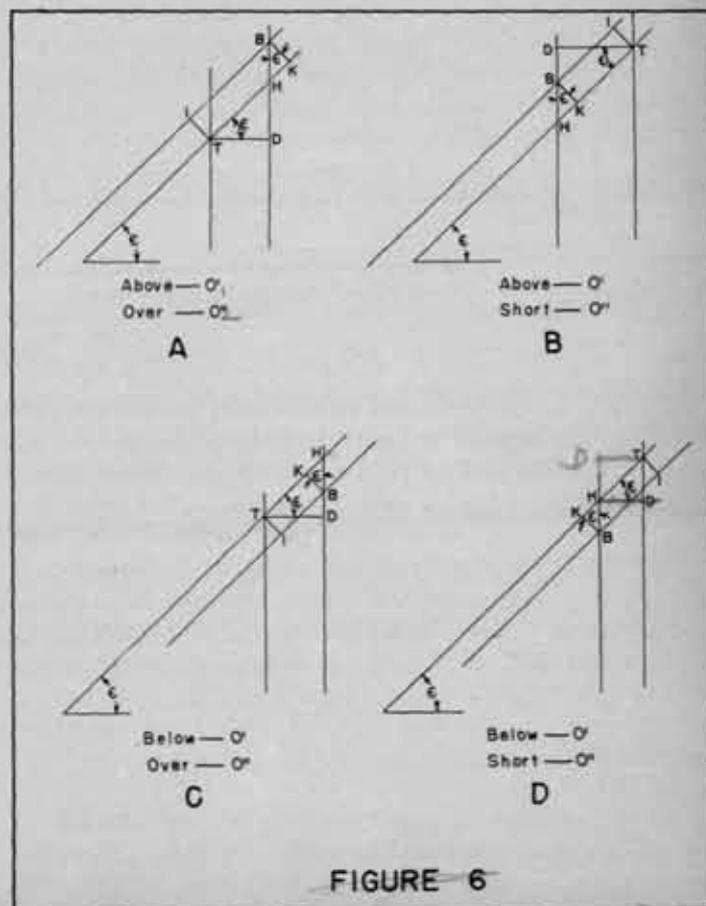


FIGURE 6

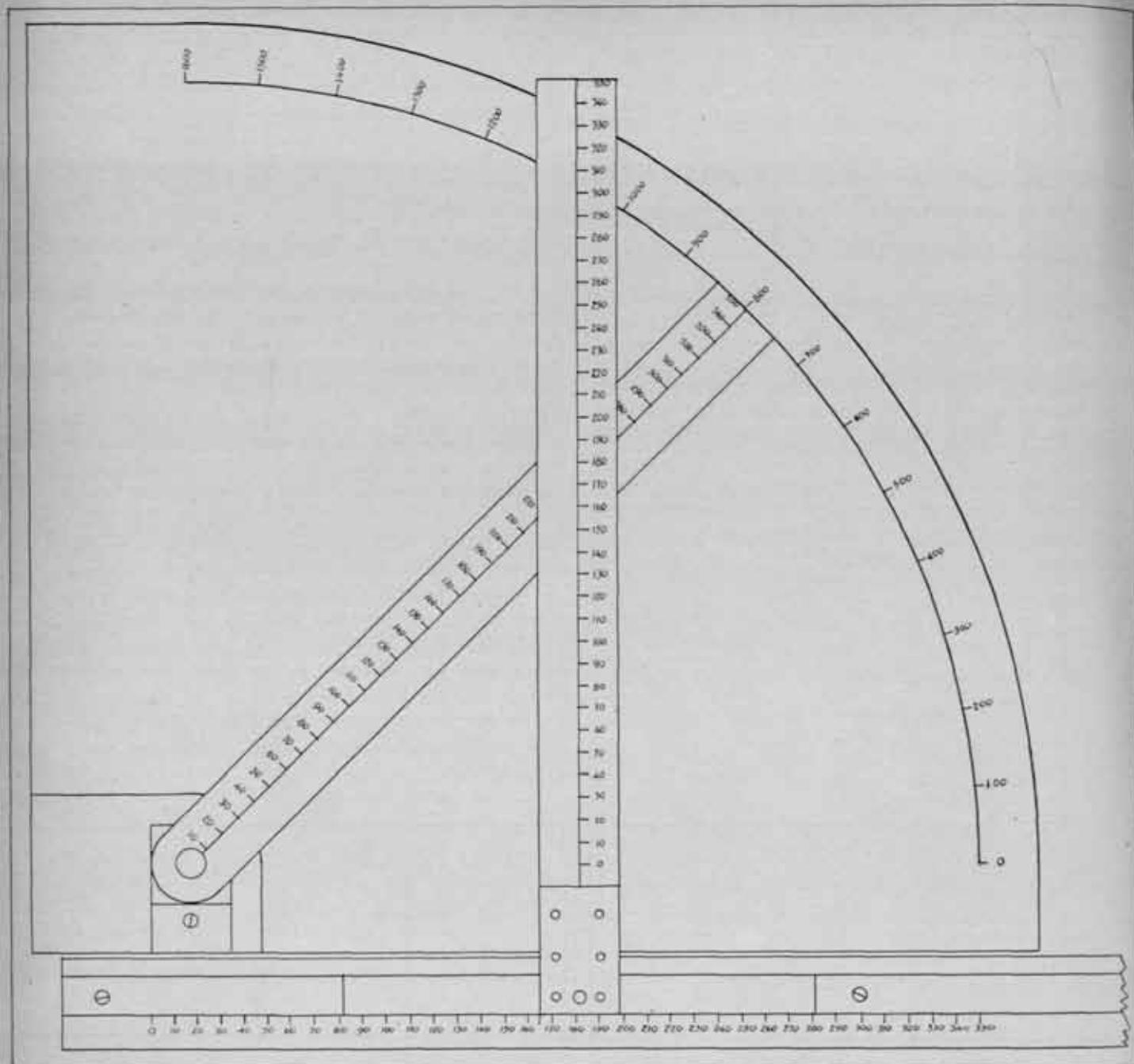


Figure 7

We now have a horizontal projection of each burst with respect to the target (see figure 5, TM 4-234), but we are interested in the position of these bursts only with respect to the gun-target line, a line which has to this point not been used for any purpose. If necessary the next man extends the gun-target line, and using a "T" square and triangle drops perpendiculars from the plotted burst points to the gun-target line (see figure 5). The O_1 deviations right or left and the horizontal projection of the range deviation can now be measured perpendicular to and along the gun-target line respectively, for each burst and these entered into columns 17 and 18. The same scale, 40 yards to the inch, is used.

The O_1 deviations, right and left are true deviations, but the range deviations as entered in column 18 are the horizontal projections of the true deviations. In figure 6A (a projection on the vertical plane containing the line of

position), T represents the target and B represents the burst (see figure 6, TM 4-234). In this figure we have obtained the horizontal distance TD whereas the desired deviation is TK along the line of position. In the right triangle TDH the desired quantity is TH, the hypotenuse. Since we know the base of the triangle, line TD, and the base angle, DTH, we can solve for the hypotenuse. In the right triangle KBH the desired quantity is HK, the altitude. Since we know the base of the triangle KB equals T1 (vertical deviation from O_1) and the base angle KBH, we can solve for the altitude. Adding these two components, TH and HK we have obtained the desired deviation TK. The four drawings in figure 5 represent the possible combinations of deviations from O_1 and O_2 . An examination of these figures will reveal that the true deviations, TK in each case, can be considered as consisting of two components; an O_2 component which is the hypotenuse of a

right triangle having the O₂ horizontal deviation as its base and the O₁ vertical angle E as its base angle, and an O₁ component which is the altitude of a right triangle having the O₁ vertical deviation as its base and the O₁ vertical angle as its base angle. It will also be seen that if O₂ deviations are considered as plus values for overs and O₁ deviations considered as plus values for aboves, the two quantities may be added algebraically to obtain the true deviation—an over being represented by a positive value of the sum and a short represented by a negative value of the sum. This brings us to the last board (see figure 7).

This board is made of plywood covered with linen-backed paper cemented on with linoleum cement. At the lower edge is a one-inch brass channel in which rides the brass head of a "T" square. A small pointer on the "T" square head rides over the deviation scale engraved on the lower brass strip. The "T" square arm is made of lucite. On its under surface (to avoid parallax) is engraved a scale of yards to the same scale as that on the brass strip (10 yards to the inch). Pivoted above the zero of the horizontal scale is the hypotenuse arm on top of which is engraved a third scale of yards. At the end of the hypotenuse arm and centered at its pivot is a mil scale with zero horizontal with the pivot. For any group of bursts the hypotenuse arm is positioned at the O₁ angular height as read from column 5. The "T" square head is then slid to the O₂ horizontal deviation as read from column 18. The O₂ component of the range deviation is read from the hypotenuse arm and entered with the proper sign in column 20. The head is then slid to the O₁ vertical deviation read from column 14 and O₁ component of range deviation read from the "T" square arm and entered in column 19 along with its sign.

The last step is the algebraic addition of columns 19 and 20 with the result entered in column 21.

Following is a comparison of assumed deviations computed by factors, using five place logarithms, and com-

parable items as taken from the graphical solution. The form used is the form AA-11.

1	2	3	4	5	6	7	8	9
Group	O ₁ Rng	O ₂ Rng	GTF		F ₁	F ₂	F ₃	F ₄
25	5,510	6,690	639 287		1.70	1.38	1.04	.29

by factors

11	12	13	14	15	16	17	18	19	20
1	189	-321	58 +	80	-241	-251	+50	+15	-236
2	216	-367	72 +	99	-268	-279	+44	+13	-266
3	229	-389	99 +	137	-252	-262	+38	+11	-251
4	209	-355	174 +	240	-115	-120	+28	+ 8	-112

by 5 place logs

11	12	13	14	15	16	17	18	19	20
1	S189	-322	58 +	80	-242	-253	+50	+15	-238
2	S216	-368	72 +	99	-269	-280	+44	+13	-267
3	S229	-390	99 +	137	-253	-263	+38	+11	-252
4	S209	-356	174 +	240	-116	-121	+28	+ 8	-113

Graphically

16	17	18	19	20
-242	-252	+50	+15	-237
-269	-280	+44	+13	-267
-254	-261	+38	+11	-250
-115	-120	+28	+ 8	-112

While the explanation of this system may seem to indicate that it is time-consuming in operation it has proven very rapid, being something of an "assembly line" procedure. The construction of the boards themselves, once the designs were satisfactorily completed, was not difficult, and the training of the men was surprisingly easy. As a hint to possible users of the system, it was found advisable to use a colored pencil for drawing the target line, and to make masks or templates which expose only the columns of figures and blank spaces to be used by any one man.



Convoy Interval Guide—By Lieutenant George A. Dudichum

With the "gadget" described below, which I have named DIG (Dudichum Interval Guide), the assistant driver can check his vehicle's position in a convoy instantly.

The DIG can be applied to the windshield either by stencil (using a grease pencil or other removable substance) or by drawing the required oblongs on Dura-Seal and applying the Dura-Seal to the windshield. The oblongs must be applied at the assistant driver's eye level.

The assistant driver closes one eye to observe the interval. If the vehicle ahead fits perfectly into the proper rectangle, the interval is correct. If the forward vehicle is too large to fit into the rectangle, the vehicle ahead is too close. If the vehicle ahead does not fill the proper rectangle, the observer's vehicle is lagging.

The DIG should be especially valuable in training drivers—after being checked a few times the driver should have a fair idea of how large the vehicle ahead should appear at different intervals.

DIG DUDICHUM INTERVAL GUIDE

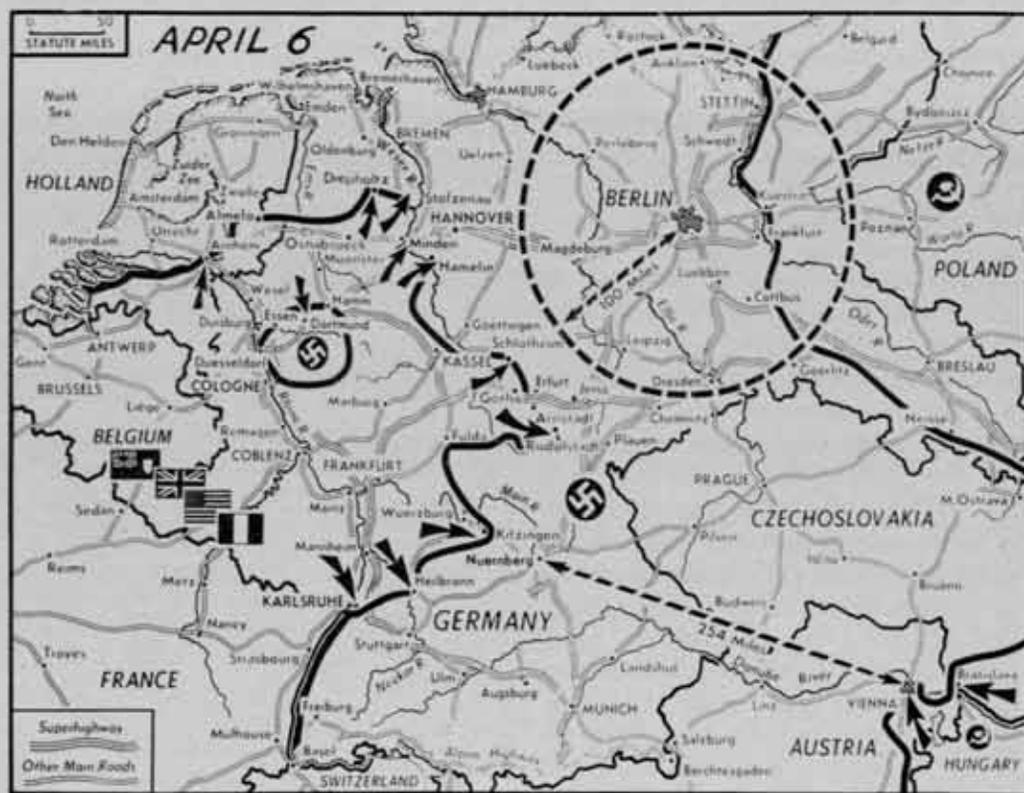
2 1/2 TON CARDS	2 1/2 TON VAN	5 TON WHEE HOVER	5 1/2 TON WEAPON CARRIER
30 YDS. 1'10" X 1'50"	50 YDS. 1'00" X 1'50"	55 YDS. 1'00" X 1'75"	30 YDS. 1'00" X 1'10"
100 YDS. 0'58" X 0'71"	100 YDS. 0'55" X 0'85"	100 YDS. 0'64" X 0'90"	100 YDS. 0'52" X 0'69"
150 YDS. 0'56" X 0'59"	150 YDS. 0'56" X 0'55"	150 YDS. 0'59" X 0'61"	150 YDS. 0'52" X 0'56"

DIG FIRED ON INSIDE OF WINDSHIELD AT EYE LEVEL OF ASSISTANT DRIVER

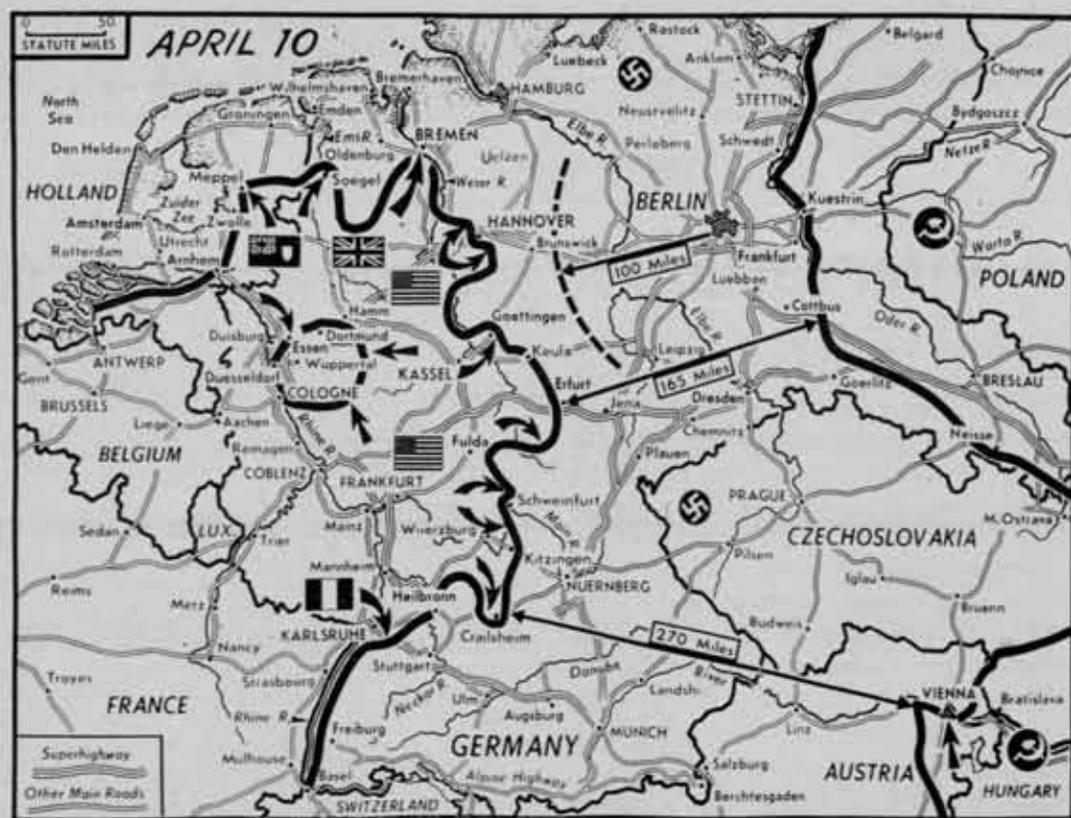


PORTION OF ASSISTANT DRIVER WHILE LOOKING THROUGH DIG

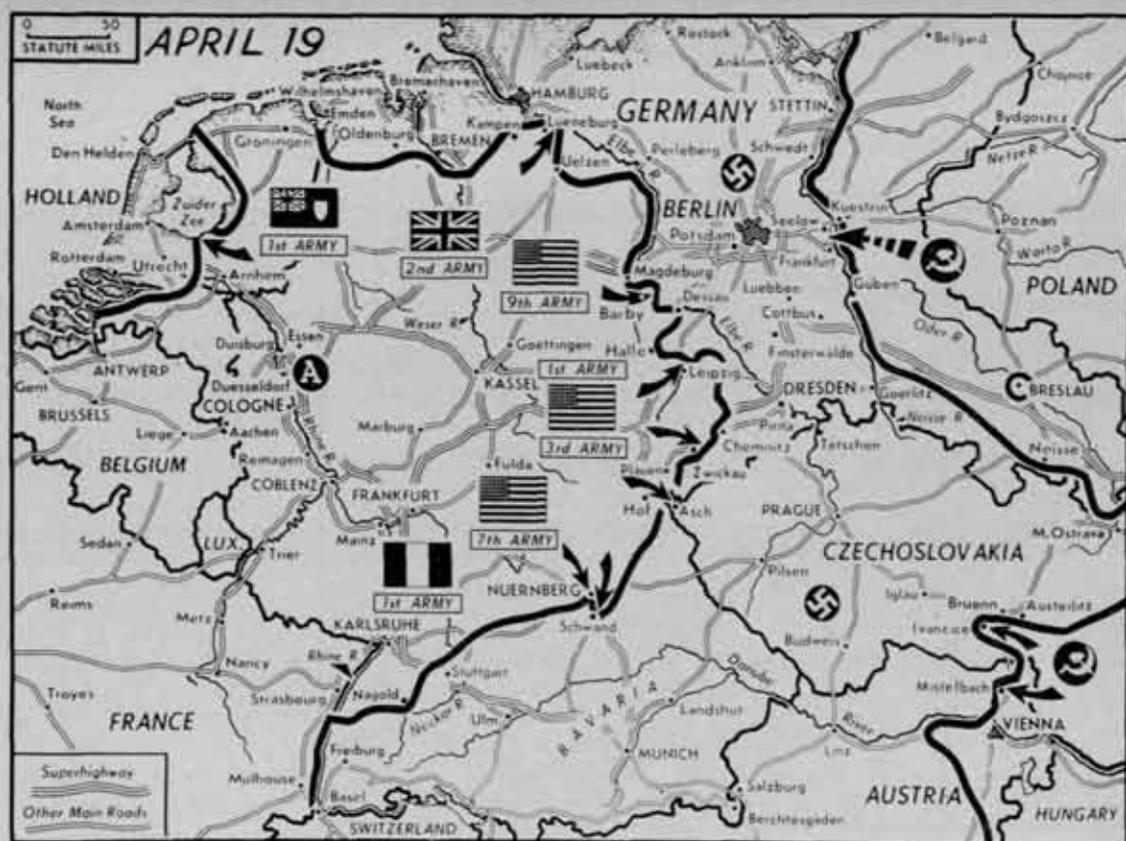
VICTORY IN EUROPE



On 6 April, the Americans and British were thrusting across the Weser in the Minden-Hamel area. Other British troops reached Diepholtz and captured Stolzenau. The Americans in the center of the Western Front were under a news blackout, but were believed to be in the Rudolstadt area. The Russians were near Vienna.



By 10 April the Russians were in and west of Vienna, the British were thrusting northward toward Emden and Bremen, and the Americans were pushing beyond Hannover.



Progress by 19 April showed the Canadians at the Zuyder Zee, the British at the Elbe southeast of Hamburg, and the Americans past Leipzig. In the south other American troops had entered Czechoslovakia and cleared most of Nuernberg. The Ruhr pocket (A) was virtually cleared. The Germans reported Russian attacks toward Berlin; the Russians announced only that gains were made between Vienna and Bruenn.



The shaded area indicates what remained to Germany on 25 April. Two Russian armies were fighting in and around Berlin.

APRIL 25



Americans and Russians joined at Torgau on 25 April. The black areas indicate remaining German-held territory within the pre-1938 borders of the Reich.

By 1 May the Americans were in Austria; another link-up with the Russians was expected at Linz. The French took Friedrichshafen; Americans had Munich and Mittenwald. In Italy the Allies held Turin, and were approaching the Yugoslavs in Trieste. The Russians held almost all of Berlin and were gaining farther north.





The map, covering the situation up to 4 May, shows the territory gained from the Rhine crossing 8 March to the junction at Torgau on 25 April; and in a different shading, that gained since the crumbling of German resistance on that date.



The closing drives, on 7 May, the date of the surrender. Stockholm reported that the Germans in Norway (A) had surrendered. Black areas still held out up to the time of the official surrender. There was still German resistance in Czechoslovakia up to about 14 May.

PRESSURE ON JAPAN



Areas in black were Japanese-held on 19 March. Since then we have landed on: Panay, 20 March; Malanaui, 20 March; Cebu, 23 March; Guimas, 23 March; Mactan, 30 March; Cautit, 30 March; Negros, 31 March; Caballo, 31 March; Tawi Tawi, 4 April; Bongao, 4 April; Sanga Sanga, 4 April; Masbate, 5 April; Busuanga, 8 April; Jolo, 9 April; Bohol, 11 April; Rapu Rapu, 15 April; Batan (Island), 15 April; Cagraray, 16 April; Balabac, 19 April; Carabao, 19 April; and Samal, 10 May. The city of Davao was liberated 6 May.

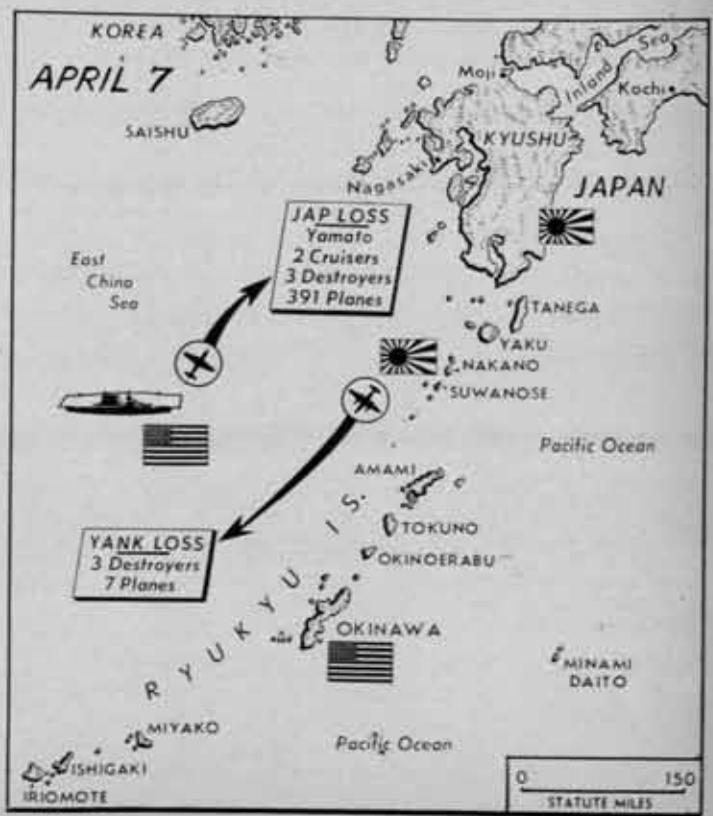


On 13 May the situation on Mindanao was progressing favorably. Solid arrows indicate the American drives. The 24th Division fought off a bitter counterdrive (broken arrow) northwest of Davao.



The black area shows that held by Americans on Okinawa 4 April, after the landing 1 April. By 17 May Americans were fighting in Naha, which had been leveled during the fighting. Yonabaru Airfield had been captured 14 May; the near-by island of Ie Shima had been taken 19 April, and Tori (55 miles west of Okinawa) was taken 12 May.

Boxes show Jap and American losses in the two-day air-sea battle off Okinawa and southwest of Kyushu. Among the Jap losses was the battleship *Yamato*. The B-29 raids on Japan itself, from Guam and Saipan, with fighter support from Iwo, were increasing in intensity. On 17 May Nagoya took the second large-scale raid in 68 hours—500 B-29's dumped 3,500 tons of incendiaries on what was left of the target from previous raids.



Some of Our Subscribers Are Missing . . .

The JOURNAL tries very hard to keep in touch with its subscribers, but mail goes astray, subscribers fail to send in changes of address, and some headquarters neglect to forward mail. We have lost contact with the personnel listed below—if you know where they are, or if the missing men read this, please notify the JOURNAL.

Name	Last Known Address	Name	Last Known Address
Adam, Lieut. William E.	Hq., 55d Tng. Bn., Camp Haan, Calif.	Kirby, Lieut. Parnell C.	501st AAA AW Bn.
Albers, Lieut. Bert F.	Btry. C, 504th AAA AW Bn.	Kitsonas, Lieut. Nicholas T.	Ft. Bliss, Texas.
Allen, Lieut. Robert H., Jr.	Btry. C, 858th AAA Bn.	Kleiner, Lieut. Robert E.	454th C.A.
Anderson, Lieut. Paul E.	Btry. B, 498th C.A. Bn.	Koch, Lieut. Kenneth A.	Farmingdale AAF, N. Y.
Arthur, Lieut. Virgil D.	Btry. C, 246th C.A.	Krasnow, Lieut. Nathan A.	AP0 7019, N. Y., N. Y.
		Kupper, Capt. Theodore H.	AP0 487, N. Y., N. Y.
Baird, Capt. Ralph W.	605th C.A.	Lafin, Lieut. Eli F.	AGF Repl. Depot No. 1
Baldwin, Capt. Frederick M.	99th AAA Gun Bn.	Lawrence, Colonel Abraham M.	Hotel Cortez, El Paso.
Beal, Lieut. Harold J.	135th C.A. Bn.	Lyon, Lieut. David L.	Farmingdale AAF, N. Y.
Benson, Capt. Edward M., Jr.	AAA ORP, Camp Callan, Calif.		
Bloom, Capt. George E.	Camp Chaffee, Ark.	McCarthy, Lieut. James E.	795d AAA AW Bn.
Bostwick, Lieut. David C.	792d C.A. Bn.	McCarthy, Lieut. Max R.	147th AAA Gun Bn.
Boyd, Capt. Donald F.	Btry. D, 508th AAA Bn.	McKee, Lieut. Roland E.	Btry. F, 210th C.A.
Bridgman, Capt. John	AATC, Camp Stewart, Ga.	Martin, Capt. Wm. T.	541st AAA AW Bn.
Bruce, Capt. Peter P.	Camp Davis, N. C.	Mayes, Lieut. Jesse J.	AP0 5131, c/o P.M., N. Y., N. Y.
		Miller, Lieut. George E.	Camp Davis, N. C.
Campbell, Lt. Col. James T.	Camp Edwards, Mass.	Miragliotta, Lieut. Joseph C.	40th C.A.
Campbell, Lieut. Wm. D.	AAATC, Camp Hulén, Texas.	Mothershead, Capt. Charles I.	99th C.A.
Carpeneto, Lieut. James H.	241st C.A.	Mountain, Lieut. Harold S.	601st C.A.
Caroenter, Capt. Edmund H.	Btry. D, 210th C.A.	Murphy, Capt. Dennis V.	31st C.A.
Coghlan, Lieut. John E.	Btry. B, 204th C.A.	Murphy, Marvin H.	248th C.A.
Conway, Colonel Eugene T.	Hq., 39th C.A. Group.	Myer, Lieut. Jimmie H.	Gp. 19, OCP, Camp Edwards, Mass.
Coontz, Capt. John B.	Camp Tyson, Tenn.		
Cox, Capt. Andrew L.	2600 Pa. Ave., Pgh., Pa.	Olsen, Lieut. Carl B.	511th AAA Gun Bn.
Crow, Lt. Col. Frank M.	San Diego, Calif.		
Crowley, Capt. Francis	197th C.A.	Penney, Lieut. John J.	605th C.A.
Curtis, Capt. Elmer P.	AAA ORP, Ft. Bliss.	Pohl, Major Marion G.	AAA ORP, Camp Davis, N. C.
		Post, Lieut. Judson S.	AP0 852, c/o P.M., Miami, Fla.
Davis, Lieut. Albin P., Jr.	TC NYPE.	Potter, Lieut. Howard S.	8th C.A.
Davis, Lieut. Donald F.	Off. Sch., AAATC, Camp Haan, Calif.		
deLatour, Major Frank A.	89th C.A.	Rasbury, Capt. Manning S.	214th C.A.
Denmark, Lieut. Bernhardt	Btry. K, 603d C.A.	Reid, Lieut. Clarence G.	Btry. A, 165th C.A. Bn.
DuBois, Capt. Edmund L.	Btry. B, 70th C.A.	Rice, Lieut. Wm. S.	EPRC, Hq., 4th Ser. Comd.
		Ritchie, Lieut. Robert D.	Camp Hulén, Texas
Ellard, Capt. George E.	605th C.A. AA Group.	Roberts, Lieut. Dale E.	Brooke Gen. Hosp.
		Robinson, Lieut. Arthur F.	IORP, Camp Wheeler, Ga.
Fleming, Lieut. Raymond L.	Btry. H, 369th C.A.	Rowan, Capt. J. M., Jr.	862d AAA Bn.
Forsander, Capt. Donald E.	267th C.A.	Ruf, Lieut. Frederick M. J.	517th AAA Gun Bn.
Fox, Lieut. Morley E.	Btry. F, 40th C.A.		
Fredericks, Lieut. Robert I.	Btry. J, 88th C.A.	Saleeby, Lieut. Drahma J.	422d C.A.
Furlan, Lieut. James E.	AGF Repl. Depot No. 1.	Savles, Lieut. Harry L.	AP0 847, c/o P.M., Miami, Fla.
		Schott, Major Carl H.	Ft. Eustis, Va.
Gay, Major Wm. S.	AAAC MDS, Washington, D. C.	Schub, Lieut. John P.	549th C.A.
George, Capt. Robert B.	Hq. Btry., 570th F.A. Bn.	Scott, Lt. Col. Charles H.	Camp Davis, N. C.
Gifford, Lieut. Horace S.	Hq., 216th AAA Group	Searles, Lieut. John R., Jr.	AAFSAT, Orlando, Fla.
Gilman, Lt. Col. Seymour I.	Hq., 335d Sl. Bn.	Sexton, Lt. Col. James N.	451st C.A. Bn.
Graham, Lieut. Rudy N.	AP0 390, c/o P.M., San Francisco, Calif.	Shabanowitz, Lieut. Harry	544th AAA AW Bn.
		Shelton, Lieut. Frank W.	54th AAA Brig.
Grasso, Lieut. Vincent A.	Btry. E, 18th C.A.	Shinney, Lieut. Francis J.	7th C.A.
Gray, Lieut. John T.	Btry. B, 422d C.A.	Slover, Lieut. Archy F.	248th C.A.
Groll, Lieut. Donald J.	Ft. Knox, Ky.	Smeltzer, Capt. Paul T.	399th C.A.
Grunewald, Capt. Walter C.	1st Bn., 215th C.A.	Smith, Lieut. Dale H.	248th C.A.
Guala, Lieut. Victor A.	Camp Edwards, Mass.	Smith, Capt. Henry J.	AP0 851, c/o P.M., Miami, Fla.
Gum, Lieut. John D.	Camp Howze, Texas.	Smith, Capt. Herbert E.	79th C.A.
		Smith, Lieut. John C.	248th C.A.
Hafer, Lt. Col. Joseph B.	602d C.A.	Spottswood, Major Robert F.	AGF Repl. Depot No. 1.
Haggerty, Major Francis V. J.	Hq., 68th AAA Brig.	Stafford, Capt. Carroll W.	79th C.A.
Hammond, Lieut. Henry R.	Btry. D, 69th C.A.	Stevenson, Colonel Peter J.	Camp Edwards, Mass.
Hand, Capt. Robert G.	834th AAA AW Bn.	Suhar, Major Stanley	47th C.A. Brig.
Hebert, Lieut. Achille C.	Ft. Eustis, Va.		
Herrick, Brig. Gen. Huoh N.	Brooke Gen. Hosp.	Terry, Lieut. Wm. H.	Btry. A, 420th C.A.
Hochuli, Capt. Arthur J.	264th C.A.	Thewllis, Lieut. Leonard L.	468th AAA Bn.
Hotson, Capt. Hugh H.	Camp Howze, Texas.	Tibbetts, Lieut. Walter I., Jr.	Wrightsville Beach, N. C.
Huckaby, Lieut. Floyd C.	305th Ord. Maint. Co.	Townsend, Lieut. John G.	16th CAMP Btry.
Hudgins, Lieut. Benjamin F.	701st AAA Gun Bn.		
Huff, Lieut. Arthur R.	Hq., 328th AAA Sl. Bn.	Virag, Major Alfred	Seattle, Washington.
Huffman, Major Walter	605th C.A. (AA).		
		Walbridge, Colonel Vern	89th C.A.
Isham, Charles H.	Mapping Sec., 2d Engr. Bn.	Waller, Lieut. George M., Jr.	914 Octavin St., El Paso.
		Warnecke, Lieut. Edward M.	AGF Repl. Depot No. 1.
Jakovec, Lieut. Milton E.	Camp Bowie, Texas.	Warren, Lieut. Wm. A.	Ft. Standish, Mass.
		Weber, Lieut. James J.	Camp Tyson, Tenn.
Kaz, Lieut. George W.	587th AAA AW Bn.	Williams, Capt. Charles H.	12th Fighter Command.
Kelly, Major Ira D. S.	1315th Engr. C.S. Regt.	Wilson, Lt. Col. Auston M.	2418 39th St., Washington, D. C.
Kile, Lieut. Wm. S.	4th Army	Wolsie, Lieut. Sidney	Camp Edwards, Mass.
King, Lieut. Wm. I.	216th C.A. (AA).	Wollner, Lieut. D. E.	402d AAA Gun Bn.
		Wood, Capt. David M.	938th AAA AW Bn.
		Woodes, Major Raymond C.	Camp Butner, N. C.
		Woodson, Lieut. Bob M.	605th C.A. A.W. Bn.
		Wozniak, Capt. Alfred J.	Ft. Bliss, Texas.
		Wright, Lt. Col. Fred A.	Santa Monica, Calif.
		Yancy, Lieut. Travis A.	3891 Locust St., Riverside, Calif.
		Yates, Major Justin J.	588th AAA AW Bn.

COAST ARTILLERY

Citations and Commendations

Distinguished Service Medal

TO: LYMAN L. LEMNITZER, Major General, U. S. Army.

FOR: Exceptionally meritorious service in a position of great responsibility in North Africa, Sicily and Italy from 25 July 1943 to 2 May 1945. As Deputy Chief of Staff, Allied Armies in Italy, formerly Fifteenth Army Group, and as Commanding General, United States Contingent thereof, and later as Deputy Chief of Staff, Allied Force Headquarters, General Lemnitzer played an important rôle in the planning and execution of carefully prepared plans for the destruction of the Axis armies in Sicily and in the defeat, and final surrender of the German Army in Italy. Responsible for the supervision of the coordination and issuance to the Allied Armies of operational instruction for the conduct of the campaigns in Sicily and Italy, and for close liaison in the field between the Armies of the Allied Nations, as well as the Partisan Forces working in the rear of the enemy lines, General Lemnitzer by his keen foresight, intimate knowledge of military tactics, impartial judgment and untiring devotion to duty made a major contribution to the success of the coordination of the Allied Armies in the Mediterranean Theater of Operations. His outstanding and vitally important management of negotiations for the surrender of the Axis armies in Italy was a major contribution to the Government of the United States and her Allies. Entered the United States Military Academy from Pennsylvania.

TO: GEORGE R. MEYER, Major General, U. S. Army, 447 Burr Rd., San Antonio, Texas.

FOR: Service as Commanding General, Panama Coast Artillery Command, from February 17, 1943, to September 6, 1944, and as Deputy Commander, Panama Canal Department, from September 7, 1944, to January 30, 1945. His high professional attainments, coupled with sound judgment and keen foresight have manifested themselves in the outstanding manner in which he performed his many important duties. As Commanding General of the Panama Coast Artillery Command he accomplished its reorganization with a minimum of disruption, and its subsequent high order of operating efficiency was largely attributable to his clarity of vision, wisdom, energy and inspiring leadership. He maintained his large command under war conditions alert at a high degree of combat efficiency and most notable high morale despite the fact that a large majority of the personnel were living in jungle housing accommodations. As Deputy Commander, Panama Canal Department,

he performed important administrative and tactical duties, including close exercise of authority over the Joint Command Post involving integrating of air, ground and naval forces in a highly creditable manner, thus affording the Department Commander sufficient freedom to carry out his dual responsibilities as Commanding General, Caribbean Defense Command, and Commanding General, Panama Department. By his outstanding performance he materially contributed to the defense of the Panama Canal and its installations.

Legion of Merit

TO: WILLIAM R. NICHOLS, Brigadier General, U. S. Army.

FOR: Exceptionally meritorious conduct in the performance of outstanding service as Chief of Staff, Fourth Corps Area and Fourth Service Command, from December 6, 1940 to February 6, 1944. General Nichols assumed his duties as Chief of Staff at a time when the expansion of the Corps Area due to the National Emergency was in its infancy. On account of his previous experience and his thorough knowledge of mobilization procedures, much of the detail work incident to the installing of the numerous new camps and the establishing of the necessary installations, occasioned by the mobilization of Reserve and National Guard troops was left to his keen judgment. The tremendous influx of troops, increasing as they did from a few thousand to in excess of 1,400,000, created many complex problems in connection with matters that are a service commander's responsibility. The superior results and achievements in the accomplishment of the mission of the Fourth Service Command can largely be attributed to the superior leadership, the intelligence, and the initiative of Brigadier General Nichols, and these qualities were a constant inspiration to the personnel throughout the Fourth Service Command.

TO: RICHARD A. DEVEREUX, Lieut. Col., CAC, 3513 76th St., Jackson Heights, New York.

FOR: Service in the development and establishment of principles, doctrine and procedure of flak analysis. As a senior instructor in the Tactics Department, Antiaircraft Artillery School, from September 30, 1941, to June 10, 1944, his sound practice and technical knowledge of anti-aircraft artillery gunnery influenced his selection to serve with the VIII Bomber Command in the European Theater from September 25 to December 3, 1943, as Assistant A-2,

Antiaircraft Officer. He utilized the material acquired by inexhaustible interest and energy in field and document research in the preparation of training material and the personal instruction of special classes of Army, Navy and Marine officers in the study of flak analysis.

TO: JOHN H. KOICHEVAR, Lieut. Col., CAC, 170 W. Main St., Newark, Del.

FOR: Service as Antiaircraft Officer, Headquarters Airborne Command and Airborne Center, from September 11, 1942, to July 18, 1944. Going well beyond the scope of his assigned duties, he demonstrated outstanding qualities of ingenuity and mechanical ability. He perceived the lack of a .50 caliber machine-gun ground mount suitable for use by airborne troops and he worked untiringly to develop such a mount. After many months of effort and repeated attempt, he evolved a machine-gun mount which proved so superior to existing improvised and standard mounts that it was adopted for the use of airborne troops and subsequently procured in quantity for the use of other troops as well. His talent for invention, his personal initiative and professional skill have provided these troops with a mobile and highly effective means of defense against both ground and low-level air attack which has materially enhanced the combat efficiency of our Army.

TO: ERVAL J. JENKINS, Staff Sergeant, Btry. C, 105th AAA AW Bn., Bogalusa, Louisiana.

FOR: Exceptionally meritorious conduct in the performance of outstanding services, from 15 March to 13 May 1943, in North Africa.



Silver Star

TO: WILLIAM A. HARTMAN, Sergeant, Btry. D, 105th AAA AW BN., Cuero, Texas.

FOR: Gallantry in action on the morning of February 1943, in Tunisia. When his gun position was over-run by enemy infantry attacking with hand grenades, mortars, and machine guns, Sergeant Hartman organized a determined stand and later covered his men when their withdrawal became necessary. Before Sergeant Hartman withdrew he rendered his weapon useless to the enemy by removing essential parts. His display of courageous leadership and intrepidity against the advancing enemy exemplifies the highest traditions of the military service.

TO: ROBERT W. CADY, Corporal, CAC, Verdland Park, Layton, Utah.

FOR: Gallantry in action at Pontaubault, France on the night of 8-9 August 1944. Corporal Cady was on duty at his assigned position in a 90 millimeter antiaircraft gun emplacement when his battery position was attacked by enemy aircraft which dropped many anti-personnel bombs. One of these bombs struck Corporal Cady, knocking him down. The bomb failed to explode. Utterly disregarding his personal safety, Corporal Cady picked up the bomb, carried it outside the gun emplacement, and covered it with sandbags. To have thrown the bomb from the emplacement would have endangered the lives of other personnel in the

vicinity of the gun. Corporal Cady's courageous action while under enemy attack saved his comrades from a potentially dangerous bomb.

TO: HERBERT L. MIDDAGH, Corporal, Btry. D, 105th AAA AW Bn., Wooster, Ohio.

FOR: Gallantry in action on 10 July 1943 in the vicinity of Gela, Sicily. During a landing operation an LST in which Corporal Middaugh and other members of his platoon were preparing to disembark received a direct bomb hit from enemy aircraft. The entire ship burst into flames, and ammunition started exploding. Although wounded, Corporal Middaugh assisted two other seriously wounded men to the upper deck where they could be evacuated. His calmness, courage, and ability to face imminent danger exemplify the highest traditions of the military service.



Soldier's Medal

TO: ORVILLE J. LAW, Sergeant, Btry. D, 105th AAA AW Bn., Detroit, Michigan.

FOR: Heroism not in action on 15 August 1944 in the vicinity of Castelfiorentino, Italy. Summoned to the battery mess by the sound of an explosion, Sergeant Law found the enlisted man on duty there enveloped in flames which covered his head, chest and shoulders. Without hesitation Sergeant Law threw his arms around the burning man and using only his bare hands succeeded in extinguishing the flames, sustaining burns on his hands and face in the attempt. The prompt and courageous action of Sergeant Law was responsible for saving the soldier's life, and is in keeping with the finest traditions of the military service.



Bronze Star

TO: JOHN BARKLEY, Lt. Col., CAC, New Orleans, Louisiana.

FOR: Exceptionally meritorious service in direct support of combat operations in Italy, during the period 11 May 1944 to 25 June 1944.

TO: ANTHONY E. FILIBERTO, Major, CAC, New Orleans, Louisiana.

FOR: Meritorious service in combat from 8 November 1942 to 17 August 1943 in North Africa and Sicily.

TO: GEORGE E. ZORINI, Major, CAC, Cincinnati, Ohio.

FOR: Meritorious service in combat, from 10 March 1943 to 9 September 1944, in North Africa, Sicily and Italy.

TO: HAROLD J. GRUNSKY, Captain, CAC, Bettendorf, Iowa.

FOR: Meritorious service in combat from 3 December 1943 to 5 December 1943 in Italy.

TO: JOE B. HUBBARD, Captain, CAC, Sweetwater, Texas.

FOR: Meritorious service in combat from 20 May 1944 to 4 June 1944 in Italy.

TO: FRANCIS J. DUFFY, 1st Lieut., CAC, Minneapolis, Minn.

FOR: Meritorious service in combat from 22 October 1944 to 26 October 1944 in the vicinity of Crocetta, Italy.

TO: EDWARD F. MITCHELL, 1st Lieut., CAC, Johnstown, Penna.

FOR: Meritorious service in support of combat operations in North Africa and Sicily from November 1942 to September 1943.

TO: JEAN L. TULLERY, 1st Lieut., CAC, Spencer, South Dakota.

FOR: Meritorious service in support of combat operations in North Africa, and Sicily from November 1942 to September 1943.

TO: SAM P. PEPE (then Staff Sergeant), 2nd Lieut., CAC, Bogalusa, Louisiana.

FOR: Heroic action in combat on 9 December 1943, in the vicinity of Colli, Italy.

TO: HENRY S. PIERCE, 2nd Lieut., CAC, Franklinton, La.

FOR: Meritorious service in support of combat operations in North Africa, Sicily and Italy from 8 December 1942 to 25 December 1943.

TO: GILBERT I. LEHNERTZ, M/Sgt., CAC, Muenster, Texas.

FOR: Meritorious service in support of combat operations from 28 March to 9 September 1944, in Italy.

TO: WILLIAM H. KNIGHT, Staff Sgt., CAC, Franklinton, Louisiana.

FOR: Meritorious service in support of combat operations from January 1944 to December 1944 in Italy.

TO: LOUIS CORMIER, Sgt., CAC, Crowley, Louisiana.

FOR: Meritorious service in combat in Italy from 6 December 1943 to 15 December 1943.

TO: JOSEPH C. KEITH, Cpl., CAC, New Orleans, Louisiana.

FOR: Heroic achievement in action, on 17 February 1944, in the vicinity of San Pietro, Italy. Enemy shelling of a stub airplane field set fire to a pile of .50 caliber ammunition which in turn ignited a camouflage net and tarpaulin on a nearby truck. While the shelling was still in progress, Corporal Keith left his place of safety, assisted in smothering the fire and in removing the burning truck and another vehicle from the area. His courageous and voluntary action prevented the loss of valuable equipment.

TO: STEVE J. BURTYK, Tec. 5, CAC, Freen Isle, Minnesota.

FOR: Heroic action in combat on 9 December 1943, in the vicinity of Colli, Italy.

TO: CHARLES W. CARR, Tec. 5, CAC, Cuyahoga Falls, Ohio.

FOR: Heroic achievement in action on 20 September 1944, in the vicinity of Rifredo, Italy.

TO: W. RECER, Lt. Col., CAC, 501 N. Marienfield St., Midland, Texas.

ALFRED J. WANGEMAN, Lt. Col., CAC, 435 E. Ash St., Mason, Michigan.

HARRY T. AKERS, Captain, CAC, 8007 Westmoreland Ave., Pittsburgh, Pa.

CHARLES E. AUERBACH, Captain, CAC, 1700 Broadway, San Francisco, Calif.

WILLIAM E. DOUGLASS, Captain, CAC, 175 Hines St., Newark, Del.

ALFRED L. LEA, Captain, CAC, 106 N. Drive, San Antonio, Texas.

JOE G. LEVIN, Captain, CAC, 861 Montelle Drive, N. E., Atlanta, Ga.

RICHARD C. ANDERSON, 1st Lieut., CAC, 146 Chiswick Rd., Brighton, Mass.

FRANCIS X. CARNEY, 1st Lieut., CAC, 67-116 Dartmouth St., Forest Hills, L. I., N. Y.

ALEXANDER G. CARSON, 1st Lieut., CAC, 61 Hess Ave., Woodbury, N. J.

WILLIAM B. HARACZ, 1st Lieut., CAC, 3259 N. Lorel Ave., Chicago, Ill.

ROBERT C. KUNS, 1st Lieut., CAC, 1504 Fannin, Houston, Texas.

JOHN A. MOORE, 1st Lieut., CAC, 304 Howard Ave., Rockville, Ind.

PATRICK J. O'CONNOR, 1st Lieut., CAC, 3925 Bowser Ave., Dallas, Texas.

ROBERT R. OWENS, 1st Lieut., CAC, 315 Nichols, St., Clearfield, Pa.

JAMES C. SACKETT, 1st Lieut., CAC, Rt. 4, Rochester, Minn.

CARL E. SCHREINER, 1st Lieut., CAC, 324 Gray, Joplin, Missouri.

ROBERT P. TURNER, 1st Lieut., CAC, 612 2nd Ave., Lewisburg, Tenn.

EDWARD A. ZIPPERLE, 1st Lieut., CAC, 1050 Wetterau St., Louisville, Ky.

FRANK P. NARDONE, 1st Lieut., CAC, Rt. 1, Bothell, Washington.

SYLVESTER J. BERG, M/Sgt., CAC, Sauk Center, Minn.

CALVIN C. BONO, T/Sgt., CAC, 810 Clintania Ave., San Jose, Calif.

VICTOR M. CALCLAUSON, T/Sgt., CAC, Pelican Rapids, Minn.

DONALD T. ETHUN, T/Sgt., CAC, Sauk Center, Minn.

GILBERT J. DEMONSABERT, S/Sgt., CAC, 2401 Orleans St., New Orleans, La.

VALMORE J. LANOIX, S/Sgt., 60 Center St., Penacook, N. H.

LAWRENCE E. NELSON, S/Sgt., CAC, 410 Andrews Ave., Breckinridge, Minn.

BRUCE A. WILLS, S/Sgt., CAC, 812 10th St., Bemidji, Minn.

LEROY DUCET, Tec. 3, CAC, Sulphur, La.

OSCAR J. BRASH, Sgt., CAC, Florence, Arizona.

SIDNEY J. DICKINSON, Sgt., CAC, Marganza, La.

ROBERT W. DOGGETT, Sgt., CAC, Greenview, Ill.

CLYDE J. HOLLINGSWORTH, Sgt., CAC, 202 Roosevelt Ave., Shawnee, Okla.

ANSELL T. HUDGINS, Sgt., CAC, Alba, Alabama.

CURVIN J. JEANDRON, Sgt., CAC, 736 Milam St., New Orleans, La.

THURMAN C. JONES, Sgt., Wiseman, Ark.
 JAMES C. LEACH, Sgt., CAC, Rt. 1, Horn Beck, La.
 RICHARD C. LEWIS, Sgt., CAC, 308-5 Barcelona, Pensacola, Fla.
 NORMAN J. LUTTIG, Sgt., CAC, Fowler, Mich.
 RAYMOND R. MIDDLEBROOKS, Sgt., CAC, Tupelo, Ark.
 CHARLES R. O'KELLEY, Sgt., CAC, Hull, Ga.
 ANTONIO PANETTA, Sgt., CAC, 91 Thompson St., Dover, N. J.
 OLIVER H. PEDERSON, Sgt., CAC, 1103 South Moorhead, Minn.
 ROBERT F. RUSHING, Sgt., CAC, Box 556, Springer, N. Mex.
 BRUCE R. SHARPE, Sgt., CAC, 363 California Ave., Oakmond, Pa.
 WILLIAM H. STACK, Sgt., CAC, 322 Riverside Ave., Valley City, N. D.
 ALBERT J. STRUBLE, Sgt., CAC, Great Neck, N. J.
 ARVLE R. DAVIS, Tec. 4, CAC, Rt. 1, Mexia, Texas.
 ARTHUR T. MENNINGEN, Tec. 4, CAC, 1617 82nd St., West Allis, Wisc.
 ELMER R. SENDELWECK, Tec. 4, CAC, Box 263, Churdan, Iowa.
 ANDREW KIRALY, Cpl., CAC, 10434 Avenue N., Chicago, Ill.
 ELI M. SMITH, Cpl., CAC, Kittaning, Pa.
 JOHN C. WALKER, Cpl., CAC, Rt. 1, Box 50, Houma, La.
 HARRY E. FRASHER, Tec. 5, CAC, Cromwell, Okla.
 ROBERT GREEN, Tec. 5, CAC, 409 S. 2nd St., Pekin, Ill.
 DAVIS A. GRAY, Tec. 5, CAC, 1129 Firmona, Englewood, California.
 GLANDON E. MCFARLAND, Tec. 5, CAC, Rt. 2, Tecumseh, Oklahoma.
 LOY C. ZELLER, Tec. 5, CAC, Morse Bluff, Nebr.
 PHIL J. BALCEZAK, Pfc., CAC, 947 Michigan St., Grand Rapids, Mich.
 HYMEN BERNSTEIN, Pfc., CAC, 707 N. Lawndale Ave., Chicago, Ill.
 JOHN R. BLASKO, Pfc., CAC, 302 10th St., Scranton, Pa.
 PAUL R. BOTTOMS, Pfc., CAC, Newark, Ark.
 JOHN H. BUSCH, Pfc., CAC, 5333 Linden Ave., St. Louis, Mo.
 ROLAND S. COLE, Pfc., CAC, Box 228, Dallas, Ga.
 PAUL J. COOK, Pfc., CAC, Rt. 2, Swatara, Minn.
 JOHN R. CUEVAS, Pfc., CAC, 2709 Bering St., Houston, Texas.
 RAMON DIAZ, JR., Pfc., CAC, Rt. 37, Box 19A El Paso, Texas.
 TROY E. EPPS, Pfc., CAC, Rt. 3, Lake City, Ark.
 THEODORE J. MECHAM, Pfc., CAC, Paul, Idaho.
 JAMES B. MILAM, Pfc., CAC, Cecil, Ark.
 SIDNEY J. ORDOYNE, Pfc., CAC, Raceland, La.
 ELMER C. PETTERY, Pfc., CAC, Rt. 2, Jacksonville, Ark.
 RALPH ROACH, Pfc., CAC, Earlysville, Va.
 JOHN B. RUBASZKO, Pfc., CAC, 14 Garfield St., Maynard, Mass.

ANTONIO SCARALE, Pfc., CAC, 128 Engleside Ave., Westchester, Mass.
 WALTER E. TURNER, Pfc., CAC, 83 Graveland St., Springfield, Mass.
 BENTLEY C. TURPIN, Pfc., CAC, Pendleton St., Radford, Va.
 JOSEPH H. WEST, Pfc., CAC, 211 S. Broad St., New Orleans, La.
 ROBERT H. WILSON, JR., Pfc., CAC, 6134 Coliseum St., New Orleans, La.
 MALCOLM C. AYER, Pvt., CAC, 193 W. Broadway, Bangor, Maine.
 FRANK R. BALLOU, Pvt., CAC, 1100 North St., Jackson, Miss.
 JAMES M. ELLIOTT, Pvt., CAC, Rt. 1, Hittick, Ill.
 HUGH C. LAIRD, Pvt., CAC, 428 6th St., Braddock, Pa.
 FRANK PEDRO, Pvt., CAC, Casablanca, N. Mex.
 WILLIAM K. ROBB, Pvt., CAC, 402 Butler St., Peoria, Ill. (Posthumous).
 ROBERT O. SOREGHEN, Pvt., CAC, 4756 Kilpatrick Ave., Chicago, Ill.
 EARL L. WEEMAN, Pvt., CAC, RFD, Steep Falls, Maine.

* * *

Oak Leaf Cluster to Bronze Star Medal

TO: GEORGE E. ZORINI, Major, CAC, Cincinnati, Ohio
 FOR: Heroic achievement in action on 17 February 1944 in the vicinity of San Pietro, Italy.

TO: ALFRED L. LEA, Captain, CAC, 106 N. Drive, San Antonio, Texas.

* * *

Commendation

HEADQUARTERS 103D INFANTRY DIVISION
 Office of the Commanding General U. S. Army

Subject: Commendation.

To: Commanding Officer, 534th AAA Bn.

1. During the period 19 to 22 March, when the Division was breaking through the Siegfried Line, two very poor dirt roads were the only routes available. If these roads had failed, the Division might have taken longer to accomplish its mission and speed was essential. A composite platoon of your battalion was assigned the mission of maintaining one of these roads. This they accomplished in a superior manner and with apparent understanding that the mission was vital.

2. I commend you and your battalion, and especially the men of this platoon, for the fine spirit and willingness with which they worked. The Division is grateful for their support.

A. C. McAULIFFE,
 Major General, United States Army
 Commanding.



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.

THE COAST ARTILLERY BOARD

COLONEL LEON C. DENNIS, C.A.C., *President*

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CAPTAIN C. W. ZIEGLER, O. D.

Solenoid Power Latch Mechanism for Elevating Brake of 16-inch Barbette Carriage M4 and M5. The Board recently completed the test of the solenoid powered latch mechanism for the elevating brake of the 16-inch Barbette Carriage M4 and M5. The mechanism consisted of a solenoid actuated latch which held the elevating brake levers in a raised or "off" position until the instant of firing. In its project report, the Board concluded that the solenoid powered latch mechanism as tested was inadequate and unsuitable for a power operated brake mechanism for the 16-inch Barbette Carriages M4 and M5. The Board recommended that further study and development be conducted.

Subcaliber guns. The Subcaliber Gun T19 for the 155mm Gun M1, M1A1, or M2 is under test at the present time. This subcaliber gun is an internally-mounted 75mm gun similar in design, having the same ballistics, and firing the same type of ammunition as the 75mm Subcaliber Guns M7, M8, and M9 for the 12-inch Gun M1895A4 and M1895M1A4, 8-inch Gun Mk VI M3A2 and 16-inch Howitzer M1920 respectively. The standard firing mechanism for the 155mm gun is used; however, a special obturator spindle is necessary. Auxiliary equipment for the T19 gun includes the necessary equipment tools, wrenches, and gauges for assembly, disassembly, and maintenance of the gun.

The Subcaliber Guns T16, T17, and T18 for 6-inch Guns M1903A2, M1905A2, and M1(T2) are 75mm subcaliber guns similar in design, having the same ballistics and firing the same ammunition as the Subcaliber Gun T19 described above. The T16, T17, and T18 guns are being procured at present by the Ordnance Department and probably will be tested by the Board during the month of June 1945. The Subcaliber Guns T16 and T17 are intended to replace the one-pounder subcaliber gun which is at present used with the 6-inch Guns M1903A2 and M1905A2.

Mechanical fire adjustment corrector. An exposition by Major H. C. Hatchell, G.S.C., describing a mechanical device for adjusting artillery fire, has been received recently by the Board. This device is proposed to replace the manual

procedure now performed by personnel assigned to fire adjustment.

The proposed device, given splash deviations as they occur, is described as capable of computing the center of impact of a predetermined number of splashes and indicating the corresponding adjustment correction. Means are included with the device to indicate whether the computed correction is greater than one-half probable error for the armament being used and hence whether the computed correction should or should not be applied.

The advantages of the proposed device are described as lying in the fact that the rapid computations possible would assist in the fire adjustment of rapid-fire armament making possible the use of more accurate magnitude adjustment procedures where bracketing methods are now employed. Another advantage of the proposed device might be derived through the fact that more rapid computation might be expected to permit a more rapid application of corrections and consequently the number of uncorrected rounds before adjustment corrections take effect would be reduced. This in turn might be expected to increase the effectiveness of fire delivered.

The exposition under discussion has been forwarded to the Commanding General, Army Ground Forces, with a request for comment by the Chief of Ordnance.

Loading platform extension for 16-inch Barbette Carriage M4 and M5. The test of an extension to the breech operator's platform for the 16-inch Barbette Carriage M4 and M5 was recently completed by the Board. The extension is of the same width as the present platform but extends the length an additional twenty inches. A section ten by twenty inches had to be cut out of the center of the platform extension to provide clearance for the operation of the breech block. The addition of the extension, which weighs ninety pounds, has no appreciable effect upon the elevating hand-wheel effort. In its report, the Board concluded that the addition of the extension to the breech operator's platform practically eliminated the hazard of breech operating personnel falling into the emplacement pit. The Board recom-

mended standardization of the platform extension and the issue of one per 16-inch Barbette Carriage M4 and M5.

Telescope socket assembly for adapting Panoramic Telescope M12 to Telescope Mount M43. The Board has recently tested a Telescope Socket Assembly C77981 for adapting the Panoramic Telescope M12 to the Telescope Mount M43 when 155mm Gun M1 Seacoast Artillery batteries are to be engaged in landward fire missions. The socket assembly as designed would satisfactorily mount the Panoramic Telescope M5A2 but slight difficulty was encountered in mounting the Panoramic Telescope M12. The Board recommended that the Telescope Socket Assembly C77981, modified to overcome the slight difficulty encountered with the Panoramic Telescope M12, be standardized. In field use, the socket assembly will remain assembled to the Panoramic Telescope M12. The addition of the socket will permit a change of telescopes from the M8 to the M12 or vice versa, within a very short time (i.e. two or three minutes).

Metal pontoons for Seacoast Target M10. Recent action of the Board has resulted in the provision of metal pontoons on all future procurement of the Seacoast Target M10. These pontoons will be compartmented and will have the same general shape as the present wooden pontoons. It is anticipated that only two metal pontoons will be required rather than three wooden pontoons as now provided. The Ordnance Department is at present engaged in the design of the metal pontoons and consideration is being given to designs reported by field organizations on this project. It is contemplated that the new pontoons will be available early in 1946.

Firing Table Data for 37mm Subcaliber Guns. A request has been forwarded through the Commanding General, Army Ground Forces, to the Chief of Ordnance for Coast Artillery type firing table data for 37mm Subcaliber Guns M1916 (left-hand twist of rifling) and M14 (right-hand twist of rifling) firing the 37mm Practice Shell M92 and 37mm Practice Shell M63, Modification 1, in order that the appropriate charts and scales for these ammunitions may be prepared by the Board for using organizations.

At the present time, Firing Tables 37-BJ-1 (abridged) which apply to the Practice Shell M92 and Firing Tables 37-BA-2 (abridged) which apply to the practice Shell M63, Modification 1, contain range elevation relation and probable error data only. The additional lateral and range ballistic data will make possible construction of deflection charts and range correction charts such that the Deflection Board M1 and Range Correction Board M1A1 may be used and personnel operating these equipments may participate in subcaliber practice in a manner similar to target practice or battle firing. In addition, with ballistic corrections available, emphasis on firing accuracy can be maintained in subcaliber firings.

Microphones T30 and T45.

a. Recommendations have been recently made for the substitution of Microphone T45 for Microphone T30 in the seacoast artillery T/O & E's. Microphone T30 is a throat microphone in which the speech sounds are picked up by two small button-type carbon microphones which are placed in contact with the throat near the Adam's apple. The T45 microphone is a lip microphone which is placed against the

upper lip below the nose. It is held in place by two straps which go back over the ears in much the same manner as the earpieces of eyeglasses. The sensitive unit of this microphone extends down in front of the lips. It is a differential microphone, that is, room noise which is picked up about equally by both sides of the unit is effectively cancelled out, whereas, the speech sounds which are applied primarily to one side of the unit will produce electrical currents.

b. Transmission and articulation qualities of the T45 microphone have been found to be nearly equal to those obtained when using the microphone on the Chest Unit T26. Transmission and articulation qualities of the T30 microphone, on the other hand, were found to be definitely inferior. The lip microphone is not as comfortable to wear as the throat microphone, but its materially better characteristics warrant its use. It is intended for use when it is necessary to wear the gas mask.

Remote antenna tuning unit for Radio Set SCR-543. The Remote Tuning Unit TU-76() for use with Radio Set SCR-543 has recently been tested. This unit makes it possible to obtain satisfactory operation of this radio set with an Antenna AN-44() located up to 150 feet away from the set. This unit provides for the use of a coaxial RF transmission line between the set and the antenna, and for remotely selecting any one of six pre-tuned channels by means of a switch corresponding to the band switch on the set. The antenna is tuned to the desired frequencies by means of a tapped coil and six adjustable condensers. The condensers are connected into the circuit as required by means of relay controlled by the above-mentioned switch. An average transmission gain of approximately 8 db over the transmission obtained with a standard whip installation was observed when this remote tuning unit and Antenna AN-44A were employed. The tuning unit is in a metal, waterproof box approximately 8" x 12" x 18" and weighs 33 lbs. Recommendations are being made for the issue of one of these tuning units with appropriate accessories to each Radio Set SCR-543 in use by seacoast artillery.

Military characteristics for a new field telephone. Military characteristics for a new field telephone have recently been reviewed. These characteristics provide for incorporating the latest development in the art, such as lightweight alloys, new permanent magnet materials, and latest developments in transmission and signaling apparatus. A form factor is being considered which will be as small and inconspicuous as possible and will permit use of the telephone on a desk top or shelf or hung on the wall, tree, tent poles, etc., with the ability to ring without holding the set with one hand. Circuit arrangements are contemplated which will permit local battery talking with magnet signaling; local battery talking with common battery signaling; common battery talking with common battery signaling; or common battery talking with magnet signaling. Provision for the use of the telephone as a remote push-to-talk station for a radio set employing the button on the handset for push-to-talk operation is also included. Provision for both audible and visual signaling is indicated together with a high bridging impedance so as to minimize transmission and signaling losses when sets are connected multiple across the circuit.

Fuze Setter Adapter. The confined space within the

of the 90mm M3 mount, especially during antiaircraft fire, has given rise to the design of an adapter by Mr. E. D. Cawley, Armament Foreman, Harbor Defense of Los Angeles, which has been approved by the Coast Artillery Board. This adapter consists of a flat metal plate which seats into the fuze setter bracket and extends forward about 10 inches. The forward end is braced by an extension rod bolted to the base of the gun mount and contains a seat for the fuze setter. No modification of the fuze setter or the fuze setter bracket is involved. When installed, the rim of the fuze setter is set forward about 10 inches from its normal position, resulting in more room for the gun crew during all types of firing. There is no difficulty in serving ammunition from fuze setter to breech during antiaircraft fire. An Ordnance Technical Bulletin is being prepared on this adapter to enable Ordnance personnel in harbor defenses to manufacture the adapters in the field.

Meteorology for Artillery—TM 20-240. It is desired to invite the attention of all artillery units and harbor defenses to the new meteorological publication, *Meteorology for Artillery, TM-20-240*, which replaces the old TM 4-240,

Meteorology for Coast Artillery. This manual contains complete information on the meteorological message together with revised tables for all messages and new tables for Messages 4 and 5 for the Coast Artillery. All Coast Artillery meteorological stations should be directed to conform to the new procedure at the earliest possible date.

* * *

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 March and April:

Number on hand 1 March	47
Received during March and April	150
Total	197
Completed during March and April	132
Number on hand 1 May	65



Bearings

Ball and roller bearings are carrying the war to the enemy on trucks, tanks, tractors, trains, planes and ships. And bearings are just about number one when it comes to critical items used in the Army.

Constant attention to the care and handling of bearings by all personnel concerned with operation and maintenance of mechanical equipment on which they are used is a vital factor in keeping the Army's mechanical equipment running smoothly and efficiently toward victory.

Three main points in the care and handling of bearings should be kept in mind at all times. First, keep bearings clean! Remember that sand or grit will score a bearing in short order—a few drops of moisture will rust it just as quickly. So keep bearings wrapped at all times when they are not in use, and when installing or removing them always place them on clean surfaces. The dry-cleaning solvents you use to clean them and the lubricants you use to keep them running smoothly must be clean, too. For this reason it is important that containers be kept covered as much as possible to prevent dust and grit from settling and blowing into them. Hands, benches, rags, tools—everything that touches bearings—must be clean.

Second, keep bearings adjusted properly. This is especially important in operation of motor vehicles where removal of front wheels for lubrication is a frequent occurrence. Reinstallation of bearings at times like these, or installation of new bearings when necessary, must be performed carefully so that bearings are neither too tight nor too loose. A bearing that is too tight will overheat quickly and a bearing that is too loose will be subjected to jolting

and jarring far in excess of its ability to withstand. Bearings are shock breakers, not shot takers.

Lubrication is the third important maintenance service in the care of bearings. War Department Lubrication Orders for specific items of equipment should be followed so that the right lubricant in the right amount is always applied. Here, again, the cleanliness of lubricants must be emphasized and the practice of keeping lubricant containers covered whenever they are not actually in use must be stressed.

In connection with second, third and fourth echelon handling and reclamation of bearings, a new technical manual, TM 9-2856, "Maintenance of Ball and Roller Bearings," is now in the process of preparation for distribution in the near future. This manual gives special attention to inspection procedures in connection with determining whether bearings are serviceable or unserviceable. It would be well for personnel responsible for this phase of bearing maintenance, especially, to watch for the appearance of this manual, though of course, everyone who handles bearings will find the manual of interest and help.

It takes just as much, if not more, equipment to win a war as it does to lose one. So the fact that we are winning many victories as the days pass does not mean that we can let up on our efforts to make our equipment last as long as possible and give the utmost in efficiency service. Bearings are small in size but they are big in importance. Give them the attention they deserve—keep them clean, keep them adjusted properly, and keep them lubricated—to keep them rolling.

Coast Artillery Journal

Fifty-fourth Year of Publication

COLONEL E. B. WALKER, Editor

LT. COL. ARTHUR SYMONS, Associate Editor



The JOURNAL prints articles on subjects of professional and general interest to officers of all the components of the Coast Artillery Corps in order to stimulate thought and provoke discussion. However, opinions expressed and conclusions drawn in articles are in no sense official. They do not reflect the opinions or conclusions of any official or branch of the War Department.

The JOURNAL does not carry paid advertising. The JOURNAL pays for original articles upon publication. Manuscripts should be addressed to the Editor. The JOURNAL is not responsible for manuscripts unaccompanied by return postage.

The United States Coast Artillery Association

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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

The Missions Will Still Exist

The Coast Artillery has gone through a trying and discouraging period. When this war first threatened the outlook was most encouraging. The great *Luftwaffe* demanded that antiaircraft artillery not only protect invasion ports and lines of communication, but also the armies in the field on large areas at home. In the Pacific after the Pearl Harbor attack, the Japanese fleet was in control (but the Japanese failed to exploit the opportunity) and that fact coupled with German surface and sub-surface naval strength seemed to guarantee the employment of seacoast artillery to protect our own shores and every base and stepping stone we secured. The outlook was rosy for a tremendous expansion and it appeared that the Coast Artilleryman's dream of directly engaging the enemy would be fulfilled. Further, the precedent of World War I indicated that in land operations Coast Artillery would be employed to man 155's, 240's and railroad artillery.

The tremendous expansion did take place. However, the much-vaunted German air strength was whittled down by the Allied Air Forces and Antiaircraft Artillery so that shortly after the invasion it was apparent that the need for such great strength in Antiaircraft Artillery would not exist. In the Pacific the vision and foresight of the naval planners and the fighting qualities of the army and naval air units and naval surface units caused Japanese naval and air strength to shrink to merely raiding or nuisance value. The need for much Seacoast Artillery and Antiaircraft Artillery shrunk with Japanese strength and geographical distribution.

There was a crying need for Infantry and Field Artillery to make up replacements.

The pool of Coast Artillery units and officer personnel was available and no longer needed for their original tasks. Their technical ability and training made their conversion to other branches a simple matter. The transfers began.

At the time this is being written a great mass of Coast Artillery personnel has been absorbed into other branches. Many units required to man Coast Artillery weapons merely as a precautionary measure now spend much of their time as labor units.

Except for the units actually engaged with the enemy the watching and waiting and labor details seem interminable and the number actually engaged with the enemy is small compared to the total that were mobilized and trained as Coast Artillerymen.

But the picture has some rosy tints. Wherever they are and whatever they are doing the Coast Artilleryman and the ex-Coast Artilleryman are doing an excellent job. From the combat zones come reports that make every one of us proud. Our Coast Artillerymen have fought as Infantry alongside Infantry; they have fought enemy tanks; in Field Artillery rôles they have supported Infantry in ground attack; they have protected the Infantry, the Field Artillery and Air Force installations from air attacks—all this with

vigor and an effectiveness that have brought forth words of appreciation from the other branches. Other branches! Well, we are one Army; we who have been trained as Coast Artillerymen are merely more flexible technically. The Field Artilleryman, the Infantryman, the Coast Artilleryman, the Chemical Mortar man are coming out of this war with a mutual understanding they never before attained.

And we are proud of our Coast Artilleryman! Whether he is in a labor battalion in the South Seas casting longing glances at his idle guns, whether he wears the Field Artillery red or the Infantry blue, he is doing his job in the only way a Coast Artilleryman can do it—the best he can.

The Army has weathered many a discouraging outlook. And it is remarkable how the reality always turns out to be much better than even the optimists predicted.

Many years ago one officer when promoted to his first lieutenantcy figured that the best he could possibly do would be to reach the grade of major on retirement for age. He had his regular commission as a major after ten years service.

Coast Artillerymen should look toward the future with confidence. Some day the composition and organization of our postwar army will be decided upon. There will always be a need for defense against air attack. Indeed, our own developments of long-range powerful bombers, the development of rockets and flying bombs, and rocket-launching aircraft seem to point to increasing violent air war in the future. In our army-to-be there will be a large place for the Antiaircraft Artillery. Whether this be in one artillery branch or otherwise is beside the point. Our future army will be organized and composed so as best to carry out our military policy; and we can be sure that Antiaircraft Artillery under whatever guise it serves will be part of that force. Our own forces and the public will demand that it be so. The need is there; the AAA will fill it.

Outlying positions, our important bases, our important harbors and naval repair stations will need Seacoast Artillery. The true story of the influence of the seacoast fortifications along the German and French coasts has yet to be disclosed. The pain felt in the English Navy's side where the horns of Heligoland pressed has been considerable. The British Navy would have given much to have had Heligoland destroyed. It has had considerable influence on both German and British naval operations because it is a modern seacoast fortification. Again, under whatever authority the seacoast fortifications operate, the mission is there; the place is to be filled.

And if we lose the designation "Coast Artillery" it will not be too unfortunate. Although it is a fact that under that designation officers and men have built a reputation for intelligent devotion to duty, of getting the job done the general public never exactly understood the Coast Artillery—its missions, its weapons, or functions.

The name carries little meaning to the public. It may well be that in the future army the name will be lost—but the missions will still exist and you Coast Artillerymen and Coast Artillerymen will find yourselves filling the job in a new, progressive army.

Group Subscriptions

The 382d AAA AW Battalion tops the list of group subscriptions for this issue with a total of thirty, submitted by Lt. James C. Macpherson, Jr. Tramping on the 382d's heels is the 633d AAA AW Battalion, with twenty-two in one group and three in another, for a total of, our adding machine says, twenty-five. Lt. Col. Mazzei, the CO of the live-wire 633d, is a JOURNAL author and a JOURNAL booster from 'way back.

In a tie for third place, with nine subscriptions each, are Battery B, 213th AAA AW Battalion, Captain E. L. Stephenson commanding, and the 543d AAA AW Battalion, WOJG Carl A. Gylling, reporting. Battery B, being the smaller unit, gets the decision, but all eighteen subscriptions are appreciated.

The 243d AAA SL Battalion accounted for eight subscription orders, with the letter signed by WOJG Richard F. Dement. Orders for five subscriptions each came from the 222d AAA SL Battalion (CWO Herbert R. Wolever); the 227th AAA SL Battalion (Major Harlin A. Moore); and the 70th AAA Gun Battalion (Lieutenant James R. Kaiser).



Why You Don't Get Your JOURNAL

The following extract from a letter received from a POE will explain to our readers why some of their JOURNALS have gone astray. Once more we plead, *keep the JOURNAL in touch with all your changes of address.*

"Current War Department regulations require that personnel at replacement depots assigned temporary APO numbers, notify the publishers on WD AGO Form 923 to discontinue mailing of publications until further advised. Upon assignment to a unit, regulations require that they notify publishers of their new address, including permanent APO number on WD AGO Form 971.

"In accordance with instructions received from the Adjutant General, all publications addressed to personnel at temporary APO numbers, indicating that addressees moved as casuals or replacements, are not given directory service nor forwarded."

The Circulation Department has been receiving many notices that your JOURNALS are being turned over to Special Services for educational purposes, but very few Forms 923.

We do all we can to get your magazines to you—BUT YOU MUST HELP.



Even the Japs Do It

It really is funny what people can do when they don't know "it can't be done." The Japs didn't know you couldn't make a quick-change barrel without screw threads, so they made it. They didn't know that you can't make a 20mm cannon on the .50 caliber Browning system—so they did it. Their standard pistol, from the standpoint of design, is one of the finest weapons of that type—and is perhaps the cheapest of all modern military pistols to manufacture.

Can we learn something from the Japanese? Could be! They are learning from us, certainly.—*American Rifleman.*



Signal Corps Photo

Railway gun, 274mm, captured near Rentwershausen. The gun is believed to have been taken over from the French.

Regular Commissions

The War Department has asked Congress for authority to commission in the Regular Army 250 temporary officers who are serving in this war. Under the War Department plan, the officers would be commissioned in grades from second lieutenant to captain, inclusive.

The figure of 250 was set, not as a limit to the number of officers who will be commissioned eventually, but as a dry run to work out policies and procedures for postwar expansion. Brigadier General E. S. Wetzel told Congress, "With the present peak number of non-Regular officers on active service, now is the time to enliven the interest of high-grade war experienced officer personnel and also to utilize the planning and operation under the instant bill in determining the larger over-all program for their integration into the postwar Army."

✓ ✓ ✓

Ruined Corregidor

May 8 (UP).—Corregidor, once proud fortress guarding the entrance to Manila Bay, is a battered and broken rock mass. But it is back in American hands after three years of Jap control.

The "Rock" is in shambles because its deliverance from the enemy forced American troops to blast the Japs out of caves and tunnels honeycombing the five-mile long island.

From top to bottom of Corregidor, you see evidence of the fanaticism and savagery with which the Jap defended the forbidding pile of stone. You see first hand what American troops are up against in fighting a suicidal foe. You marvel that Gen. MacArthur's troops were able even to get ashore, let alone retake the fortress.

At the base of Corregidor, the Japs had gouged "Q-boat" pens out of solid rock. From these pens suicide boats, laden

with explosives, raced out into the bay to throw themselves at the American invasion craft.

Midway up the face of the sheer cliff rising out of the water there are more man-made caves whence the Japs lobbed mortars and directed murderous machine-gun fire at island-storming American troops.

At intervals of about 15 yards along the road winding to the top of the rock are one-man caves where the Japs concealed themselves.

Malinta Tunnel, MacArthur's headquarters during the siege of Bataan and where Gen. Jonathan M. Wainwright was forced to surrender on May 6, 1942, was the main Jap defense bastion. Smoke—a stinking, nauseating smoke—still pours out of the tunnel. And it is more than two months now since hundreds of Japs were trapped within the tube that looks like the entrance to Holland Tunnel.

Along one of the trails leading to the top, there is a huge crater almost the size of the Yale Bowl. It once was level ground beneath which the Japs had an ammunition dump. Three hundred Japs blew themselves up there.

✓ ✓ ✓

Fireboat, MI

In the mouth of Manila Bay, flanking Corregidor, an American-made battleship that never went to sea was blown to bits. Fort Drum, built of concrete on a tiny rock island shaped like a battlewagon, had served hold-out Japanese troops too well. For two months American planes and warships pounded its concrete "deck" in vain. The fort's four 14-inch and four 6-inch naval guns mounted on revolving turrets were knocked out of action. But the Japs simply burrowed deeper into its rock-hewn tunnels and supply rooms.

On the morning of April 14, an American raiding party

from the 38th Division set out to sink "The Ship." An LSM (Landing Ship, Medium) nosed up against the fort's sheer 40-foot-high walls and the doughboys scrambled ashore. Then they hauled in a giant hose from a fire boat standing by, pumped 3,000 gallons of a gasoline mixture into the "hatches," set the demolition charge, and fled. Ninety minutes later, three deafening explosions sent chunks of concrete, steel plating, and a great steel bomb door sailing 100 feet into the air. An hour later smoke still billowed out of the destroyed fort. The enemy garrison had been wiped out at the cost of one American casualty.—*Newsweek*.

* * *

Manila (Saturday), April 7 (INS). The American Army in Liberation, seeking to reduce casualties suffered in wiping out Japs hidden in caves in the Philippines, today is using a new and terrible weapon—the fireboat.

The function of the fireboat is to pump huge quantities of oil in the caves, the oil then being set aflame by gunfire. Judging by what I have seen it's a good guess this weapon will be used extensively.

The fireboat was first used Thursday against Japs fighting from mortar emplacements American forces themselves built on mile-long Caballo Islands off the southern tip of Corregidor.

They included two tremendous mortar pits with walls as much as 18 feet thick and constructed so ingeniously it was impossible to dig out the Japs by frontal assault or by Navy gunfire, artillery, mortars, tanks or bulldozers. The fireboat was the last resort of the exhausted Yanks who had been attacking the mortar pits for 10 days.

The new weapon was constructed in three days under direction of Lieut. Col. William P. Holtzman of Chicago and Capt. Emory Williams of Tulsa, Okla., of the 113th Engineers, Thirty-eighth Division.

A big centrifugal pump with the capacity of thousands of gallons a minute was installed in the boat, together with huge oil tanks. Space was reserved for a thousand feet of pipe in 20-foot sections.

The fireboat came to Caballo none too soon. Just before dawn the day before the boat arrived the Japs had poured out for a murderous attack in surprising strength, killing 4 and wounding 16 of an 80-man Army unit. Although out-



General Joseph W. Stilwell is greeted at Fort Bliss by Major General G. Ralph Meyer, commanding the AA Command, and Brigadier General William Hesketh, commanding the AARTC.

numbered, the Yanks killed 86 Japs in a furious struggle before Yank reinforcements arrived.

Construction of the fireboat had been carried out in such secrecy the soldiers did not know what it was when it arrived at Caballo, dropped its ramp and a pipe was carried out and connected to a large tank on a barge.

The soldiers stared incredulously and one grimy GI remarked: "For 3 days some of us have been pinned on a cliff without water and now they give us a boatful."

What the battle-weary soldier thought was water was a lethal concoction of one-third gasoline and two-thirds diesel oil.

From the southern edge of a mortar pit where two platoons hugged a slope, I watched the engineers throw a pipeline together with incredible speed up the tortuous hill. Covering soldiers heaved dozens of grenades to pin down Japs over a ridge only 20 feet away. We were all expecting return mortar fire.

The pipeline was tested with sea water which washed dead Japs down the hill. Then the nozzle was draped into the west pit. We moved over to an observation on another hill to watch.

The big pump below had hardly whirred into action when soldiers on the hill shouted "My God, its draining out of the pit." I could feel the despair in the men around me as they thought they saw their last chance ending the hell of Caballo draining into the sea.

While mortar crews threw shells into the pit a machine gunner squirted lead at the drainage hole, hoping to ignite the oil with tracers.

Suddenly, the mortar shells set the pit aflame with an earth crumbling blast. The soldiers leaped up and yelled with joy when the drainage hole exploded into flame with even greater violence.

The whole center of Caballo erupted into a quaking inferno. Massive pillars of jet-black smoke leaped skyward while flames boiled up in the pits. We soon heard small arms ammunition popping, then larger stuff and finally detonating charges marked by green smoke of picric acid the Japs use. Through it all we heard the constant "whoomp" of grenades, probably used by suiciding Japs. The heat was so intense we felt it strongly a thousand feet away.

An investigating platoon later reported an 18-foot wall was cracked to a depth of 2 feet by the savage heat.

"That pit was like one big oven," chortled a soldier. "It'll be a week before it's cool enough to go down into the tunnels."

* * *

Quotes from Letters

I feel that the JOURNAL is being published in most excellent form and contains articles of great value to events in the field. May I congratulate you on your excellent work.

BRIG. GEN. CHARLES A. FRENCH.

* * *

I find your articles conform 100% to the practical.

CAPT. CLARENCE T. CALLAHAN.

* * *

Even though I have recently changed branches of the

service would still like to continue to keep in touch with Antiaircraft.

Would appreciate it if I could manage to have the JOURNAL sent to my home address which appears at the bottom of this letter. There it can be saved for me until the day when once again I will be able to return to Coast Artillery.

LIEUT. GEORGE I. CALVERT.

* * *

Enclosed is M/O covering my subscription. At least I will have one tie with the good Coast Artillery. Much to my dismay, I had to put on cross muskets as I am now detailed to the Infantry.

This is life in the Army tho . . . one damn surprise after another.

CAPT. HARVEY J. GRAY.

* * *

This issue is the best so far. It won my renewal. Suggest more and more pictures.

CAPT. ORVILLE R. HARRIS.

* * *

Received your invoice today and I am enclosing it, with a M/O for my subscription. I want you to know that each time that I sent my check or M/O, I feel very happy in the knowledge of another year of good reading.

I enjoyed the JOURNAL in the States, but find it most helpful over here. I pass it among my gun sections and they also get enjoyment out of it. If we give them Field Manuals they put them aside and very seldom look at them; but with the JOURNAL, it's a different story. The JOURNAL's policy of putting Artillery data in a story form hits the spot. Keep the good work up.

LT. JAMES W. EWING.

* * *

Enclosed is my renewal of the subscription of the JOURNAL. It is a fine publication and every copy is interesting and informative.

LT. RICHARD C. CLARK.

* * *

The issues of the JOURNAL are now arriving and I want to thank you sincerely for the trouble you have taken.

We all enjoy reading the JOURNAL and it is always passed along among both officers and men.

I enjoyed very much reading of your own experiences in France during the last war and I think you may take pride in the part that the Coast Artillery Corps is playing here on the continent in the present war. We have the privilege—and we consider it both a privilege and honor—to be with the 79th Infantry Division and have been attached to it since June. You may recall the part the 79th played in World War I and we hope that the record of this war will be equally as impressive as the one they established in 1918.

Again, thank you very much.

CAPTAIN ARTHUR L. NOVICK.

* * *

Although I'm detailed for duty with the A.A.F. I am still very much a Coast Artilleryman. THE COAST ARTILLERY JOURNAL serves as one of the links with my branch.

My work here on the Staff of Fighter Command is AA, the JOURNAL is also of professional value.

MAJOR MARK PARSONS.

* * *

Have not had a copy of the JOURNAL since August; just moving too fast. AA is doing a bang-up job.

MAJOR EVERETT K. HIGGINS.

* * *

Enclosed you will find subscriptions for twenty-two officers and men of the —. Sorry there are not more, but under the conditions we're in, I can't bring as much pressure to bear as I'd like. Three others have gone under separate cover.

"A GO-GETTER."

✓ ✓ ✓

Automatic Carbine in Close Combat

As originally developed in 1941, the caliber .30 M1 Carbine was intended as a replacement for the pistol. The carbine weighed less than five and one-half pounds and had a magazine holding 15 rounds. As this weapon came into extended use, a better sight was called for and promptly manufactured. It then became apparent that a bayonet could be used to advantage and, by a slight modification, the standard trench knife was made to serve a dual purpose. A grenade launcher was subsequently developed and the carbine became capable of filling all the missions of a rifle at short range.

As the pace of the war accelerated and as our troops encountered new types of terrain and new enemy tactics, the need for more firepower was foreseen. Anticipating this need, a further development of the carbine was started by the Ordnance Department, Army Service Forces, in May,

1944. Twenty-one days later a modification was accomplished by which full automatic fire could also be delivered by a trip of the selector, and the carbine would continue firing at the rate of 750 rounds per minute until the trigger was released or the magazine was empty. By reverse movement of the selector, semiautomatic fire, as in the original model, was again possible.

✓ ✓ ✓

Lord Mountbatten Commends U. S. Railroad Soldiers

American soldier-railroaders in India have been officially commended by Admiral Lord Louis Mountbatten, Supreme Allied Commander, Southeast Asia Command, and General Sir Claude Auchinleck, Commander in Chief in India, for playing a "notable part in the defeats inflicted upon the Japanese" in that theater.

"Before the taking over by the U. S. Military Railway Service of responsibility for the Operation of the meter-gauge railway from Katihar to Dibrugarh and Ledo on March 1, 1944, through military stores traffic by the rail and rail-water routes was of the order of 2,500 tons a day. Traffic by these routes now is of the order of 5,000 tons a day, an increase of 100 per cent," the Admiral said.

✓ ✓ ✓

German Jets Lack Aggressiveness

German jet-propelled aircraft, while constituting a threat to our bombing operations over Germany, did not succeed in shooting down many of our bombers or in impeding our attacks on pre-selected targets.

Since the Messerschmitt 163 made its first appearance in combat in July, 1944, jet-propelled aircraft have accounted for four of our bombers and seven of our fighters as of March 1, 1945, although they have attacked in numbers ranging



Onset Guard Photo

329mm guns at Toulon. The French removed the guns from a battleship in 1936. On top of the turret is a 76mm piece.

from 4 to 65 and have been in almost constant operation. Between October 1 and January 31 no bombers were destroyed by enemy jet aircraft. During the whole period, to March 1 our fighters and bombers have shot down 49 jet planes while our fighters alone have destroyed 55 German jets on the ground.

In spite of great superiority in speed, the German jet aircraft—the Messerschmitt 163 and 262 and the Arado 234—have not afforded the German pilots any great advantage in combat. The pilots appeared to be unfamiliar with their aircraft and unwilling to take aggressive action, while our fighters have frequently bested them in aerial combat through specially developed tactics and greater familiarity with the capabilities of their own aircraft.

* * *

A Difference of Opinion

APO ———

Editor, Dear Sir,

I don't like to bother you so frequently with my ever-changing address which prevents me from receiving my JOURNAL. My new address is as shown in the heading.

The inclosure (*a Training Memorandum listing eleven articles in one issue of the JOURNAL to be read by members of the command: Ed.*) will illustrate how your JOURNALS are used as training aids in my training missions. When used in this manner it is just a little embarrassing for the "Old Man" never to have a copy of his own.

Best wishes and congratulations on the very fine work you are doing for the service.

HUBERT A. McMORROW,
Colonel, ——— AAA Group.

* * *

Fort Bliss, Texas.

Editor, Dear Sir:

Please cancel my subscription to the CA JOURNAL. Reasons:

1. Of little professional value . . . too amateurish in comparison with the INFANTRY JOURNAL which has more professional articles.

2. JOURNAL is concerned largely with Coast Artillery . . . I am currently interested in AA only.

3. Letters from various camps, which were of interest, are out—practically all AA camps and activities are inactivated.

SEYMOUR I. GILMAN,
Lt. Col., ——— SL Bn.

* * *

Back from Corregidor

Dear Sir:

In 1940-41 I was carried on your subscription lists, with address Corregidor, P. I. Exactly three years ago, today, I was captured there and taken prisoner by the Japanese.

I should like to know my present subscription standing and, in the event you cannot trace my record, to renew my subscription starting with the March-April 1945 "Corregidor Issue."

Sincerely yours,

MORRIS L. SHOSS,
Major, CAC.

Science Shorts

The first jet-propelled plane to be used by the Allies in action against the enemy was the Gloster Meteor, a British plane which was brought out from under the cloak of secrecy at the same time that information was released of the American P-80, Shooting Star. It was used in France against the Germans last summer.

* * *

Ethyl Chloride, the chemical used to make tetraethyl lead that takes the knock out of gasoline, will soon be produced by a new process in a plant under construction at Baton Rouge, La. The process yields ethyl chloride by reacting chlorine with waste products from another ethyl chloride plant, also at Baton Rouge. The chemical has many uses in addition to its service in gasoline and in high octane aviation fuel, several of which are also war purposes.

* * *

Practical applications of a new basic discovery, in which X-rays and other radiations are used to alter the elastic constants and chemical properties of quartz and other crystalline substances employed in radio oscillator-plates to regulate wave length, were demonstrated to a group of scientists at the Reeves-Ely Laboratories by Dr. Clifford Frondel, head of the company's research division.

The discovery is of great theoretical interest from the viewpoint of pure science, but has already been put to practical use in the war effort. Millions of tiny plates of crystalline quartz, the size and shape of postage stamps, are used by the armed services as oscillator-plates to control radio communications. The frequency at which the radio will transmit or receive, he reminded his hearers, is controlled, in common types of crystals, by the thickness of the plate. They are brought to proper thickness by mechanical means, and the process is an extremely delicate operation.

By using the new X-ray irradiation technique, oscillator-plates can now be adjusted rapidly and easily, he said, to a desired frequency with a precision hitherto impossible.

* * *

Moving targets are no longer a problem to bazookiers now that the bazookas have been equipped with a new type of sight that is larger and permits better vision than the type formerly used. The bazooka is lighter in weight, four pounds less than before, now that the tube is being made of aluminum alloy and designed for better balance. The weapon splits in two parts for easier carrying.

* * *

Completing the line of shells for use with the popular 105-millimeter gun, the Ordnance Department has developed a new flare for turning night into day. Shot high in the air, it automatically ignites a mixture of magnesium flakes in asphalt and suspended by a parachute contained in the shell, it descends at the rate of 35 feet a second. The flare burns brightly for 43 seconds.

* * *

Still another rocket launcher will unleash 24 4.5-inch rockets in 12 seconds against an enemy as much as 5,250 yards away, hitting with a blast that is better than a 105-millimeter shell. Set off by an electric spark, the rockets

carry either high explosives or chemicals. The launcher itself is mounted on a two-wheeled truck, and the rockets are muzzle-loaded into three banks of eight rockets each by a five-man crew. The rockets themselves are spinners, each having eight vents in the tail set at an angle so that when the hot gasses escape they cause the rocket to spin. This spinning motion stabilizes the rocket in flight and takes the place of fins or rudders.

* * *

So that airmen can easily see smoke signals which might otherwise be hidden by trees, a new smoke flare has been developed that can be shot from a standard rifle launcher above the tops of trees. When it falls the smoke grenade hooks into the branches of tree-tops, where the smoke continues to pour forth, giving a signal that can readily be spotted from an airplane.

* * *

Matches which will light after being soaked in water for eight hours have been developed for the use of our troops in rain-plagued tropics and for beachhead operations.

The matches look like ordinary kitchen matches and, if the box in which they come is lost, will light when scratched on a stone or a shoe. The formula for the transparent, heat-resisting coat which makes the matches waterproof has not been made public, but both this and the manufacturing

process, which makes it possible to produce cheaply these matches in large quantities, have been made available to the government by the Diamond Match Company.

* * *

From 10,000 to 15,000 blind persons in the United States may have a chance to see again through the activities of the Eye Bank for Sight Restoration, Inc., New York, the organization states in announcing its incorporation and officers.

Those who will benefit will be persons blind because of defects in the cornea of the eye. The cornea is the transparent tissue in front of the eye lens. As far back as 1789 surgeons have tried to relieve this type of blindness by substituting transparent material such as a piece of glass for the cornea that had become opaque.

* * *

World's largest airport is a B-29 base on Tinian Island in the Pacific, reports P. B. Taylor, acting general manager of Wright Aeronautical Corporation, who recently completed a 25,000 mile journey of key points in the South Pacific theater. Several 8,000-foot runways for the Superfortresses were cut right out of the jungle, and the whole installation completed in eight weeks, he stated.—*Science News Letter*.



Interior of one of the submarine pens at Brest.

Signal Corps Photo

459th AAA Battalion in Five Countries

Operational in five countries, England, France, Belgium, Holland and at the present Germany, the men of the 459th AAA AW Battalion have fulfilled their mission of protection and infantry support through three major campaigns to a point of perfection that has won them many commendations.

Commanded by Lt. Colonel Clement C. Parrish since their basic training at Camp Hulen, Texas, the battalion received their final combat training and hardening on the bleak moors of England. Attached to the 29th Infantry Division, the men rehearsed beach landings before rolling in with elements of the big show on D plus four to guard the Normandy skies.

Battle honors are numerous, led by Sgt. John J. Kelly, Philadelphia, Penna., who holds the Distinguished Service Cross. In addition, the men of the battalion have earned one Silver Star, thirty-six Bronze Stars, and forty-nine Purple Hearts. Pvt. James B. Hudepohl, Pittsburgh, Penna., has invented a sight for the M-16 half-track that was greatly increased the potency of this weapon.

Shooting down enemy planes is their primary function, and their record contains many star-studded pages. New Year's Day netted them six Nazi aircraft shot from the skies, and the wreckage still remains as mute testimony to their marksmanship. This action was over in five minutes and is the high water mark of a career which started with the bagging of a JU88 and an Me410 back at St. Lô. One Jerry pilot recently captured, admitted to the gun crew that he had never witnessed such terrific shooting.

Any lack of air activity did not mean idle guns. Their first infantry support rôle was with the 29th Division in the final assault on St. Lô. Half-tracks rolled down the Martinsville road and showed the Germans something new in hedgerow fighting when the quadruple-mount .50s opened up at a rate of 2400 rounds per minute. In the same operation, a platoon of Bofors saturated enemy emplacements, pumping out HE at a rate of two rounds per second per gun. Total fire power of all AA weapons of this battalion would be approximately six and three quarter tons of hot steel per minute.

From St. Lô the battalion moved to Vire, always keeping the sky clear of any marauding Nazi intruders. From this point the Bofors were detached to protect the new supply routes opened up by Lieutenant General George Patton's drive through the continent. The amount of material that flowed through was immeasurably aided by their air-tight defense. Moves were long and fast during this period, many as long as one hundred miles, but the men of the battalion were always ready when weapons were needed. Areas of defense were Sees, Soissons, Paris and other parts of France, Liege in Belgium, Germany and an area in Holland.

Keeping lookouts for enemy over the skies of Paris and Liege were pleasant assignments for the 459th. Going into Paris close on the heels of the French Second Armored Division, the guns were placed along the Seine River at such famous sites as Notre Dame Cathedral, the Louvre, the Arc De Triumphe, and along the Champs Elysees. Main observation post was the top of the Eiffel Tower. They were later stationed in Liege in similar operations. These were fine opportunities for relaxation for the men, along with

the business of war, but straight shooting was needed on the rapidly advancing line, and they were soon back at the front.

✓ ✓ ✓

Thirty Battle Honors

Two new battles and campaigns have been added to the list of battle honors of the United States Army. With these additions and other changes, the number of battles and campaigns in the present war has increased to thirty. Participants in the officially designated operations are entitled to wear bronze stars on the appropriate theater service ribbons.

The additions to the list are as follows:

CENTRAL BURMA—Time limitation from January 29, 1945, to a final date to be announced later.

ARDENNES—From December 16, 1944, to January 25, 1945.

Changes in designation, marking new boundaries and setting time dates, include the following:

CENTRAL PACIFIC—New boundaries set, excluding the main islands of Japan, the Bonin-Vulcan and the Ryukyu Island chains.

PHILIPPINE ISLANDS—Philippine Islands and adjacent waters.

PAPUA—Boundaries revised to include the Philippine Islands.

NEW GUINEA—The Philippine Islands are included in the combat zone up to October 16, 1944, inclusive. Australia and those portions of New Guinea both south and east of Medang are excluded from the combat zone effective October 1, 1944.

INDIA-BURMA—Final date set at January 28, 1945.

EASTERN MANDATES—Air: from December 7, 1943, with final date to be announced later. Ground: from January 31, 1944, to June 14, 1944. This was formerly included in the combat zone of the "Mandated Islands" campaign.

WESTERN PACIFIC—Air: from April 17, 1944, to June 15, 1944. Ground: final date to be announced later. This was formerly included in the combat zone of the "Mandated Islands" campaign.

SOUTHERN PHILIPPINES—Time limitation from October 17, 1944, to a final date to be announced later. Formerly included in the combat zone of the "Philippine Liberation" campaign.

LUZON—Time limitation starts from January 9, 1945, to a final date to be announced later. Formerly this also was included in the combat zone of the "Philippine Liberation" campaign.

The other nineteen battles and campaigns, previously included in the list of battles and campaigns in the present war are: Rome-Arno; Southern France; Germany; Air Offensive, Japan; Naples-Foggia; Normandy; East Indies; Guadalcanal; Northern Solomons; Burma, 1942; China; Aleutian Islands; Air Offensive, Europe; Egypt-Libya; Algeria—French Morocco; Tunisia; Sicily; Bismarck Archipelago; and Northern France. Specific boundaries of areas are given in War Department General Orders.

The IX Air Defense Command

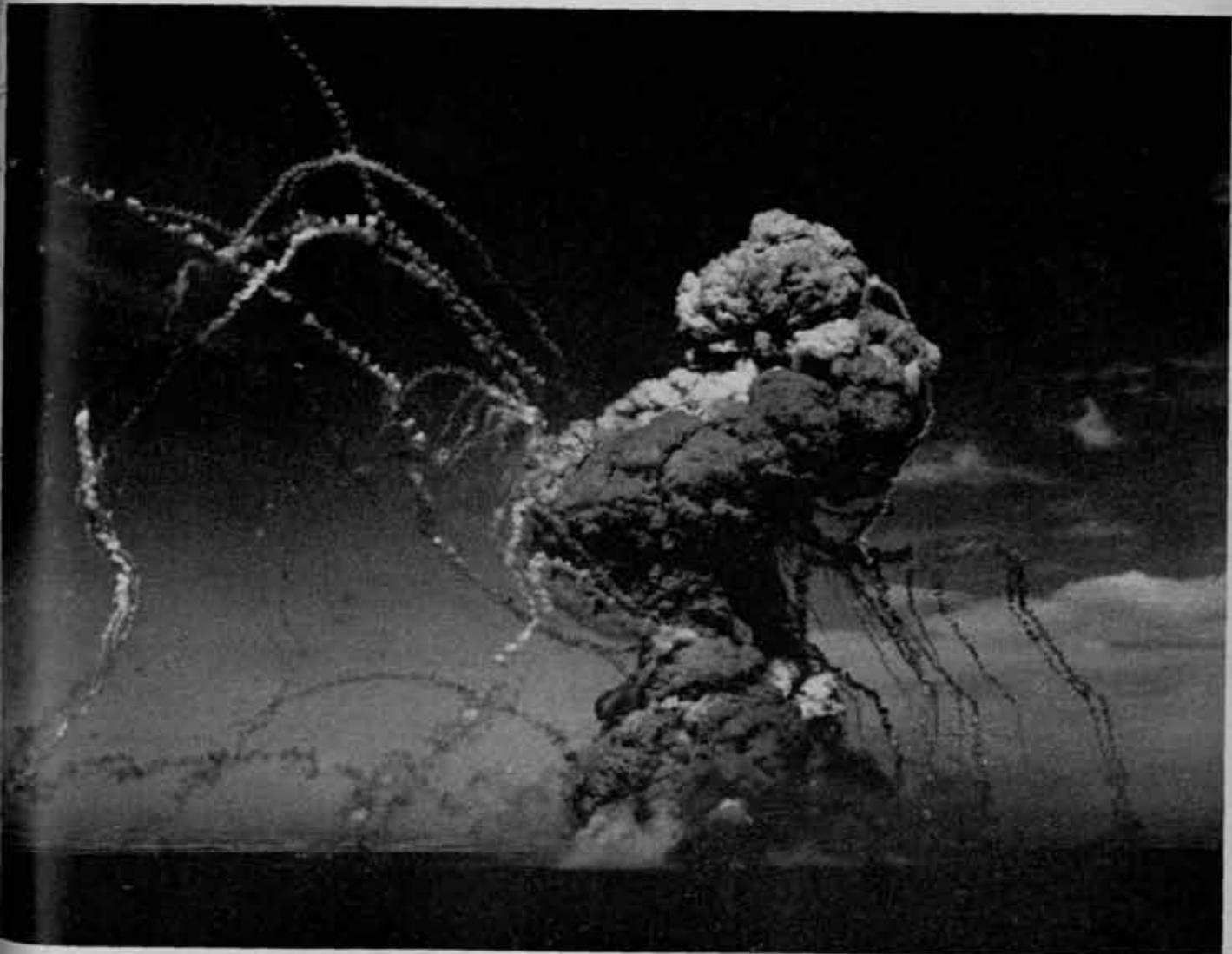
The first anniversary of the IX Air Defense Command on March 30, 1945 marked a most important milestone in the life of this new and integral part of the Ninth Air Force. One year after activation finds the Defense Command a proved and vital part of that air force.

Today its sphere of activity extends over all the ports, bases and lines of communication used by the Air, Ground, and Service Forces from the English Channel to the Mediterranean Sea and the boundaries of the German borders. It has become the largest Air Defense Command in any theater. Its growth has been rapid and expansive and the story of its rise has been one of fast development, quick decisions, and far sighted leadership. The story must go back to the late months of 1943 when the stage was being set for the world's most daring invasion . . . D-Day 6 June 1944. However, preparatory experimentation for an Air-Antiaircraft team in the United States Air Forces goes back even further to combined training in the United States in 1942-43.

The conception and birth of the IX Air Defense Command as such, however, came in England. In planning for the invasion of Europe it was realized that there was a need

for a Command which would be responsible for a coordinated air defense of the great area liberated by the advancing forces. It was realized that the Tactical Air Commands could not continue with this responsibility after the advance left the beachheads. The mission of the Tactical Air Commands was purely offensive in nature. It was further realized that an Air Defense Command should be a balanced organization including all the measures of air defense; day and night fighters, antiaircraft artillery, searchlights, and air warning units. At this time there was no precedent in the Army of the United States for an overseas command of this type. In view of the need for such an organization, Lieutenant General Louis H. Brereton, who then commanded the Ninth Air Force, requested and was authorized to create the IX Air Defense Command.

He further requested the services of Brigadier General William L. Richardson to organize, train, and direct the operations of this Command. General Richardson had previously served in England with General Spaatz and Eaker as Defense Officer for the Eighth Air Force, and was currently engaged in directing combined air-antiaircraft training in the Fourth Air Force on the west coast of the United States. He arrived in London for his second tour of overseas duty in late December 1943.



An American cargo ship, hit by Nazi dive bombers, explodes off Sicily.



A dug-in mess hall at an AA position in France.

Then began the arduous and careful planning for this newly created organization. Officers and men who had been instructors in air defense schools in the United States were called for service in this early planning and organizational stage. It was agreed that close coordination and teamwork on the part of all elements would be required if the Command were to fulfill its mission. The primary mission was to protect Air, Ground, and Service installations through the combined use of fighters, antiaircraft, and air warning weapons. With the basic plans and mission set forth, a proving ground was established in Northeastern Britain. It was there that the components of the IX Air Defense Command began to operate as a coordinated team.

Included in this team were the searchlights, the 90mm guns, the 40mm automatic weapons, and the machine guns of the Antiaircraft Signal Air Warning Units; night fighters and day fighters. Using this proving ground for pre-invasion training, organizations moved into camouflaged positions as though in the wake of a victorious army. Information on aircraft entering the area was relayed to fighter control stations where their courses were plotted and fighter aircraft guided to intercept the invaders before they could reach their objectives. Those "enemy" aircraft which evaded the fighters were taken under the simulated fire of antiaircraft units strategically placed around the vital areas. During all of these dress rehearsals, advantage was taken of the lessons learned in the air defense of Great Britain and in the campaigns of Africa, Italy, and the Far East.

One by one AA Battalions, Groups, and Brigades were incorporated into the Command. Finally in June 1944, the stage was set and the IX Air Defense Command was prepared to transfer its activities to the Continent. The laboratory training and a study of the events of the war prior to D-Day had made it clear that the IX Air Defense Command must be prepared to follow closely behind the army advance with highly mobile forces and must take over the air defense of installations as fast as required by the advancing army. At the same time the Command must continue the defense of the installations to the rear.

The first important assignment on the Continent was the

defense of the Cherbourg Peninsula. To perform this and subsequent tasks, a number of Gun and Automatic Weapons Battalions, Barrage Balloon Batteries, and Chemical Smoke Companies were employed, together with both British and American night fighter squadrons. That this mission was successfully performed is apparent by the fact that although Cherbourg was at that time our only port on the Continent, and as such, a high priority target for the German Air Force, the work of bringing in and unloading supplies was never impeded.

With this initial success, came the ever expanding area of defense and its corresponding problems. The Command saw its troops follow the advance through Granville, Mortain, Rouen, Paris, Le Havre, Liege, Antwerp. The problem of defense was complicated due to the fact that heavy bombers of the Allied Air Forces in the thousands were daily and nightly crossing the lines to pound the heart of Germany. The problem of identification was solved by forming a movement liaison section. In spite of the complexity of existing conditions, there were only rare cases of AA engaging friendly aircraft. In addition to its defensive activities, the IX Air Defense Command, without curtailing its other missions, contributed a number of truck companies to the "Red Ball" service when transportation of supplies was sorely needed.

Searchlights deployed for the illumination of enemy aircraft for 40mm and 90mm fire, assumed the additional mission of providing beacons, or "homing" for lost friendly aircraft. Many pilots and crew members of the Ninth Air Force have been saved by these lights when all other means for safe return had failed. To date the searchlights have "homed" over 3,000 friendly aircraft.

The fighter aircraft and antiaircraft weapons of the Command have successfully destroyed hundreds of standard enemy aircraft, jet-propelled planes, and "buzz bombs" since D-Day. In addition, they have been called on to assist the infantry and antitank units of the United States Army at the front. In the German counter offensive launched in December of 1944, units of the IX Air Defense Command received commendations from the Armies for their brilliant work in assisting in driving back the German advance.



A German flak-wagon, mounting two captured American 50-caliber machine guns, captured near Mortagne, France.



Signal Corps Photo

German 305mm gun, abandoned near Wollseifen.

26th Division Ack-Ack Aims True

With the 26th (Yankee) Infantry Division—In the hills of Luxembourg men of the 390th Antiaircraft Battalion, attached to the Yankee Division, who had been acting as artillery to cover the infantry's advance, heard the drone of Hitler's *Luftwaffe* overhead. In a few seconds they had changed their missions from field artillery to antiaircraft, changed their guns skyward and knocked out thirteen of twenty German aircraft, probably destroyed three more, and sent the remaining Nazi planes limping homeward, shattered and stunned.

The men of the 390th, commanded by Lieutenant Colonel Roy A. Tate and known as "Tate's Terrors," had been resting after days of violent ground fighting when the Focke-Wulfs and Messerschmitts struck. Truck drivers and clerks were guarding the guns. Some of them had never handled these guns in their lives. But in fifteen minutes of fast action they made a record that will probably stand beside the epic of the Infantry in the Ardennes campaign.

As the first plane swooped down, Corporal Ferdinand R. Domingue, whose regular assignment is driving but who was on guard in a turret at the time, began pumping .50 caliber bullets into the plane until it burst into flames and crashed. The regular gunner, Cpl. Ray M. Norris, then dashed into action, took over and put lead into a second plane, an Me 109, forcing it to crash.

Immediately a number of American P47s came into view and began mixing it up in a dog fight.

Instinctively a plan of deadly team work went into effect between the Yanks in the air and the Yanks on the ground. The American planes forced the Jerries down from a high altitude into the range of the antiaircraft guns. They did

not pursue them, leaving the ground crews clear fields of fire.

The action now spread like a prairie flame over a wide area, one battery after another opening up. Pvt. Morris Goldstein, an office clerk with the battalion, had never fired a machine gun before. But he proved a natural for the job. An Me 109 flew low. He cut loose with his machine gun and brought it down.

Three other planes, F-W's, following the Me, strafed the battery. Pvt. Goldstein brought one of them down.

As the other two planes dove, machine guns blazing, they flew below the battery, which was perched on a hill, into the valley. The crew had the unusual test of shooting below their level to get at the planes.

To cover them, Pvt. Ralph Fury had to fire several rounds between two trailers loaded with a hundred pounds of dynamite each. Pvt. Fury missed the dynamite and kept one of those planes under a constant burst of fire until it exploded and crashed down.

One Jerry tried to climb steeply and roll. He hung motionless for a second as Corporals Harry Peterson and Ronald Allen, and Pfc. James Saborido poured lead into him by the bucketful. Then he burst into flames.

Another Jerry flying very low was ripped into by four guns. The cockpit canopy flew off and the planes flipped into a tailspin.

The count rose as the excitement of the gunners grew. Three more—one fell to pieces in mid-air, two hurtled against a hill—fell out of the flight soon after.

Upon tallying up, the count was found to be thirteen planes brought down and three others probably destroyed out of a total of twenty.

CPX and Landward Service Practice

At the Harbor Defenses of Galveston, Colonel John Harry, Commanding, conducted a Command Post Exercise and a maneuver with a Landward Service Practice at a terminating phase of the exercise during the period 21 March 1945 to 28 March 1945, on Galveston Island, Texas.

The maneuver started with a purely intelligence phase with which preceded the land phase of the problem. The HECF-HDCP and all other Command Posts were fully manned during this phase. There were no sea nor air phases in this problem, but previous exercises which included amphibious and air operations, in which units of the Army, Navy, and Air Corps worked in close liaison, were very successful and instructive.

On the evening of 28 March 1945 the situation had developed to a point where troops of the Harbor Defenses, and a battery of two 90mm Guns, M1, on mount MIA1, were ordered to move out with full field packs and three meals of "C" rations under blackout conditions and to establish a defensive zone on the end of the island, a distance of about twenty miles.

Officers were used as umpires to represent the enemy. They were instructed to "paint the picture" of what is happening by initiating messages which would inform participating personnel of the occurrences in a manner as near possible to that prevailing in battle. Each umpire was permitted sufficient latitude by the Director to develop the situation according to his own estimate of probable enemy plans consistent with the general plan and time and space factors.

The maneuver progressed under the cover of darkness with all the incidents and events of modern battle. Infantry tactics were predominantly necessary as the maneuver developed. Strict blackout conditions were enforced, and valuable experience was gained by all participants working under these conditions.

The civilian population had been warned in the local newspapers that a large convoy of army trucks would move over the roads down the island at night and that the vehicles would run with blackout lights. Military Police preceded the various parts and no difficulties were encountered with civilian personnel.

After several engagements with the enemy, the main body of troops reached the defensive zone on the end of the island around midnight. All enemy action then ceased, and a bivouac was established.

On the morning of the 29 March 1945, the 90mm battery registered on a check point, using HE ammunition, and stood by for fire missions. Previously, there had been constructed two targets on the Air Corps Bombing Range that were the approximate size of a Sherman tank. One of these targets was used as the registration point which was at a range of 5,700 yards from the guns. Later a fire mission was then called for by the Task Force Commander on the second target which was at a range of 6,140 yards from the guns. A total of 40 rounds was fired according to the provisions of TM 4-235 (Seacoast Artillery Target Practice) dated 1 January 1945, as amended by Change I. The forward observer adjusted fire using the small T method of adjustment. An officer was prepared to be an aerial observer

for the practice but due to bad weather, the airplane was unable to leave the airport, so the firing was held without aerial observation. The practice was rated as satisfactory. No material hits were obtained, but several impacts were near misses.

The bivouac area was established in the area where the forward observer for the 90mm battery was located. In this position, the troops got the experience of witnessing the effects of high explosive projectiles on a target.

Immediately after the firing was completed, all the officers who had participated in the maneuver were assembled at the bivouac area and Brigadier General Raymond E. McQuillin, Commanding General, Southwestern Sector, Eastern Defense Command, who had witnessed the maneuver since the morning of the 28 March 1945, held a critique.

On Friday afternoon, a final critique was conducted by Colonel John Harry at the Post Theater. All the officers stationed in the Harbor Defenses of Galveston, including the officers of the Service Command, attended this session.

The details of the maneuver were not divulged to anyone except the Commanding Officer and the Control Officers. As the situation developed the various staff officers functioned in their capacities and got the experience of working under battle conditions both in barracks and in the field. All personnel displayed enthusiasm throughout the maneuver, and it was considered by all concerned to be very instructive.

XYZ Highway

Four American armies were supported in their dash into Germany by an express highway system so efficient and so flexible that about 9,000 tons of urgently needed supplies, plus several thousand tons of bulk petroleum products, reached the front every day, the War Department announced.

Devised by the Army Transportation Corps, in cooperation with Communication Zone sections and the Armies, the new system was known as the "XYZ Highway."

Trucks moved on a 24-hour-a-day schedule, stopping only for loading and maintenance. Two drivers were assigned to each truck, and one man was with the truck at all times.

Using five- or six-ton truck-tractors hauling trailers with a ten-ton capacity, more supplies were delivered to Allied armies in Germany over the XYZ Highway than were delivered either by the "Redball" or the "ABC" highway systems, even though far greater distances were involved because of the rapidly advancing Allied spearheads.

Closely controlled express highway routes were laid out to each army. The routes were established with sufficient flexibility so that their terminals and routes could be altered as the tactical situation demanded, and trucking units could be transferred from one to the other without delay.

Trucks ran from railheads in or near Germany to forward areas from where the supplies were taken directly to the depots of individual army units. Truck marshalling yards, strategically located in relation to the railheads and depots where the routes originate, were set up for each army.



Hawaiian Antiaircraft Artillery Command

BRIGADIER GENERAL ROBERT M. PERKINS, *Commanding*
By Major John H. Warner

The high lights of the month of April in the Hawaiian Antiaircraft Artillery Command were the visits of Major General H. R. Oldfield from the Office of the Chief of Air Forces, and Brigadier General R. T. Pendleton and Brigadier General E. R. Crowell, both from the Antiaircraft Artillery School, Ft. Bliss, Texas. These officers are on their way through the Pacific Theater on tours of observation and inspection pertaining to training, equipping and tactical employment of antiaircraft artillery troops. During their brief stay in this area, these officers visited units of this command and questioned men and officers on all phases of training.

Throughout the command emphasis continues to be centered on training of all types. Aircraft Recognition recently has been given a training priority equal to that of artillery and small-arms training, and an intensified program has been initiated. Currently the AAATC is conducting special aircraft recognition instructors' schools. Small-arms training has shown steady improvement over the past few months, and at the present time 93.4% of the command have qualified with the weapon issued and 81.7% have completed familiarization firing as required. Continual emphasis on swimming has resulted in 96.8% of the command being able to swim fifty yards unaided and 92.9% of the command being able to swim one hundred yards fully clothed but with life jacket.

On Army Day the command sponsored a large public exhibit of antiaircraft artillery matériel, in conjunction with that displayed by other arms and services. The exhibit included an OQ-2A radio controlled target, a GE 60-inch searchlight with control station, a 40mm with director, M55 multiple machine gun, a 90mm with M7 Director and stereoscopic height finder, and a 120mm with M10 Director and SCR-584. Appropriate prime movers and power plants for all matériel were also exhibited. This marked the most extensive public display of antiaircraft matériel in this area. The use of all equipment displayed except the SCR-584 was demonstrated by selected details of troops for the benefit of the spectators. The exhibit continued for three days, during which time thousands of

civilians and service men and women saw modern antiaircraft artillery weapons for the first time.

In the field of competitive athletics, the Hawaiian Antiaircraft Artillery Command has won four of the six Central Pacific Base Command Tournaments held so far this year. To date, AAA teams have won the Marathon, Bowling, Horseshoes, and Basketball Championships. The Command was runner-up in the Handball Tournament. Currently HAAAC teams are taking part in the baseball and swimming competitions in an effort to continue the long string of championships.

The Seventh War Bond Drive is scheduled to get off to a good start with a special transcribed radio show featuring Boris Karloff and the cast of one of the current Army variety shows. A composite Army-Navy band will also be featured. The entire program was prepared by the Command's Information and Education Officer and the War Bond Officer.

The following extract from an Intelligence Bulletin published by a unit formerly with this Command, now on Iwo Jima, has been widely read but is deserving of even wider dissemination:

" . . . The POW captured by Battery D, — AAA Gun Bn. claimed that he had been hiding since D plus 1 in the crevasse where he was found by members of the Battery. Previous to his capture and unaware of the presence of the enemy, the Battery erected a latrine over the crevasse. Three days later members of the Battery standing near the latrine heard someone say 'Me Japanese—me surrender.' Upon investigation a small crudely drawn American flag (37 stars and 16 stripes) was seen to appear from a hole in the latrine box. It was fixed to the end of a long pole at the other end of which was a Jap who, tiring of it all, had devised this means of surrender. He was promptly fished out. Later investigation revealed he was dissatisfied with his place of hiding. . . ."



Army Day Exhibit.

Signal Corps Photo



Southeastern Sector

MAJOR GENERAL DURWARD S. WILSON, U.S.A.

Commanding

With warmer weather and bright sunny skies outdoor training for the troops of the Harbor Defenses of Chesapeake Bay, under the command of Brigadier General Rollin L. Tilton, has gotten underway and while the program is designed to keep the tactical mission paramount, considerable time will be devoted to mass athletics, recreation and physical fitness.

Small-arms firing, automatic weapons practice and the usual vigorous outdoor problems have been planned and will be carried out through the entire summer months well into fall. With the seacoast and antiaircraft practices for the first quarter successfully completed the batteries will enter into the present training program unhampered.

During the past quarter there were two instances that caught the attention of the Harbor Defense troops. One was the firing of the largest major caliber guns at Fort Story and the other was the series of lectures on amphibious operations presented at Camp Bradford, Virginia, for the officers of the command. Although the amphibious operations were covered briefly it did afford Coast Artillery officers an opportunity to gain a general knowledge of the type of craft employed and the methods of carrying out a sea-borne landing operation.

With the inevitable approach of V-E day and the aroused interest of all G.I.'s, orientation has taken the spotlight in the Harbor Defense installations and a lively contest has resulted among the various outfits as to the best information and education center. In addition to these "centers" a discussion period has developed that has proven more than enlightening insofar as the actual knowledge and awareness of the enlisted men on world affairs. Quite often lectures have been cut short and a round-table discussion resulted from some point. Maps, heretofore little noticed, are consulted every day and it appears that each G.I. is taking it upon himself to watch the progress of the battle lines and has his own version of what will happen next and when.

While the Harbor Defense troops are on the outside



Orientation Center at a Seacoast Battery, Harbor of Chesapeake Bay.

fringe of reflected glory, the Convalescent Hospital at Fort Story has afforded considerable entertainment in that numerous national radio broadcasts have originated there.

A visit from Army and Navy dignitaries high lighted the past two months when a party, headed by Lieutenant General George Grunert, Commanding General of the Eastern Defense Command and Vice Admiral Herbert F. Leary, Commandant of the Eastern Sea Frontier, arrived to inspect the defenses of Chesapeake Bay. The party visited the various batteries at Fort Story, the Convalescent Hospital and the mine casemate and returned to Fort Monroe where they were the guests of General Tilton and his staff at lunch. Following lunch the inspection tour was continued by plane to Charleston, South Carolina.

Fort Monroe's baseball nine, boasting only a few college stars, was able to hold the Washington Senators to a 5 to 4 decision in a game played at the historic old Fort. The Gunners have scheduled a full program of games for the season with local teams which will continue into September.

At the Harbor Defenses of Key West, under the command of Colonel R. E. Turley, Jr., a Harbor Defense maneuver was conducted by personnel of that command on 24-25 March 1945. The purpose of the maneuver was to practice the execution of current plans, test combat efficiency, and observe the action taken by Intelligence and Operations personnel. During this maneuver, troops were confronted with sea, air and land attacks.

The problem commenced by receipt of messages from Army and Naval Intelligence of approaching high-speed hostile vessels. During this phase of the maneuver, intelligence furnished estimates on progress of hostile vessels and time at which they were capable of reaching Key West.

During the afternoon, reconnaissance planes passed over all installations of these Harbor Defenses on photographic missions. The following morning, a dawn air attack was made and all installations were "bombed" with sacks of flour.

While the air attack was in progress, the enemy made a landing on the southeast shore of Key West. Battery "B" and 1459th SCU established an initial line of resistance and manned all positions during the night and were in a position to meet the attack and withdraw to a final line which was to be defended at all cost. During the early morning the 1459th SCU became the attacking force. Batteries "A" and "C" (mobile platoons) were dispatched to attack on each flank of the enemy (1459th SCU) and assist Battery "B" in the annihilation of the enemy.

Battery "A" fired a 90mm and 40mm practice and Battery "C" fired a 37mm practice during the maneuvers.

It is felt that the maneuvers were quite successful and that all personnel benefited considerably.

All noncommissioned officers are taking a course in Photo Interpretation. The course only handles forty men at a class but it is expected that all men will take the course.

On 8 March, the following high-ranking officers with members of their staffs visited the Harbor Defenses of the Delaware: Lieutenant General George Grunert, Commanding General of the Eastern Defense Command; Vice Admiral Herbert F. Leary, Naval Commander of the Eastern Sea Frontier and Major General Durward S. Wilson, Commanding General of the Southeastern Sector.



Fort Bliss



BRIGADIER GENERAL WILLIAM HESKETH
Commanding AARTC

By Major Rex Ragan

Sole surviving Antiaircraft Replacement Training Center in the United States today, the AARTC, Fort Bliss, Texas, under the direction of Brigadier General William Hesketh, handles the all-important task of transforming men fresh from reception centers into expert antiaircraftmen, capable of serving as AA replacements both in this country and in any combat theater of operations.

Operating on the premise that a great majority of trainees here, after qualifying as expert antiaircraftmen, will be utilized to plug the gaps sustained by AA combat units, individual training of the men both as soldiers and specialists is greatly accentuated.

Courses for specialists, particularly in the more intricate phases of AA warfare as pertains to maintenance of guns and equipment under combat conditions, holds an important place in the AARTC program. Under the supervision of the AARTC Centralized Schools system, small groups of trainees, specially selected for certain aptitudes and knowledge, acquire diversified skills through comprehensive courses of instruction.

Two of the most popular schools with the men are the Artillery Mechanics' School and the Electricians' School. Chief function of the former is the repair and maintenance of antiaircraft artillery weapons, while graduates of the latter school are taught an over-all picture of electrical maintenance of AA equipment with the exception of radar and radio.

Students in the Artillery Mechanics' School are thoroughly trained in first and second echelon repairs on the .50 caliber machine gun, 40 and 90mm antiaircraft guns, M7 power plants, M7 director and the M1 rifle and carbine. They also receive basic instruction in third echelon work, which includes major repairs to ordnance matériel.

Since the Allied steam-roller offensive in the European theater crushed completely the Nazi war machine, greater emphasis is being focused on the Japanese war, which, despite our stirring triumphs in the Southwest Pacific recently, and even after Germany fell, looms as a long, hard struggle.

Cognizant of this fact, the AARTC training program is designed to give the trainees a liberal and invaluable education against the barbarous tactics employed by the wily Japs through the use of mines and booby traps. Stressing the importance of not underestimating the Japanese, the AARTC class on mines and booby traps vividly shows the devilishly ingenious measures utilized by the Nips to kill the unwary.

To this end, a realistic replica of a Japanese house has been constructed and against the authentic background, the soldiers-in-training witness the dramatic unfolding of "The Saga of Hepplefinger Snodgrass Sack." Created by the S-3 Section, the "Sack" becomes a living exemplification of the character either too dumb or too tired when he had the opportunity to learn proper protective measures, and when forced to fend for himself falls an easy prey to the deadly machinations of the enemy. Perfectly timed and executed, "this show with a purpose" succeeds in making a forcible and lasting impression on the minds of the trainees.

The gentle "zephyrs" which struck El Paso in March (all Texas' Chambers of Commerce please note), raised havoc with field problems. Gales which reached a velocity of 60 miles an hour whipped up fierce sandstorms which completely disrupted all radio communication.

Despite the weather, the tactical field problem held by the 51st, 52d, and 56th training battalions, from the viewpoint of practical application for trainees, especially Ground Aircraft Observers, was deemed one of the best ever held here.

An intensive tour of Fort Bliss installations was made during February by The Honorable John J. McCloy, Assistant Secretary of War, accompanied by Brigadier General J. B. Sweet, Colonel Harrison A. Gerhardt and Colonel R. A. Cutter.



Northern California Sector

Scott and Sub-Posts in addition to his duties as Commanding Officer of the Harbor Defenses of San Francisco. Colonel Lafrenz replaces Colonel Arthur E. Rowland.

Commander Lin Sian-Kwan, Chinese Assistant Naval Attaché from Washington, and his Aide, Lieutenant Chow Chia-Tsung, visited the Harbor Defenses recently with the special mission of observing the administrative organization of the Harbor Defenses.

Commander Lin met Colonel Lafrenz, Colonel Kenneth Rowntree, Executive Officer HDSE, and Colonel Rowland. After Colonel Lafrenz had pointed out items of interest, Commander Lin and Aide were conducted on a tour of the Harbor Defenses by Captain Leslie A. Irvin.

BRIGADIER GENERAL RALPH E. HAINES, *Commanding*

Colonel William F. Lafrenz assumed complete command last month when he took command of Fort Winfield

The Navy Detachment, Fort Scott, came through with flying colors recently in assisting in the dramatic rescue of the crew of a giant naval air transport which had been forced down within sight of the Golden Gate in treacherous 30-foot swells. Our observers aided in the location of the lost plane.

The 1945 HDSF softball season was opened before a record attendance at Fort Scott. Batteries for the first pitch were Brigadier General Ralph E. Haines, Commanding General, Northern California Sector, pitcher; Colonel Lafrenz, catcher; and at bat, Colonel Rowntree.

Empty barracks at Fort Cronkhite served as the answer to an emergency military housing problem recently when more than 1,000 soldier-patients from Letterman General Hospital, Presidio of San Francisco, were shuttled to the sub-post to alleviate a serious shortage of beds existing in the already overcrowded hospital. The temporary annex lasted only a few days. The majority of the patients were ambulatory cases awaiting removal.

Members of the Harbor Defenses have become ice hockey enthusiasts due to the very successful season of the HDSF team. Playing fifteen games, the HDSF sextet was high team with eleven wins.

Harbor Defense antiaircraft units have undergone a period of training and firing at the HDSF AA Firing

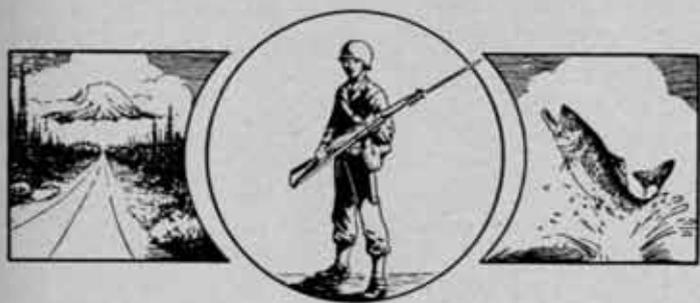
Range under supervision of Lieutenant William S. LaM...

Harbor Defense Automatic Weapons Officer. Fort Scott orientation classes heard an eye-witness account of the famous "Death March of Bataan" and other Jap atrocities when Corporal Glen Kuskie, 23-year-old son of a Fort Barry civilian fireman, spoke before a large gathering at the Fort Scott theater. Kuskie is one of the eight three who survived when an American submarine torpedoed and sunk an unmarked Jap troopship carrying 73 Yank prisoners of war. The young soldier wears three Presidential Citations, three Bronze Stars, Purple Heart and Combat Infantryman's Badge.

Three Harbor Defense soldiers received awards in the recently completed Ninth Service Command Army Artillery Contest. They included Cpl. Arthur Leiser, and Private Kenneth Strelow, photographers; Sergeant Ted Mike, artist.

Service Command Unit troops under direction of Lieutenant Joseph Schneider and Lieutenant Joseph B. Jones are undergoing specialized training this month as auxiliary military police for the San Francisco area.

Special services for tribute to the late President Franklin D. Roosevelt were held in the Ft. Scott theater Saturday April 14.



Northwestern Sector

BRIGADIER GENERAL JAMES H. CUNNINGHAM, Assistant Sector Commander for Harbor Defense Matters

Memorial services for President Roosevelt were held in both harbor defenses on Sunday, 15 April.

At an impressive ceremony at Fort Stevens, Oregon, on 6 April, a Legion of Merit was presented to Staff Sergeant Walter J. Zduniak for exceptionally meritorious conduct in performance of duty from 22 February to 24 November 1944 in Alaska; at the same ceremony a Bronze Star Medal was presented to Staff Sergeant Carl P. Sheedy for heroic action in combat on 27 January 1944 near Tracchio, Italy. Presentations were made by Colonel C. S. Doney, Commanding Officer, Harbor Defenses of the Columbia.

In spite of the attention being given to infantry training, intensive artillery instruction and the regular target practice schedule, including a number of surprise shoots, has been continued in both harbor defenses, including both officers' and noncommissioned officers' schools. Searchlight target practices under the new regulations were carried out in both harbor defenses with excellent results.

Each harbor defense has received a 63-foot aircraft rescue boat capable of towing targets at a high rate of speed. This

will enable future target practices of AMTB batteries to be fired under conditions which more nearly approximate normal targets for these batteries. These boats also work exceptionally well as control vessels for JR boats operated under radio control.

During the week 9 to 15 April, a school in the operation of Radio Controlled Airplane Targets was conducted in the Harbor Defenses of Puget Sound for Canadian and Navy personnel, under the supervision of the Commanding Officer, 14th CA Battalion, Fort Casey.

A series of tactical exercises and command post exercises were held during March-April in both harbor defenses, and this program will be continued through June and will be climaxed by an exercise involving all units of the Northwestern Sector.

Particular attention is being paid in both harbor defenses to Army Orientation instruction and information for enlisted men, including maintenance of orientation centers and unit war rooms.



Orientation Center, Fort Worden.

Signal Co



BOOK REVIEWS

The JOURNAL can supply any book in print,
at the usual Association discount.

Pocahontas and Poe

THE JAMES: FROM IRON GATE TO THE SEA. By Blair Niles. New York: Farrar & Rinehart, 1945. 310 Pages; Sources; Index; Illustrated. \$2.50.

There are few Coast Artillerymen (especially officers) who have not served at Fort Monroe. Service at Monroe gives one a personal interest in the James, which is probably our most important river in the historical sense. As we read this book the country around Monroe comes to life. Jamestown, Bacon's Castle, Williamsburg, Richmond, and the reaches of the river above that now-bustling city become more than places on a map.

Both the glories and the hardships of colonial life are gone, but with a competent guide the memories linger. This book is a competent guide. The author writes not of past and dead history, but of history as the roots of the present. In her account of the James country from 1607 to the present, we can understand why this area is as it is. Berkeley, Bacon, John Smith, Pocahontas, Powhatan, Washington, Jefferson, Patrick Henry, Robert E. Lee, and hundreds of others seem to live in the pages of this book.

The author meets head-on the problems and social implications of the system of bond-servants, of slavery, of the Civil War and the Reconstruction period, and the agricultural basis of Virginia's existence. The lace and romance of America's history is not permitted to cover completely the hard facts of existence through three centuries. The book is worthy of its subject.

Milestone to Liberty

THE DECLARATION OF INDEPENDENCE: THE EVOLUTION OF THE TEXT. By Julian P. Boyd. Princeton: Princeton University Press, 1945. 78 Pages; Illustrated. \$3.50.

The way history is taught in our secondary schools (or was taught in the reviewer's time) Thomas Jefferson sat down one night and wrote the Declaration of Independence, which was immediately adopted by the Congress and was gratefully accepted by an enthusiastic populace.

The real story, of course, was vastly different. The Declaration had its backgrounds in history and in the writings of thinkers before Jefferson's time. Jefferson wrote an original draft, which was altered by the Committee of Five, and altered again by the Congress. The author has attempted, with fair success, to analyze the various changes and to correlate the

various drafts. Even though all the answers are not known definitely, his researches have made possible an illuminating study of the thoughts and labor that resulted in the Declaration as we know it.

Reproductions of all known drafts and copies in Jefferson's own hand are included in the book. The book's 8½ by 11¾ pages lend themselves to clarity in the reproductions. Patriots and historically minded people will welcome this book in their libraries. It would be difficult to accept the Declaration merely as another historical document after reading this volume.

Maps

THE OXFORD WAR ATLAS: VOLUME III. By Jasper H. Stemberge. New York: Oxford University Press, 1945. 98 Pages; Maps. \$1.50.

This volume of the series covers events of the war that happened in 1943. Maps and text present a concise and accurate review of the war in all theaters, including sociological, economic, and other factors, as well as the military picture. The maps are clearly drawn, designed to present the particular points outlined in the accompanying text, but at the same time they may be used as an atlas for events as they are now occurring.

Aid to the Commander

THE MILITARY STAFF: ITS HISTORY AND DEVELOPMENT. By Lt. Col. J. D. Hittle, U.S.M.C. 188 Pages; Bibliography; Index. \$2.00.

Our present-day staff organization is probably not the final and complete answer to the problem of higher-echelon command, but it works—and will continue to operate until somebody dreams up a better system. Our staff did not spring full-blown from a single brain, but is the product of evolution through the centuries of warfare. It differs from the English, French and German staff organizations (which are treated in this book) and from the Russian (which is not treated due to lack of information on the subject). The French system was the nearest approach to our own, but even it was vastly different. Part of the trouble with the French General Staff was its isolation from the remainder of the army—a condition which does not obtain in the United States.

In tracing the development of the staff from earliest times, Colonel Hittle helps us to understand not only why a staff is

necessary, but how it operates. When Elihu Root was Secretary of War, supporting the General Staff idea in Congress against the arguments of Lieutenant General Nelson A. Miles, he explained in telling words how proper staff organization would have obviated the scandals of the war with Spain. Congress listened, and our present staff organization was born. Its ancestors were Alexander, Frederick the Great, Napoleon, Bismarck, and countless others who solved the problem of assistance to the commander in their own way.

American in the Boondocks

AMERICAN GUERRILLA IN THE PHILIPPINES. By Ira Wolfert. New York: Simon and Schuster, 1945. 301 Pages. \$2.75.

One of the more famous of the Americans who stayed in the Philippines during the Jap occupation and worked with the guerrillas was IJiff David Richardson, an ensign in the U. S. Navy who fought in Bulkeley's PT squadron. Richardson became a major in the guerrilla army of Colonel Kangleon, probably the most noted of the Filipino undercover leaders, and later took over the command of the radio communications with MacArthur's headquarters.

Life was rather raw, to understate the case a bit. The Japs, noted for their cruelty and indifference to human suffering, were bad enough, but the complications of racketeering guerrilla leaders, fifth columnists, and the seamier sides of the tropics added the finishing touches to a rough life.

Richardson dodged Japs and fought them, aided in the organization of Kangleon's pitiful little army, scrounged radio parts and munitions, kept in radio contact with Australia, and still found time to fall in love with a native (Spanish) girl. Wolfert, Pulitzer Prize-winner, tells Richardson's story well, blending the military implications with the personal angle to present a complete and human picture of the activities of the Americans who remained behind to aid the recapture of the Islands.

Postwar Relations

MAIN STREET'S NEW NEIGHBORS. By Melvin K. Whiteleather. Philadelphia: J. B. Lippincott Company, 1945. 252 Pages. \$3.00.

Mr. Whiteleather attempts to evaluate the problems that peace will bring, and to propose solutions to some of the problems. The book is divided into seven main portions; one of them is really an introduction. Two of the sections concern our relationships with Britain; one deals with France; one with Russia; one with Germany. The last section merely emphasizes the problems of the peace to come.

The general trend of the book is little different from that of other books that have dealt with the same problem, especially in the portions that deal with England. The theme of this section seems to be that neither Britain nor the U. S. is perfect, that neither is wholly bad, that we both follow forms of imperialism that we can't very well stop, and that as a result of the war we will know each other much better, and should be able to cooperate more effectively.

Russia, he says, needs peace more than she needs World Communism, and knows it—we can and will get along with Russia. France, according to this author, was more sinned against than sinning—our aid and comfort to Vichy and other "wrong ones," and our policy toward De Gaulle, has done almost irreparable damage, but the cause of friendship with a strong France is not yet lost.

As for Germany—this is a gloomy chapter. The panacea had better take another look, according to this author. Making Germany fit to live with her neighbors will be a long, heartbreaking process, with many pitfalls.

On the Beach

THE FAR SHORE. By Max Miller. New York: Whittles House, 1945. 173 Pages; Illustrated. \$2.50.

The mechanics of an invasion are intricate and, to a degree, precise, but the human aspect is the power behind the mechanics. No one knows which ship is going to be hit, or which man is going to be killed; in fact, not even which beach will be the more strongly defended is a certainty. The battlewagon and the transports have their place, but the little boats that shuttle to the shore, commanded by kids who should be in high school instead of taking what the sea and the enemy has to offer, perform the tasks that put the army in the far shore.

There is Army at sea, Navy ashore. The whole mixed-up business seems to be aimless and improbable, but North Africa, Sicily, Salerno, Anzio, Normandy, and the Riviera (to say nothing of the Pacific area), indicate that somehow the problem is worked out—if not to a mathematical certainty, at least to within a workable number of decimal points.

This book tells, in text and pictures, of the Normandy and the Riviera landings, from the Navy's viewpoint. The book is a lot of little scenes, blended into a fragment of the big scene that will help to tell the reader a little of what an invasion from the sea is like.

Red Banners

REPORT FROM RED CHINA. By Harrison Forman. New York: Henry Holt & Co., 1945. 238 Pages; Illustrated; Appendix; Index. \$3.00.

The Chinese Communists, according to Mr. Forman, are not really Communists, since they have no links with Russia. Their system is a form of Communism, probably based on Marx, but adapted to their own people and their own country. The Russians give them no aid, either morally or in material things. Many of the Chinese Communist educational methods, however, have been borrowed from the Russians.

What is of more interest to Americans, however, is the fight against Japan. Our newspapers have told how the Chungking government and the Chinese Communists seem to be fighting each other more effectively than they fight the Japs. We, and how the Chungking censorship has permitted few mentions of the Communists. Mr. Forman, in spite of some opposition from the Chungking government, finally was permitted to visit the Communist-controlled area.

His findings indicate that the Communists and their Eighth Route Army are probably a more effective fighting force than the Chungking group, size for size, and in spite of the fact that none of the supplies we send China have been given to the Communists. The Communist military forces support themselves, fight the Japs, and help build the economy of the area. Their "regular forces," their guerrillas, and the peasantry themselves have been bleeding the Japs for years, with relatively few losses, as compared to the Chungking forces.

An interesting feature of the Communists' activities is the Japanese People's Emancipation League. The members are former Japanese soldiers, who have been taken prisoner by the Communist forces, or who have escaped to them. Since the Japs cannot return to their units or to their homeland once they are captured, they stay with the Communists and besic

the Jap garrisons with megaphone harangues, printed materials, and tapped telephone conversations, urging the Japs to desert and join the League, to save Japan from the militarists and to give themselves a better life. The idea seems to work, in spite of all we have heard about the character of the Jap soldier. Mr. Forman offers no solutions to the difficulty of reconciling the Chungking and Communist factions so they can fight more effectively against Japan, other than to point out the rather obvious value of such a move.

Aspirin for the World's Headache

THE MORAL CONQUEST OF GERMANY. By Emil Ludwig. New York: Doubleday, Doran, 1945. 183 Pages. \$2.00.

As this review is being written, four days after V-E Day, Americans are just beginning to realize the problem we must meet—and the problem of making Germany a fit member of the nations of the world. The horrors of twelve years of Nazi domination have been well publicized, but we must remember that the source of pollution in Germany is not only the Nazis, but the Germans themselves. Without Germans there could have been no Nazis. Emil Ludwig, one of the greatest contemporary historians, and a writer who knows Germany and the Germans, outlines in this book some of ingrained traits that must be eradicated by some means before we can sit back and relax, knowing that Germany will not begin World War III in the next generation.

Some quotations from the book will give a fair idea of its content and treatment:

"In America the State is a union of millions of people who have entrusted a few thousands with their administration. In Germany the State is a deity, imperceptible and enthroned above the clouds; every single public employee is an anonymous priest of that invisible god, equipped with olympian powers over his subjects, even over their very lives and deaths."

"As other nations hail freedom, the Germans hailed obedience, the new leader (Hitler) had found the key to their starts."

"... the simple fact is not realized that for centuries power and culture have been separated in Germany, allotted to two different classes.

"Rathenau tried to rule Germany with an eye to spiritual values—and therefore was bound to lose out."

"In 1913 the proportion of noblemen in the Prussian officers' corps was 22 per cent against 21.3 in the republican year of 1921. The missing 0.7 per cent apparently represented the victorious revolution."

"Germans have always rejected freedom and craved victory."

"While uncounted Americans gave their lives for liberty, those men (German exiles) have the audacity to write on American soil that both France and England share the war guilt with Germany. Such stuff is printed in American-German language papers."

There is little sympathy for any German in Ludwig's book. He damns the masses with the leaders, because the masses were senseless in choosing their leaders, and were enthusiastic in following them. Even the few Germans who realized what was happening followed the parade.

POW Novel

THE PRISONER. By Ernst Lothar. New York: Doubleday Doran & Company, 1945. 308 Pages. \$2.75.

The POW was a 15-year old Austrian, a youth caught young

Basic Manual of Small Arms **\$2.00**

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Studies of Frederick, Marlborough, and Napoleon.

Napoleon and Modern War **\$1.00**

By Colonel Conrad H. Lanza
Napoleon's famous maxims applied to modern war.

Warfare **\$3.00**

By Brig. Gen. Oliver L. Spaulding, Col. John W. Wright, and Maj. Hoffman Nickerson
The story of war from the days of tribal squabbles to the end of the eighteenth century.

by Hitler and pumped full of the *Herrenvolk* myths. The Nazi story meant more to the boy than even his father and mother until he was caught in the gears of intrigue that kept the Nazi Party on the road to temporary power. The book is the story of the boy's acceptance of the Nazi ideology and of his disillusionment, after he was unjustly accused of stealing, forging, and cashing a money order. When he found that the real culprit was being protected because his uncle was a Nazi official, and that even his idol Hitler was merely another selfish man, he had little to live for but the girl who stood by him when even his mother had her doubts.

The incidental setting of the POW camp in the West, with its secret courts and summary executions, adds an American twist to the story, and presumably makes it of more interest to Americans. Although the tale limps in spots, and is slow-paced throughout, it might help us to understand some of the roots of Naziism.

Little Joe

SCARNE ON DICE. By John Scarne. Harrisburg: Military Service Publishing Co., 1945. 379 Pages; Glossary; Appendices; Index. \$2.50.

The theme of this book seems to be that you can't win at dice if you are honest (it's dangerous to be dishonest); but if you are determined to play anyhow, you might as well cover your losses by knowing what you are doing. Very few players do know what is happening while their money melts away even in an honest game. Odds that look even are not even; odds that seem to be generous are often even more generous than they seem (in favor of the other fellow); house percentages may not seem large, but they count up in the course of an evening and you may be carrying crooked dice in your pocket without any knowledge that they are crooked. Incidentally, only very table amateurs use "loaded" dice; they are too dangerous. There are other, comparatively safer ways of fixing the little cubes.

As the size of the book might indicate, the author goes into the subject quite thoroughly. Some little-known facts are brought out. For instance, games in "respectable joints" are usually honest, although the house gets the best of it in the odds and in the commissions, or "vigorish." Back-alley games are often dishonest, and even the honest ones give the informed (and necessarily the "smart") player a much better-than-even break. Things are rarely what they seem, and the "lucky" player is usually not so lucky as he is either crooked, or more informed about proper odds.

Every person who rolls the cubes, either for profit or relaxation, can learn much from this exhaustive treatise on square ballistics. He will probably save the purchase price on his first night of play.

Zzzzip!

ROCKETS AND JETS. By Herbert S. Zim. New York: Harcourt, Brace and Company, 1944. 316 Pages; Illustrations; Index. \$3.00.

For laymen readers, this book will be instructive and interesting. For military readers, there will be much repetition of material already known (along with new material). Much of the historical material on rockets, especially, has been taken from writings by Willey Ley, portions of which have appeared in the *JOURNAL* in the form of articles. Mr. Zim covers his subject from all angles except the deeply technical ones, and does his subject justice, on the whole. Many may consider some of his statements and other material flights of fancy, but of course,

the time the idea that people could fly was considered non-sense.

In one place, the author states, "Powder (black powder) is not affected by temperature or humidity. It will keep indefinitely and is always ready for use as long as it has been kept dry." The statement is either ambiguous, inaccurate, or both—and common black powder is no longer used in military rockets. There may be more of these lapses which a rocket or jet expert could detect—the reviewer places himself with the laymen, and feels that he did learn.



Action! Camera!

MOVIE LOT TO BEACHHEAD. By the Editors of *Look*, New York: Doubleday, Doran, 1945. 291 Pages; Illustrated. \$3.50.

The moving picture industry has contributed much to the preparation for war, to the prosecution of the war, and to an understanding of the problems that will come after the war. This book, replete with pictures, places the industry's contributions on record.

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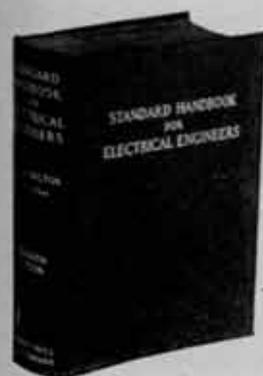
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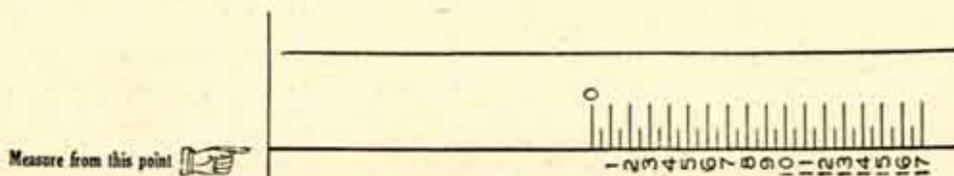
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