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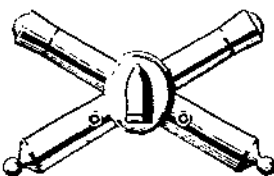
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A black and white photograph showing a formation of approximately 15 biplanes flying in an echelon pattern over a rugged, mountainous landscape. The planes are arranged in three staggered rows, moving from the upper left towards the lower right. The terrain below is characterized by deep valleys and rolling hills, with the San Bernadino range visible in the background under a sky filled with large, white clouds.

Formation: Echelon to the left.

These are the modern planes of the 17th Attack Group of March Field, California, in formation flight over rugged country. The San Bernadino range bulks in the background.



BOMBING OPERATIONS in the ZONE OF THE INTERIOR

... By Lieutenant Colonel Roger B. Colton, SIGNAL CORPS

This subject will be discussed principally from the viewpoint of the defense against land-based bombing aircraft. Operations of this character were undertaken on a considerable scale during the World War; these are well documented, and there is practically no disagreement as to the facts. Therefore we begin this discussion by a study of World War bombing operations.

TARGETS SELECTED DURING THE WORLD WAR

The military value of any bombing operation should be measured in terms of its contribution toward the defeat of the enemy. This was recognized during the World War. Emphasis was placed on the destruction of facilities having the most direct bearing on the outcome of the war; therefore attacks on such military establishments, as airdromes, navy yards, docks, arsenals, ammunition storage yards and military and naval training camps were generally regarded as of prime importance. Of course these and other military activities could, in some cases,

best be paralyzed by proceeding back along the chain of supply and destroying transportation centers, munition factories and other supply establishments. Since nearly all of these targets were necessarily contiguous to, or parts of, cities, the missions assigned to bombers, though reading more or less in terms of military or industrial objectives, nevertheless made the cities themselves the actual targets. If the bombers failed to reach the large cities, they dropped their loads on anything handy.

RESULTS OBTAINED

Since monetary damage, loss of production, expense of defense measures, and morale factors were roughly proportional to casualties, it appears that the number of casualties inflicted affords the best yardstick for measuring the success achieved by bombing operations in the Zone of the Interior.

Some idea of the relative profitableness of airplane attacks on large and small cities may be obtained by com-

Modern AA guns have kept pace with modern bombers



paring *airship* results before London was denied to the Zeppelins (141 Zeppelin journeys, 432 killed, 3.07 killed per trip) and thereafter, when attacks could only be safely made on the north of Great Britain (47 Zeppelin journeys, 25 killed, 0.53 killed per trip).

German airplanes dropped 73 tons of bombs on Southern England killing 857 people, injuring 2,058, and doing about 7 million dollars of damage, mostly in central London. British airplanes dropped 323 tons of bombs, mostly at night, on "industrial" targets in Alsace-Lorraine, Luxemburg, Belgium, the Palatinate and vicinity, after June 6, 1918. (The British apparently consider that their bombings prior to June 6, 1918, were almost entirely in the nature of field operations.) The British seem to have killed about 343 Germans and wounded some 828 more.

Casualties in the London area, due to airplane raids, were 487 killed and 1,444 injured; in Paris, 266 killed, 603 wounded. Damage incident to airplane raids on London came to about six million dollars, practically all within 6 miles of Charing Cross. The cost of the antiaircraft defenses of London could hardly have been less than 15

million. Loss of production may have amounted to another 15 million dollars.

MEANS OF DEFENSE

All active means of antiaircraft defense were used by the British and French. The principal means were their (and our) field forces; these so engaged the attention of the enemy that although he had on hand about 20,000 airplanes at the time of the armistice, his attacks on Great Britain were never made with more than 33 or 34 airplanes and never constituted a major effort.

Study of various memoranda (by Major General Trenchard, of the British War Office, Sir William Weir, Secretary of State for Air, and Marshal Foch) and the detailed account of the missions of the 41st Wing and Independent Force, October, 1917, to November, 1918, fails to disclose any direct connection between bombing or cessation of bombing of London and Paris, and the Allied bombing operations, which were in part conducted as reprisals. Owing to geographical conditions, first-class reprisals by the Allies were impractical, if not impossible.

According to the best French source available, 195 cannon were used in the defense of Paris, as well as balloons, searchlights, and sound locators. Fighter aviation though constituting the principal daytime defense, was little used in the night defense of Paris.

The defense of London on June 10, 1918, consisted of 152 "efficient" fighter airplanes, 210 "deficient" airplanes, a number of reconnaissance ships, 278 cannon, 355 searchlights, 7 balloon aprons (apparently involving a total of 21 balloons), 4 sound locators, and about 8,000 troops, together with miscellaneous auxiliary apparatus and civilian personnel.

RESULTS OBTAINED BY THE DEFENSE

Counting each trip of an airplane as a separate airplane, about 436 airplanes were used in attacks on London and its environs during the entire war; and 483 in the attacks on Paris in 1918 only. The London defenses brought down 22 airplanes or 5%; the Paris defenses, 13, or 2.7%. The London defenses turned back about 70% of the attackers before they reached their objective and the Paris defenses about 90%. These figures though not exact are about as accurate as any battle statistics.

In raiding London the Germans were confronted by

greater distances, by worse weather and, at night, by far better fighter aviation defense than in their attacks on Paris. Attacks on London ceased after May 19, 1918; on Paris after September 15, 1918. The cessation of attacks on these two cities are variously attributed by German writers to "the pressure of events in France," "military and political reasons," "fear of reprisals in view of the unfavorable military situation," and "adverse weather conditions." Although the German writers do not mention casualties as a deterring factor, it is significant that the Zeppelin attacks on London ceased after 45% of the attacking ships were lost on the night of October 19, 1917; that day airplane attacks on London ceased after 30% casualties were suffered on August 22, 1917; and that night airplane attacks on London ceased after 30% of the raiders were brought down on the night of May 19, 1918.

When we consider the fact that there would undoubtedly have been a greater increase in the number of raids had there been no local defenses to oppose them and, furthermore, that in this event the number of arrivals at the objective would have been very high, it seems fair to credit the local defenses with reducing the number of bombs dropped on Paris and London to perhaps as little as 1% of the number that would otherwise have fallen on these objectives. Had the field forces of the Allies not attracted the bulk of the German air effort, the damage to London and Paris would have been incalculably greater.

RELATIVE VALUE OF LOCAL MEANS OF DEFENSE

The following table, showing the breakdown of German losses in raids on London, gives some idea of the relative defensive worth of fighter aviation, AA artillery, and the ever-present hazards of flying.

	German air- planes brought down, totals	Brought down by fighter aviation	Brought down by AA Guns	Brought down by weather and accidents
Day attacks	11	5	3	3
Night attacks ¹	19	5	9	5
Totals	30	10	12	8 ²

The French used very little aviation in the night defense of Paris because they had small confidence in its effectiveness at night and because they believed it could be used to better advantage in daytime operations at the front. Front-line aviation, of course, furnished daytime protection of Paris. The French now expect to use fighters at night.

CONCLUSIONS

We may conclude:

1. Small cities and establishments deep in the Zone of the Interior were not very liable to airplane attack unless situated on the normal route of approach to large cities.
2. In the face of reasonable defense measures, day

¹Mostly by moonlight.

²After arriving over England. It seems probable that many more were lost prior to reaching England.

bombing was discontinued by the Germans and not greatly used by the Allies.

3. The bombing operations in the Zone of the Interior were profitable to both Germans and the Allies, so far as material effects were concerned.

4. Reprisals did not stop bombing.

5. Active operations by land, air, and sea so engaged the enemy that he could not spare any great amount of aircraft for operations in the Zone of the Interior; therefore field operations constituted the major item in protecting the Zone of the Interior.

6. Fighter aviation and antiaircraft artillery were equally valuable defensive agents, and in the World War were complementary rather than competitive. Both were essential and effective.

7. The hazards of flying (mechanical defects, structural failure, pilot error, adverse weather) accounted for at least as many ships as did the AA artillery or fighter aviation, and perhaps as many as both.

BOMBING OPERATIONS SINCE THE WORLD WAR

The Chaco and Ethiopia

Since 1918 the principal wars have taken place in the Chaco, Ethiopia, Spain, and China. In the War of the Chaco profitable targets in the Zones of the Interior were too far away to be attacked. In Ethiopia, the Zone of the Interior consisted of open spaces, mud huts, one railway line and one town; AA defense was practically nonexistent. Obviously, no worth while lessons can be drawn from either of these affairs.

Spain

There seem to be only two points of general agreement in all the great mass of reports that have come out of Spain: (1) that both sides are using World War tactics and technique with but little change; and (2) that bombing operations, both by day and by night, are being carried out at World War altitudes, i.e., generally below 12,000 feet. Except for these points of agreement commentators appear to be using the Spanish War to support their own preconceived theories. For instance, reports from air enthusiasts credit AA artillery with little success, while those at the other extreme report marvelous accomplishments of the AA guns. Some even claim that the guns can, with a dozen or so shots, bring down any ship flying in daylight below 12,000 feet; they also credit the guns with 80% of all airplanes brought down.

China

Reports from China merely indicate that an inadequately defended Zone of the Interior can be bombed with considerable effect.

Conclusion

The campaigns in the Chaco, Ethiopia, China, and Spain are in no sense comparable to the World War and none furnish a fair test of the improvement in methods of attack and defense of the Zone of the Interior.

COMPARISON OF WORLD WAR AND PRESENT DEFENSE

*Means**The British System in 1918*

As developed by the British, the night defense consisted of two teams and a coordinating and directing staff. One team was made up of fighter aviation, balloons, and searchlights; the other of AA artillery, balloons, and searchlights.

Balloons

Both teams are listed as containing balloons, but in practice the balloons are merely obstacles intended to drive the enemy to higher altitudes and thus limit the air space to be covered by the active elements of the defense. Balloon barrages were used in the defense of Venice, Paris, London, and the German zone of the interior.

The English and French agree that their balloons were raised to an altitude of about 8,000 to 10,000 feet and that they were effective. They do not claim, however, that the balloons would have constituted a complete defense even if they could have been raised to the service ceiling of the bombers. Balloons were undoubtedly a moral hazard but were probably not the great physical hazard their proponents thought them to be.

There is little reliable published data on modern barrage balloons, but current newspaper reports credit the English with balloons that will ascend to 40,000 feet. During the latter part of the War the British decided to run their balloons up to 15,000 feet, and they believed that 20,000 feet was possible. The successful defense of May 19-20, 1918, led them to abandon this plan as being unnecessary. In view of the great improvements that have been made in metals and fabrics the new British balloons may well achieve an altitude of 20,000 or 25,000 feet.

The present Martin Export Bomber is credited with a service ceiling of 28,000 feet. Aviators must have oxygen at altitudes greater than 18,000 feet; above 20,000 feet their motors must be equipped with superchargers. Low temperatures, cloud formations, haze and other difficulties further beset high flying aircraft. All in all, then, it appears that balloon barrages are about as effective today as they were in 1918.

Searchlights

Both teams contained searchlights. The fact that 355 searchlights were provided in the London area alone, indicates the esteem in which they were held. In spite of this, there is no reference in any of the authoritative descriptions of the defense of London to an enemy airplane being actually illuminated. On the other hand, it is agreed that at night the artillery used only barrage fire, based on an assumption that the enemy would fly at altitudes lower than their service ceiling and higher than the balloon barrage. Accounts detailing the search of as many as 97 fighter airplanes for a few German Gothas in the dark sounds like a game of Blind Man's Buff. The searchlights merely pointed to that part of the sky in which the bomb-

ers were heard; actual fighting was done by moonlight.

It is a matter of general knowledge that in clear weather modern 60-inch high-intensity, distant-control searchlights frequently locate aircraft at ranges up to 10,000 yards or more; and that once in the beam the enemy pilot cannot escape from it until he has passed beyond searchlight range.

Fighters and Bombers

Published figures credit modern fighter planes actually in service with anything from 6 to 81 mph advantage over modern bombers. From published engineering data it is evident that if the fighter is to carry no bombs, and only enough fuel for 1½ hours at full-throttle operation, it can be designed to give a 75 to 90 mph speed advantage over a bomber which is designed to carry about 12% of its gross weight in bombs, and fuel, for say 4 hours at full throttle. If some of the fuel—and bomb—weight savings are taken out in excess diving speed and maneuverability, it appears that the World War speed-advantage enjoyed by the fighter—of about 45 mph—still holds.

The situation is confused, however, by the fact that, in general, 75% of a nation's fighters will have little if any advantage over the latest 25% of its neighbors' bombers, since the speed of both fighter and bomber is continually increasing. For purposes of discussion it is fair to assume that the latest bombers have a maximum speed of 280 miles per hour and the latest fighters a maximum speed of 325 miles per hour.

Both the fighter and the bomber can be designed for service ceilings close to 30,000 feet, and the fighter for a higher ceiling than the bomber. Published data on rate of climb indicates that a fighter having a top speed of 325 mph can climb 20,000 feet in about 10 minutes, and 30,000 feet in about 20 minutes. The projected horizontal speed at maximum rate of climb is ordinarily taken as 60% of maximum speed, i.e., for a 325 mph fighter it would be about 195 mph. Thus, the horizontal distance covered by the fighter from take-off to 20,000 feet is 32½ miles and to 30,000 feet, 65 miles.

Taking the bomber speed as 280 miles per hour, we find it would cover the 35 miles from the coast to London in 7½ minutes, i.e., it can come in to London, drop its bombs and be well off-shore before the fighter can climb to 30,000 feet. If the fighter does not take off until 10 minutes after the bomber crosses the coast the same statement holds true for 20,000 feet.

The typical fighter used to drive the Gothas away from London waited at its airdrome for word of the enemy's approach. These ships could climb to 15,000 feet (about 3,000 feet above the Gotha's service ceiling) in 20 minutes, while the Gotha, in the same time, could only cover 23 of the 35 miles from the coast to London. Even allow-

*Later, searchlights working on the Arras front in coöperation with the London-trained No. 151 Fighter Squadron were able to maintain illumination of enemy bombers. As a result that squadron brought down 26 enemy bombers in two months, without suffering a single casualty.

ing 10 minutes for the take-off, the fighter could still meet the bomber at the outskirts of London.

Since the war, the bomber has gained so much relatively by the increase of its (and the fighter's) speed that the fighter tactics used in the night defense of London are no longer practical. Today, in defending a city situated like London, the fighter must remain on patrol at altitudes up to 30,000 feet all night, every clear night, if it is to be as effective as it was *on the ground* during the defense of London.

This advantage enjoyed by the bomber is more or less offset by the great improvements made in searchlights and in AA artillery. As already noted, London's 1918 searchlights merely indicated the enemy's general direction to the fighters. The fighters then groped for their target by moonlight. Consequently it often happened that the target was never found. Even when the searchlights "flicked" their target they were unable to stay on it. At present, under clear weather conditions, a bomber "flicked" at the coast can be kept under illumination all the way into London and all the way back to the coast. Therefore, instead of having 42 fighters flying around wildly in search of five bombers without picking up a single one, as happened on the night of March 7-8, 1918, it appears certain that today a half-dozen fighters on patrol can destroy any bomber that is once "flicked." And it must be remembered that fighters can remain on patrol at slow speed for a long time. Thus, while the bomber has gained an advantage over the fighter, it has probably lost out to the fighter-searchlight team in clear weather, and perhaps even under 50% broken cloud conditions.

On the other hand, it must not be forgotten that better navigating instruments, more reliable motors, and the increased range and speed of bombers, have made navigation possible in conditions of low or broken ceiling or poor general visibility and this may make bombing practicable under adverse weather conditions.

Bombing under bad weather conditions will increase in difficulty with the distance to the objective since navigation will usually be subject to an error proportional to the range, and since prediction of weather conditions over the objective will also be subject to error more or less proportional to the range.

We may conclude that bad weather bombing is practicable at short ranges and, since the fighter has little hope of finding the bomber under these conditions, the bomber will be relatively safe from fighter attack. It should be remembered, however, that the bomber will usually be safest when the weather is such as to make his accuracy of bombing worst.

Gun Defense

The guns used in the defense of London could reach the bomber at its service ceiling, which varied between 11,000 and 14,000 feet, depending on type and load. Most of these guns were of 3-inch caliber. According to Ashmore, the 18-pounders were classed as having a ceiling of 17,000 feet, and were quite good at 13,000 feet. The later

3-inch 20-cwt was classed as "really efficient."

According to the authors of "Air Strategy," in the Royal Air Force *Quarterly*, modern AA guns are effective at 30,000 feet. There is no technical reason why guns cannot be made effective up to this altitude, with a time of flight of 30 seconds, which is the time of flight AA gunners have become accustomed to. We may, therefore, accept without hesitation the figure of 30,000 feet and 30 seconds time of flight. Jane credits the Martin 1933 Export Bomber with a ceiling of 28,000 feet. No reported bomber has a much greater service ceiling than this nor do pilots wish to bomb above this altitude. Therefore in the matter of range and time of flight modern AA guns have kept pace with modern bombers; in other words, in these two respects, the balance between World War AA guns and bombers and today's AA guns and bombers remains about the same.

Since the speed of bombers has increased from about 70 mph (London attacks, 1918) to about 280 mph (Potez 630), while the projectile's time of flight to the bomber's service ceiling has probably not decreased, the gun has relatively lost efficiency, when used as an instrument of precision. However, the gun was never used as an instrument of precision during the World War. Artillerymen who used World War height-finders will probably agree that at best these merely furnished a rough approximation of altitude for the first salvo in daytime and no data at all at night. In daylight or when the target is illuminated, the modern stereoscopic height-finder will furnish altitudes no more than a few per cent in error. It is apparent then, that granted an adequate number of modern searchlights, the AA gun has become a precision weapon. Ashmore credits the gun with a 380% improvement between 1924 and 1929, and with "results of a higher order altogether" immediately after 1929.

Major K. McCatty, in the March-April, 1937 COAST ARTILLERY JOURNAL, gives the average percentage of hits for 2-gun batteries for diving, maneuvering, towed targets in 1934 as 4.9%. The speed of the target in the 1934 practices is not stated, but may be assumed to be about 100 miles per hour since targets can not be towed at top speed. Apparently the best result claimed during the World War was 1800 rounds per enemy machine brought down, or about .05% (month of March, 1918, British Front; probably mostly day firing though data on this point is not available). This indicates that the results obtained in today's target practice are nearly a hundred times better than the best battle results in the World War. (One hit cannot be counted on to bring down an airplane.) Therefore it seems likely both day and night bombing operations conducted in clear weather within range of heavy concentrations of modern AA artillery will be abandoned after the first few attempts as too hazardous.

Under conditions of very low visibility, AA artillery must rely on barrage fire. When this occurs, the increased speed and ceiling of the modern bomber reduces its chance of being hit to about 28% of the World War

average. It is a demonstrable fact that in these conditions the bomber's safety increases in direct ratio to increase in speed and service ceiling.

The various authorities on the defense of London believe that the balloon barrage, aided by pursuit aviation and searchlights, kept the German bombers at altitudes between 10,000 feet and 14,000 feet (the service ceiling of the loaded Gotha was 11,000 or 12,000 feet; of the Giant about 14,000 feet). This means that the depth of barrage required was about 4,000 feet. If it is assumed that modern balloons can accomplish as much but no more, then the depth of the barrage must be about 20,000 feet—the difference between 30,000 feet (modern bomber ceiling) and 10,000 feet (World War balloon ceiling). Hence the AA barrage *may* have to be five times as deep as that used in the defense of London. If we assume an effective balloon height of 25,000 feet, the barrage depth will remain at about the World War figure. But when all is said and done the effectiveness of balloons remains debatable and much in doubt.

We may conclude then that, so far as the gun defense is concerned, very low visibility bombing is now about four to twenty times safer than clear weather night bombing was during the attacks on London. Using the attack of May 19-20, 1918, as a criterion, it would require somewhere between 40,000 and 200,000 rounds of 3-inch ammunition to bring down one bomber under low visibility conditions. Expressed in dollars, this would mean an ammunition expenditure of from \$500,000 to \$2,500,000 per bomber brought down.

The Route of Approach

Whether the operation be conducted in good weather or bad, time is a vital factor to the bomber. Regardless of weather he wishes to hold the time he is exposed to attack to the minimum. In bad weather he wishes to conserve his fuel supply in order to be able to cruise deep into his own territory in search of good visibility for landing. During the World War, inadequate navigational equipment generally tied the bombers to rivers and railroads. This is no longer true; the airman is equipped with nearly foolproof navigational aids and is himself a master of the art of navigation. All this, coupled with the vital time element, means that today's bombing attack will generally drive to its objective by the shortest route.

PROBABLE TARGETS

In our preceding discussion we have shown that since the World War there has been no great change one way or the other in the duel between the bomber and the AA defense. Nor is there any reason to believe that the bomber will play for smaller stakes now than then. Accordingly, we may conclude that his targets today will be similar to those he selected 20 years ago.

PROTECTION AFFORDED BY FIELD OPERATIONS

Though this article deals with the AA defense of the Zone of the Interior, we have seen that during the World

War the principal defense of the Zone of the Interior was furnished by the normal operations of the armed forces on the land, at sea, and in the air.

In this connection we must take note that today many people believe that the next major war will be ushered in by a mass bombing attack on some one of the world's great cities and that the nation thus attacked will promptly return the gruesome visit. Regardless of the wisdom of beginning a war in this fashion, the fact remains that it may start just that way. If it does, it is obvious that field operations will have no bearing on the matter initially.

If such initial attacks are launched and are not immediately decisive, it is to be expected that normal field operations will be undertaken and will gradually attract the air efforts of both sides in greater and greater degree. It should not be expected, however, that air operations will be confined to the theater of operations on the World War scale.

PROBABLE EXTENT OF BOMBING OPERATIONS

Although the wars in Ethiopia, Spain, and China furnish no good test of the means or methods of AA defense, it is well known that a considerable portion of the air forces of the belligerents has been used in bombing the Zone of the Interior, in spite of many political and diplomatic deterrents.

Looking at the matter from another angle, the World War, the War in Spain, and the War in China have all demonstrated that air forces, while extremely valuable, are not necessarily decisive on the battle front. They may possibly be used to greater advantage in the Zone of the Interior; in any event it is certain that they will be fully tested in such operations in the next great war.

Again, most nations now have a considerable number of bombers that are too large and expensive to risk at the low altitudes necessary for accurate bombing of field fortifications or ground targets of limited area. Some of the great bombers are only suitable for use against large cities. There will be nothing to deter their use against the Zone of the Interior except fear of reprisals and the local AA defenses.

The British opinion of the seriousness of bombing attacks is indicated by the fact that they have tripled the Air Force since 1935, are arranging to provide gas masks and bomb-proof shelters for the entire population, and have organized a volunteer rescue force of 200,000 civilians.

CONCLUSIONS

The following conclusions are believed to be applicable to a war that might break out at the *present time* between the world powers:

1. Bombing operations in the Zone of the Interior are considered to be most profitable by many people; and therefore will probably be used extensively. These operations may be expected to be chiefly confined to large cities and the routes of approach thereto, and to that part of the Zone of the Interior closest to the fighting front.
2. In the face of reasonable (but very expensive) de-

fense measures, clear weather, day bombing of large cities will cease very quickly if undertaken. Clear weather night bombing will probably be undertaken on a large scale but such bombing of large cities can be rendered unprofitable by proper (but very expensive) defense.

Day and night bombing under conditions of broken or poor visibility will be undertaken and will be continued, the attacks being finally limited to those weather conditions that are found by experience not to produce excessive casualties to the bombers.

3. Reprisals will not stop bombing operations.

4. The operations of land, sea, and air forces will not afford much protection to the Zone of the Interior during the first and critical days of war. In the later stages of a

war, field operations will furnish some protection but this in itself will not be enough.

5. Fighter aviation and AA artillery are equally valuable in protecting the Zone of the Interior and are complementary rather than competitive. Both are essential and effective.

6. Such enormous improvements have been made in aircraft motors, design, stability, and structure, as well as in navigational aids, that few casualties can be expected from these causes loosely grouped under the heading "the hazards of flying."

7. As in the World War, the bomber can be greatly hindered, but cannot be stopped until the enemy as a whole has been definitely defeated.



German officers inspecting Italian Ansaldo antiaircraft gun.

HAPPY NEW YEAR

By Lieutenant Colonel A. C. M. Azoy, Coast Artillery Corps Reserve

January 1, 1777, was anything but a Happy New Year's Day for those Americans who were attempting to resign as subjects of His Most Britannic Majesty, George III. The army which they had put into the field against the British forces had been soundly defeated on Long Island and escaped annihilation only by the providential intervention of bad weather; it had been driven from its refuge in Manhattan and dislodged from its forts along the lower Hudson; bit by bit it had been pushed back through New Jersey until finally it fled across the Delaware into Pennsylvania. This staggering string of defeats had resulted in the loss of the port of New York, the almost complete severance of New England from the Middle Atlantic district, and the capture of great numbers of American prisoners, ammunition and stores. Not at any time during the course of the Revolution were the fortunes of the Continental cause at a lower ebb; indeed, there was considerable doubt expressed in Congress—lately moved from Philadelphia to Baltimore—as to the military fitness of the American commander, George Washington.

Further fuel was added to these fires of dissension by serious discord within the Army itself. Desertions were frequent, mutterings of revolt were heard, and a body blow was struck at the morale of the entire force early in

December of 1776 when the unpredictable General Charles Lee, for some mad reason, elected to make his headquarters four miles outside his own lines in Baskingridge, New Jersey, and was incontinent—a roving party of British dragoons happened on Friday the thirteenth, was



thirteen, was against American independence. Despite the vagueness which always tempered Lee's loyalty, he was an experienced and brave soldier and, as second in command under Washington, his loss was a distressing one.

Almost equalling this misfortune in the worries it added to Washington's already heavily-burdened spirit, was the immediate manifestation of the selfish intrigues of General Gates. That erratic soul had long cherished a secret ambition to combine with Lee in assuming command of the American army; now that Lee was gone, he determined to seek the command for himself. Feigning illness, he was excused tem-

porarily from duty and promptly hied himself to Congress to press his claims for promotion. Luckily, Congress had other things on its mind just then; but all this made Washington's position no easier. To the world at large he

"To arms, my lord! The old fox has slipped us again"

showed a firm jaw and unfurrowed brow but to his brother he wrote, "No man, I believe, ever had a greater choice of difficulties, and less means to extricate himself from them."

True, he had managed to have a fairly merry Christmas by leading a third of his force over the Delaware on Christmas night; these, suddenly materializing out of a howling snowstorm, had battered into surprised submission the entire Hessian brigade stationed in Trenton. But five days later the Americans were, if anything, just a little worse off than before. Following the Trenton victory they had gone back into Pennsylvania with their prisoners, returning in full force on the last three days of the year to try to consolidate their newly won decision in New Jersey by the occupation of Trenton and nearby towns. And almost at once that move assumed the aspects of a desperately serious tactical blunder.

For the British had not been idle. They were prone to ridicule the Americans, but the capture of Trenton and its garrison was something they could not laugh off. Lord Howe had peremptorily ordered Lord Cornwallis from the boat on which he was about to sail for a visit to England, and sent him scurrying to the Redcoats' winter quarters at New Brunswick, New Jersey, with instructions to do something and do it fast. Cornwallis lost no time. Leaving a small detail of men to guard the stores at New Brunswick, he speedily marshaled 8,000 hand-picked regulars on the road to Trenton and set off at their head to take the measure of the impudent Virginia fox hunter and his tatterdemalion horde.

That was on January 1. Cornwallis reached Princeton the same afternoon and spent the night there. The next morning he started on the final lap of his journey, leaving behind him the 4th Brigade of the British Line under Lieutenant Colonel Charles Mawhood, to follow later with the wagon train. As he passed through Maidenhead (now Lawrenceville), he detached the 2d Brigade as an outpost for the Princeton force and with his main column thus lightened, pushed rapidly on. News of his coming at once reached Washington from colonial sympathizers in Princeton and from a daring raid on the outskirts of the town made by Colonel Reed and a few gay cavaliers from the Philadelphia Light Horse City Troop, in which twelve British dragoons were bagged. The American commander in chief knew he was in for plenty of trouble.

Accordingly he hurriedly summoned General Cadwalader and his Pennsylvania militia from their pickets at Crosswicks, eight miles distant, and from Bordentown he rushed General Mifflin and his command, bringing the total of his army to about 5,000 men. These presented



anything but an inspiring military array, for all the old regiments had been sadly depleted by long marches and battle casualties. Colonel Haslet's Delaware regiment, for instance, could now muster scarcely 100 out of its original 800; the Maryland troops had lost 250 men at the battle of Long Island and could present only 150 effectives out of the 1,000 that started in the war; the other outfits were in no better shape. Nor did the recruits and militia replacements help matters materially. They were a motley crowd, lax in discipline and in many cases not a week away from their civilian ploughs, forges and counting houses. Uniforms were virtually non-existent; the commissary thoroughly disorganized. General Knox summed it up very neatly in his terse report that "the men were in need of clothing and rum." There was none of either for them.

Also, with the end of the year the term of service of many of the soldiers was expiring and the general discouragement with which the rank and file regarded their situation made it doubtful if any would reenlist. This pressing concern demanded Washington's immediate attention before he could worry further about Cornwallis. He

solved the difficulty with characteristic forthrightness. First, he dispatched a messenger to his friend Robert Morris, the Philadelphia financier, with a plea that additional funds be raised to pay a bounty for reenlistments. Then he called upon his unit commanders to join him in a direct appeal to the men to stand by their guns. The eminently vocal Knox made a ringing speech; General Mifflin overcame what must have been the distracting influence of his appearance in "an overcoat made up of a large rose blanket and a large fur cap" with eloquence that brought cheers from his hearers. And at the last moment a courier galloped into camp with \$50,000 from Morris, assuring each time-expired file a bonus of \$10 if he would remain for six weeks longer. Most of them remained.

By this time Cornwallis had arrived at Trenton, and after all-day skirmishes in and around the town, came as night was falling to the Assunpink Creek. This little stream, running to the south of Trenton, empties into the Delaware; on its further bank Washington had established himself to meet the final shock of the British attack. It was a position fraught with danger. With the ice-filled Delaware behind them, and with a superior force of picked British regulars in front of them, it appeared that the Americans were in a trap which Cornwallis could spring whenever he pleased. Cornwallis apparently thought so too for instead of pushing on across the Assunpink and finishing the business at once, he decided to remain where

he was for the night, meanwhile sending word to the brigades at Princeton and Maidenhead to join him the next day for what he was certain would be a victory celebration.

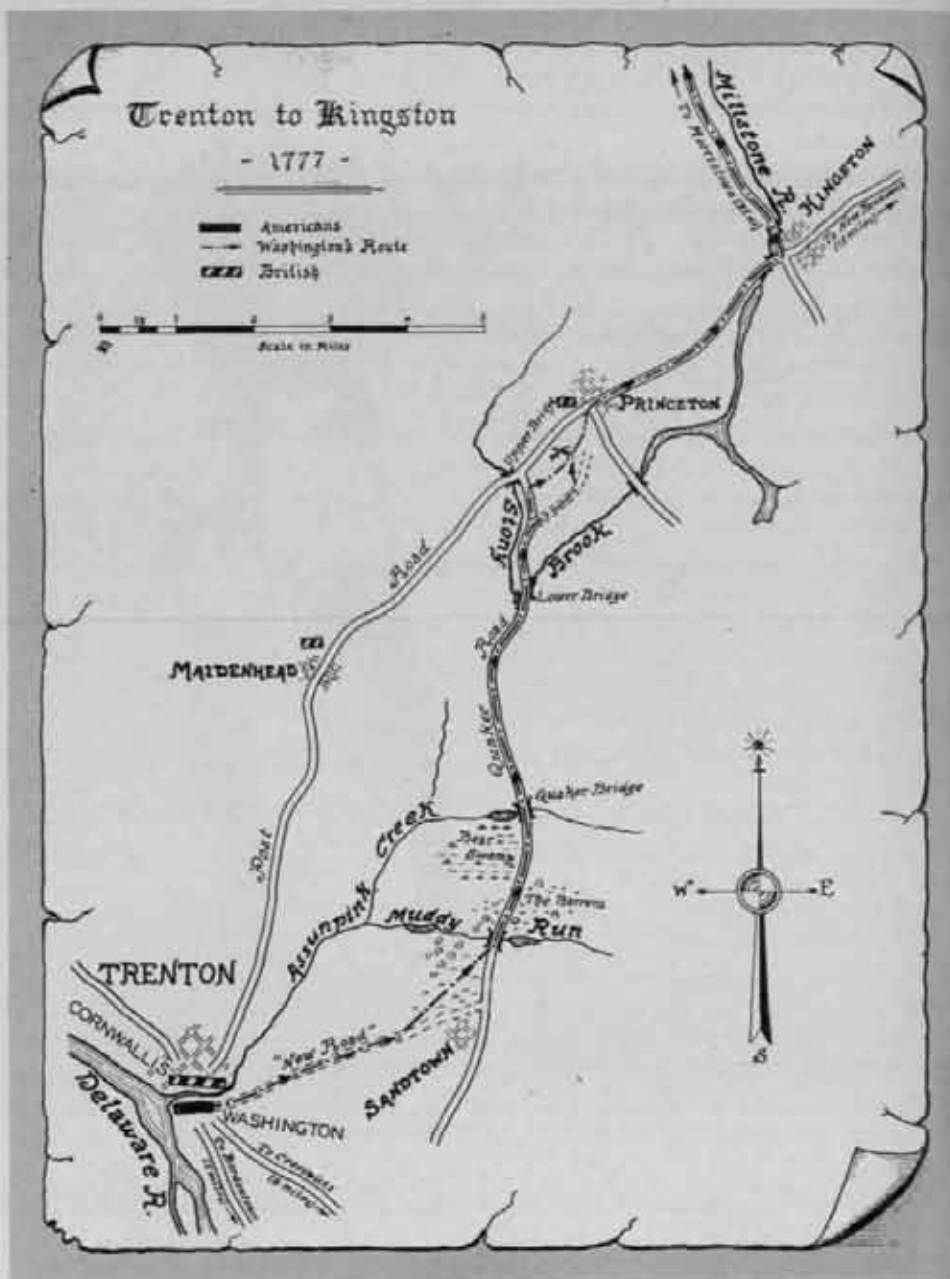
General Sir William Erskine of Cornwallis' staff was not so sanguine. "My lord," said he, "if Washington is the general I take him to be, and you trust these people tonight, you will see nothing of them in the morning." Cornwallis smiled away the warning; it was a raw night, the fires were lit, his hot toddy was waiting in his quarters and Washington, sly as he was, could not possibly get away from him this time. "Nonsense, my dear fellow," roared the noble lord in high good humor. "We've got the old fox safe now; we'll go over and bag him in the morning. The damned rebels are cornered at last!"

The "old fox" was about ready to agree with the earl. In Alexander Douglass' little shack now doing duty as General St. Clair's headquarters, he called his brigade commanders about him for a council of war and in a few words gave them his estimate of the situation. Escape across the Delaware, swollen by a thaw, would be suicidal in the face of the superior numbers

of the English; an attempt to beat down the Jersey shore of the river would be equally foolhardy; and if they stayed where they were and gave battle they would neither stay there nor would the battle last very long. But battle seemed their only hope unless—

Spreading before him a detailed map which Cadwalader had picked up at Crosswicks, Washington drew his officers closer about him and quietly said, "There is one more thing we can do, gentlemen, and that is to try to slip away from here tonight, march past Cornwallis' left flank, take this new road past the British at Maidenhead, capture the rear guard at Princeton and perhaps secure the stores at New Brunswick!"

Historians have variously given the credit for evolving this bold plan to St. Clair, Mercer, Hamilton and Reed as well as Washington, but from an unbiased review of



General Map

the evidence—letters, diaries and other material from those who were in a position to know what happened at the time—there is every indication that Washington alone fathered the idea. He was the only one familiar with all the details of the situation; therefore only he could have offered such an inspired plan and at the same time present a detailed program for carrying it out. Camp fires were to be kindled along the ridge of the Assunpink facing the British lines, and replenished through the night with tails from nearby farm fences, a large fatigue party was to proceed to a point on the creek nearest the enemy pickets and there begin to throw up earthworks as ostentatiously as possible; the iron rims of all gun carriage wheels were to be muffled in rags; the troops were to form in column in the order in which they were then disposed along the Assunpink's bank; and the entire force was to be ready to

move out at midnight. This brilliant plan was enthusiastically received by the council, but one formidable objection presented itself: Were the roads passable? "We've had a thaw for several days," a subordinate reminded his chief. "Will the ground be too deep in mire to move the guns, or even to march over?" Washington had an answer for that, too. Striding to the door, he threw it open to the full fury of a biting northwest wind that had sprung up during the meeting. "Look!" he cried, striking his heel against the earth at the threshold. "Can't you see it's freezing solid? What more do you want?"

Silently the officers hurried off to their commands; silently they routed out the company officers and in whispers gave the necessary orders that woke the tired and cold troops into quiet activity. Camp fires began to blaze before amused English eyes, and the rattle and clatter of entrenchments being dug came to amused English ears. Cornwallis chuckled at the still-dubious Erskine; there, he pointed out, was further proof that the rebels were in a cul-de-sac, knew it, and were trying to make the best of a bad job. Even when one of his captains nervously reported that the sudden activity in the American camp seemed out of all proportion to the necessities of the case, the British commander refused to bother himself further, and retired for the rest he would need against the active morrow. It was just as well for his peace of mind that he had no idea of how active the morrow would be, or why.

Across the Assunpink, behind the curtain of darkness that the blazing line of camp fires intensified, the shivering and grumbling Continentals were falling into ranks. Numbed fingers swathed the artillery wheels in sacking, and fumbled in the darkness for buckles and straps. Somehow the gun teams were finally harnessed and word went forward to Washington that the column was ready. The general shook the reins over the neck of his white charger and moved slowly off into the night. The great adventure had begun.

Along what is now Trenton's Hamilton Avenue but was then little more than a rough trail, the Americans plodded after their leader. Men tripped over boulders. Guns wedged themselves between tree stumps and had to be extricated by drag ropes while the straining horses slipped and skidded and reared among the frozen ruts. At the short halts necessary to reform the column, soldiers fell asleep where they stood and had to be kicked into sufficient wakefulness to continue the march before they froze to death, in the increasing cold.

In the lead with Sherman and the advance guard of the 26th Infantry were three Jersey farmers—Patrick Lamb, Ezekiel Anderson and Elias Phillips—who were acting as guides; immediately following came Washington and his staff. Next in line was Sullivan and the New Hampshire and Massachusetts regiments of St. Clair's brigade; then Mercer and his troops from Maryland, Connecticut and Massachusetts; next Cadwalader and the Pennsylvania militia; and finally Hitchcock with three infantry regiments from Rhode Island and two from Massachusetts.

General Knox's artillery and the Philadelphia Light Horse troop completed the command.

As the column approached the little hamlet of Sandtown, it cut across the fields to the bridge over Muddy Run where it found another road that led it through a desolate region of sand and scrub oak appropriately called "the Barrens." Immediately after passing the vapor-shrouded Bear Swamp the entire expedition came near to complete disintegration. A sudden uproar in the rear brought everyone to a stop and as Washington and his aides galloped back to investigate they were appalled by shouts that the Hessians were attacking. Fortunately it turned out to be a false alarm; the midnight march through unknown territory had been too much for the over-wrought nerves of the militia and they had succumbed to one of those unreasoning attacks of mass hysteria. Order was finally restored and the command crossed the Assunpink on the Quaker Road that took it over the Lower Bridge at Stony Brook just as the sun of January 3d was rising.

Princeton was now a scant two miles away, and Washington made final disposition of his attacking forces. About a mile to the north the Post Road crosses Stony Brook over the Upper Bridge, and thence Mercer was dispatched with his brigade to destroy the bridge and isolate the British troops in Princeton from Cornwallis and the garrison at Maidenhead (see Special Map). Mercer drew his men from the column and started along the east bank of the brook, marching in a single file without flankers; two field pieces were hauled along by hand. The remaining three brigades turned to the right swung past a small but dense grove of trees, and found themselves on a now-obiterated back road that would lead them into Princeton from the south, at the English rear. There was some confusion at this point, due to the difficulty in getting Cadwalader's skittish militia to move up quickly and fill the gap in the column caused by Mercer's withdrawal, and the leading elements were well under way before Cadwalader could move after them.

At Princeton, reveille for the British troops had sounded at 5:30 and the 17th and 55th Infantry, fifty troopers of the Queen's Light Horse and a few casuals, were already briskly on their way to pick up the Maidenhead contingent and join Cornwallis at Trenton. The 40th Infantry, left behind to guard the town, had snugly fitted themselves into Nassau Hall of the college, which had been disbanded in November. Mawhood and his men took the Post Road, serenely unaware that the foe they were marching to meet was at that moment almost within earshot on a parallel road.

It was a fine, brave morning. The sudden cold snap had given the air an invigorating tingle, and the red-coated files stepped out handsomely behind their rattling fifes and drums. You can follow their identical route today; just after leaving Princeton the road begins to dip and continues its sharp decline until it reaches the bridge over Stony Brook. On the other side of the bridge the road takes a quick rise over the top of a hill, whence you may

look over the same rolling landscape that greeted the eyes of the English outriders as they halted at the summit.

Colonel Mawhood reined in beside them, laughing at the antics of his two pet cocker spaniels who were gaily chasing imaginary rabbits back and forth across the road. But his laughter was short-lived. "Look!" ejaculated a trooper, pointing excitedly to the south. Mawhood looked, and one look was enough. There, plainly discernible in the early morning light, was a moving column of armed men on the back road; that they could only be part of the rebel army fleeing from Cornwallis with Princeton as their destination was obvious. Whipping out his sword, Mawhood swung his horse around and riding along the column, turned his troops in their tracks and went back across Stony Brook at the double. His knowledge of the local terrain prompted this decision to retrace his route along the Post Road until he could cut across the fields and reach a hill just south of Princeton (from that day to be named Mercer Heights). He knew that the force he had just seen would have to pass this hill to reach the town, and from it he would have the enemy at his mercy.

At that time, Mawhood could not have seen Mercer hastening through the ravine in which Stony Brook runs, but from reports of his scouts as well as from the evidence of his own ears, Mercer knew about Mawhood as soon as the Englishman's troops came clattering back over the bridge. At once Mercer must have realized the futility of continuing in his attempt to destroy the bridge. The British were now plainly headed back to intercept the Americans; therefore Mercer decided that it was up to him to join the main column as quickly as possible in order to lend a hand in the inevitably approaching fight. It has been surmised, though never proved, that Washington sent him orders to the same effect after spotting Mawhood. In any event Mercer wheeled his men sharply to the right off the Quaker Road into the farm land beyond. Valuable time was lost in man-handling the two field pieces up the steep grade, but at last the summit was reached and here Mercer reformed his column and looked about him. About 500 yards away he could see St. Clair's and Sullivan's men far in advance of the rest of the American army on the back road. At the same moment a lone enemy horseman appeared on a ridge to the north, halted at sight of Mercer's brigade, and as suddenly disappeared. That this was one of Mawhood's scouts there can be no doubt, and his subsequent report to his commanding officer must have been that startled man's first intimation that he had an enemy force on his immediate right, in addition to the one he had already seen a mile away on the back road.

Mawhood had no idea whence this new rebel visitation had sprung but he sensed that hostile activities were imminent and that he was not going to attain Mercer Heights without a fight. Sending a messenger posthaste to the 40th regiment with orders for it to proceed to the Heights as fast as its legs could carry it, the English colonel whistled his spaniels to heel, directed his command to drop their packs in the yard of a nearby farmhouse, led the



He let fly at the British, only 40 yards distant.

troops in three cheers for the King and ran them across the frozen ground and up the slope toward Mercer. The dragoons galloped ahead, dismounted behind the slope and crept to the crest, where they saw Mercer's brigade passing through Thomas Clark's orchard. At once they fired a volley at the Americans, and the battle was on.

Showered by the broken branches the British bullets cut from the trees—without sustaining any casualties—Mercer turned his column into line to his left and found himself facing Mawhood's 17th regiment and part of the 55th, with two field pieces; the rest of the 55th had been sent on to Mercer Heights where it was to meet and reinforce the 40th against the Americans in that direction.

Hastily taking position behind a fence that ran through the orchard, Mercer's infantry rattled a volley at the Redcoats, then another, and then a third, all in the space of five minutes. Considering that thirteen separate and distinct operations were needed to load and fire the muskets of that period, it can be appreciated that three volleys in five minutes was rapid fire of a very high order. The British dragoons appreciated it, and fell back a few rods into the ranks of their own infantry which was just reaching the top of the slope. Captain Daniel Neil of New Jersey had by this time wheeled his two guns toward the enemy and let fly at the British, only 40 yards distant. Cannister at point-blank range is highly destructive; eye witnesses reported that the king's men "squealed horribly" as the leaden slugs ripped into their ranks. The red line wavered and for a moment it looked as if it would break, but as the smoke from the firing rolled up in one great white cloud, the British rallied for one more volley and then came yelling down on the Continentals with the bayonet.

Instantly Mercer's troops knew that this fight would not be another Trenton. Against them here were pitted no foreign mercenaries befuddled with Christmas rum, but hard-bitten, disciplined English regulars reared since the days of Marlborough in a tradition of valor and vic-



The British came down on the Continentals with the bayonet.

tory. It was too much for the Americans. With no time to reload their pieces and with few bayonets of their own, they could not stand against the rush of the British and broke for whatever cover they could find before the wave of steel engulfed them.

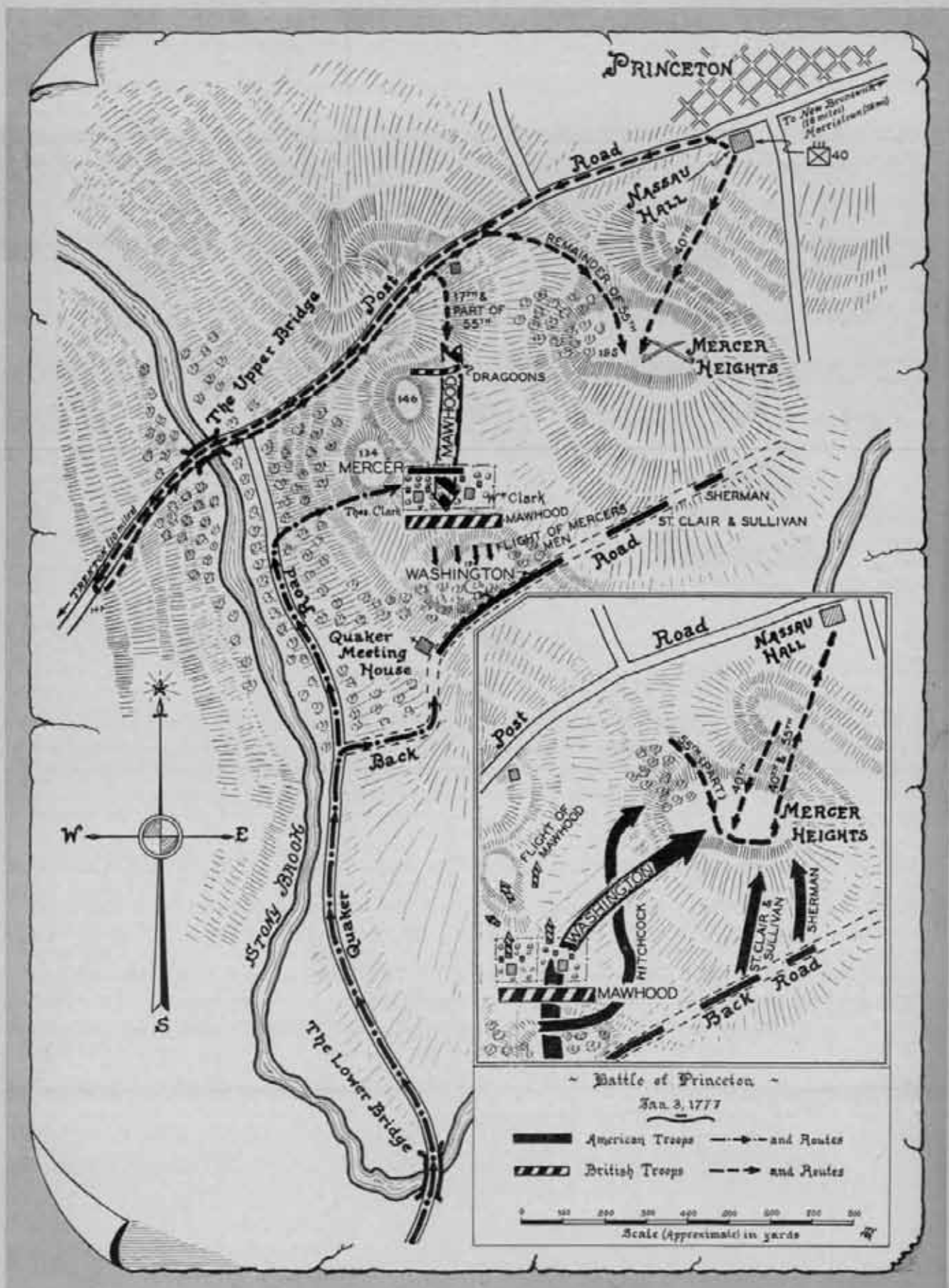
Vainly the American officers tried to stem the rout. Mercer's gallant grey was shot from under him, but he rolled clear and struggled to his feet to throw himself against his men as they streamed past. He grabbed at their arms, their coats, their shoulders, trying to hold them and turn them against the foe. "Stand fast, lads!" he pleaded. "Stay here with me!" But his men had seen and felt the wickedly gleaming skewers of the British and heedlessly rushed on. "You dogs! You cowards!" roared Mercer. "Turn and hold them! Washington will be here directly!" Even the magic of that name was unavailing, and the enemy swept through the orchard.

A British rifleman running by swung his clubbed musket into Mercer's face, smashing him to the ground. The brown surtout which the American wore over his uniform fell open, and when he arose dizzily, he was surrounded by gloating red coats shouting, "Here's Washington! We've got the rebel general! Washington is captured!" One of the circle lunged at Mercer with his bayonet. "Surrender, you damned rebel!" he yelled. Mercer was in no mood to surrender. Standing alone in the snow already red with his blood, this fiery little Scotch-born

doctor who had thrown in his lot with that of his adopted land, slashed back at his erstwhile countrymen with his sword. Sobbing with rage and exhaustion he carried the unequal fight to them. As he tried to parry and cut his way forward he gasped, "I'm no rebel, you cutthroats! Surrender yourselves, damn you!" It was his epitaph. His attackers closed in, and left him with seven bayonet wounds that nine days later would cause his death, despite the ministrations of American and British army surgeons.

Equal ill fortune was pursuing the Continentals over the entire battlefield. Colonel Haslet had died attempting to rally his Delaware regiment, Neil's guns were captured and Neil himself killed, and with him Captain Fleming of the 1st Virginia regiment. Only Captain Stone of the Maryland troops, alone among Mercer's commanding officers survived that hellish first five minutes.

The British charge carried straight through the orchard and over a ridge beyond it between the houses and out-buildings on the adjoining farms of William Clark and his brother Thomas; here Mawhood first became aware that he had become embroiled, not with a small force of rebel fugitives as he had at first supposed, but with the whole American army. Ahead of him the remnants of Mercer's brigade were in full flight, but they were flying straight into the arms of a much larger column of Americans emerging from the woods to his front. And further to his left, on the road that led into Princeton, there yet



Special Map

remained the rebel force he had first seen from Stony Brook. The surprised colonel quickly formed his main line of resistance between the Clark houses, sent forward a line of skirmishers to keep up a fire on the enemy, and awaited developments. They were not slow in coming.

The colonial troops on Mawhood's left were Sherman's advance guard and the van of Washington's army under Sullivan and St. Clair; it will be remembered that they had gone ahead while Mercer was turning off along Stony Brook, and were now standing fast while they anxiously watched the British swarm all over his brigade. The other force marching to the fight out of the woods was the rest of Washington's column with Cadwalader's militia at the head. Hearing the engagement begin while he was still out of sight of it, Washington sped the militia forward on the dead run and they arrived on the scene just in time to receive the full force of the flight of Mercer's broken brigade. Naturally enough, such an introduction to battle was an appalling one for these amateur soldiers, and they too began to fall back in a disorder that was akin to panic.

Keeping calm in this confusion, Cadwalader ordered into action on his left a battery of two long 4-pounders under Captain Joseph Moulder. As soon as Moulder opened fire the entire complexion of the struggle began to change. Mawhood's skirmishers were driven back to his main line, a flanking movement by the Queen's Light Horse was stopped almost as soon as it started, and while all this was going on the militia was whipped back into some

semblance of order by Washington, Cadwalader and Greene. Hitchcock and his veteran Continentals came up at this opportune moment and, staking everything on one final effort, Washington ordered an advance. With an optimism he could not have felt, he shouted, "Parade with us, men! There's only a handful of the enemy, and we'll have them at once!" and spurred his horse forward. The retreat ceased and the retreaters, looking sheepishly at each other, followed with a yell. Hitchcock, meanwhile, was going into battle as calmly as if on parade. Within 200 yards of the British he dressed his men carefully in line, verified the loading and priming of their pieces, and then ordered "Forward march!" while the royal infantry gaped in astonishment. When a scarce hundred yards from the enemy he halted his force, deliberately fired a well-aimed volley, and then took up the advance again apparently indifferent to the now frantic firing of the Redcoats. On Hitchcock's left, Washington was leading the remains of Cadwalader's and Mercer's detachments. Swinging his hat to encourage his followers, the six-foot American commander on his white horse was easily the most conspicuous figure on the field; every English sharpshooter had him for a target, but not a bullet so much as grazed him. So reckless was he of his personal safety that when one furious burst of musketry completely hid him in a swirl of smoke, Lieutenant Colonel Fitzgerald, his aide, hid his eyes from what he knew must be the end of his beloved chief. Yet the next moment Washington was galloping



"I'm no rebel, you cutthroats! Surrender yourselves, damn you!"

beside him and calling, "Bring up the troops, Colonel Fitzgerald. The day is our own!"

From then on, it certainly was. The British could not stand up against the combined onslaught of the colonials and began slowly to withdraw to the position held by their two guns, but they were soon dislodged and the guns turned upon them. At this point the 40th regiment, racing down from the college, had reached the waiting detachment of the 55th on Mercer Heights, but it was too late. They were cut off from Mawhood by Hitchcock's flanking movement; an attempt to maneuver to their left brought them smack up against St. Clair and Sullivan whose men, kept out of action until now, received them joyfully and sent them back again.

By this time Mawhood's retirement had become a wild retreat; throwing their guns from them the king's men ran for the woods, for the road, for farm houses, for Stony Brook, for anything that offered shelter from the berserk Americans. The latter turned their drive to their right, and quickly joined with St. Clair and Sullivan against the bewildered 40th and 55th in their precarious position on the Heights. This was more than the Redcoats could stand, and they fell back in confusion. The battle roared down from the Heights, across a small ravine and up again into the college grounds, Washington urging on his men as he rode beside them yelling, "It's a fine fox chase, boys! Push on, push on!"

Flying precipitously across the Princeton campus a battalion of the 40th flung themselves inside Nassau Hall, barricading the doors and sniping from the windows; but their escape from the inevitable was of short duration. As the Americans began to pour a steady stream of lead into the building, young Alexander Hamilton thundered up with a 4-pounder swinging behind his horses, and fired two rounds; the first shot crashed into the Prayer Hall and through a portrait of George II hanging on the wall. (The picture's frame was unharmed and now holds a painting of Washington by Peake, hanging on the same wall.) The second shot hit a cornice of the building and rebounding, killed the horse ridden by Major James Wilkinson, unfortunately sparing the major for a later life of treasonable activities that were to earn him the reputation of "the country's most accomplished blackguard."

A white flag suddenly appeared at one of Nassau Hall's windows, the firing died and nearly 200 Redcoats marched out in sullen surrender. Quickly rounding up his forces—whole platoons of Americans dropped asleep in their tracks when hostilities ceased—Washington fed them the hearty meal the British had prepared for themselves, and marched away as word came that Cornwallis was hot on his trail from Trenton.

The feelings of Lord Cornwallis and the rest of his staff may be imagined, when they first looked across the Assunpink that morning and saw only deserted fires and dummy earthworks glistening in the frost. Not an American in sight. Then the sudden rumble from the north that

brought Erskine running to the earl's side. "To arms, my lord!" he gasped. "Those are Washington's guns at Princeton—the old fox has slipped us again!" Cursing, puffing and blowing, the fat nobleman raved through his camp and got his troops on the road back to Princeton in record time, hastened by the thought of the precious stores and the ten thousand pounds sterling in the war chest in unprotected New Brunswick.

Going through Maidenhead, he picked up the garrison there, and before he reached Stony Brook he was joined by Mawhood and a few other refugees whose accounts of what had happened did little to calm his ruffled spirits. When he arrived at the brook, he discovered that Washington had destroyed the bridge. After fording the stream and reaching the outskirts of Princeton, Cornwallis was once more obliged to halt by the sight of six eight-pounders emplaced to command the approach by the Post Road. Finally rushing the guns from the flanks, the enraged Englishman discovered they were completely unguarded, but the ruse delayed him long enough for Washington to get clear away, taking a lot of British baggage with him.

Realizing that with the weakened condition of his troops he could not hope to capture New Brunswick and hold it against a counter-attack, Washington switched his plans and after leaving Princeton, turned north and headed for Morristown where he went into winter quarters. Cornwallis was glad enough to go straight ahead for New Brunswick and stay there.

That ended the battle of Princeton. In actual fighting time it lasted not much more than twenty minutes; the Americans lost about forty killed and wounded, the British some 200 captured and a few more than a hundred killed and wounded.

From the modern military viewpoint Princeton was hardly more than a good skirmish in numbers engaged or casualties suffered, but no other victory in our Revolutionary history had a more salutary effect on the country and its struggle for independence. And certainly the inspired generalship that wrought it has never been surpassed. After Yorktown, Cornwallis was to tell Washington that "fame will gather your brightest laurels rather from the banks of the Delaware than the Chesapeake." Frederick the Great ranked the escape from the Assunpink and the victory at Princeton as "the most brilliant recorded in the annals of military achievements." And von Moltke said "no finer movement was ever executed . . . the affair at Princeton was the climax."

But perhaps the most fitting tribute to both armies are these words by Alfred Noyes on the monument marking the common grave of British and American soldiers on the Princeton field:

"Here Freedom stood, by slaughtered friend and foe,
And ere the wrath paled or that sunset died,
Looked through the ages; then, with eyes aglow,
Laid them to wait that future side by side."

Air Power and Troop Movement

By MAJOR THOMAS R. PHILLIPS, Coast Artillery Corps

Air power has ended foot movement off the battlefield

If an attack pilot were asked to describe an ideal target he would reply that it should be 20 or 30 yards wide, at least 1,400 yards long, and well-massed. A marching column of men and animals meets this requirement in every respect—it provides a perfect target.

"People are always imagining themselves in the days of the stagecoach," said Foch. "Someone mentions cars or airplanes and they reply in terms of carriages." Soldiers believe they think of war in terms of airplanes. But do they? Fire power has forced dispersion on the field of battle. But in the face of fire power (air power) off the field of battle, marching is unchanged. We burrow and scatter while fighting, but mass while marching. We still march "in terms of carriages."

Not until the latter part of the World War did the possibilities of air attack on marching troops begin to be appreciated. Methods of attack and protective counter-measures were developed in 1918. A German order of June 24, 1918, signed by Ludendorff, states "Battle squadrons . . . will attack the principal roads methodically and continuously with machine gun fire and bombs. . . . The greatest effect will be attained by these groups if they mow down the enemy when he is marching on narrow roads, through defiles, over crossroads, or through villages."

During the St. Mihiel offensive the American Air Service attacked ground troops in addition to other missions. The enemy's retreating columns, troops, artillery and transport on the Vigneulles-St. Benoit road were continually attacked throughout September 12 by French and

American aviation. This road was the only route of escape for the German troops endeavoring to withdraw from the salient. As a result of these attacks all movement on the road was blocked, and when the American troops joined hands back of Vigneulles on September 13, the spoils included over 15,000 prisoners, 440 guns and large stores of material. The unexpected speed of advance of the American divisions was, of course, responsible for the victory, but American aviation, by immobilizing the troops trying to get out of the salient, greatly increased the number of prisoners and amount of material captured.

In Palestine, in September, 1918, aviation annihilated the Turkish Seventh Army which was attempting to withdraw along the Wadi Farah road from Balata. Thirty-six planes participated in the attack for two days, dropping six tons of bombs and firing 44,000 rounds of machine-gun ammunition into the column. The column was stopped in its tracks. The advancing infantry and encircling cavalry gathered in the horde of panic-stricken fugitives over the Judean hills. The stretch of eight miles of road was blocked with 87 pieces of medium and heavy artillery, 55 trucks, 937 four-wheeled wagons, 75 two-wheeled carts, thousands of dead animals and drivers, and vast quantities of rubbish that had once been stores and equipment of the Turkish Army.

"The troops were subjected to incessant attacks by the British flying squadrons, which wrought terrible havoc," wrote Liman von Sanders, commander of the Turkish-German forces. "The feeling of defenseless exposure to



A column of foot troops seen from the air.

the enemy flyers had a paralyzing effect on officers and men."

In Spain both contenders have had their lessons and no longer march in target formation. In the early days of the war an Insurgent regiment marching south in daylight from Huesca toward Zaragoza was annihilated by air attack. A Catalonian force of 8,000, which had made a successful landing on the island of Majorca in August, 1936, was driven off by air attack. The ground forces involved on the other side, amounting to only 2,000 men, had been defeated and took no part in the operation. In the Guadalajara battle in March, 1937, 15,000 Insurgents in motors were stopped by air attack after a twenty-mile advance. Their decision to withdraw was made as a result of Government aerial action and before the ground forces coming up from Madrid had intervened. The Insurgents had taken a chance on the weather which prevented their own aerial support from operating. During the withdrawal, continual aerial attacks slowed the retreat to a mile and a half a day for eight days. A Government force of 5,000 infantry and artillery, advancing to attack Toledo, was driven off by air attack before their ground operations could get under way. The tremendous effect of air attack on troop movement is no longer speculative—it is definitely established.

Attempts are made to discount the results of air attack in Spain on the ground that the troops did not know how

to defend themselves. "We can knock off aircraft like ducks," some officers proclaim. Such contentions should be accepted with caution. Undue faith in the results of peacetime fire at towed sleeves may lead us astray. Practice is conducted with ample warning, at slow speeds and with the plane flying at an ideal altitude for the riflemen. The plane is not firing back nor is it dropping bombs. If the effective range of the .30-caliber machine gun is taken as 800 yards, an attack plane with a speed of 250 miles an hour is within range for 13 seconds. It may not be visible more than half that time. Its rate of angular travel, when it is 20 or 30 feet above the ground, presents an entirely different fire problem than at altitudes of three or four hundred feet. Skimming the heads of the men, four machine guns each firing 1,200 rounds a minute, bombs dropping automatically, the attack plane is a hurricane sowing death and confusion. Troops that will fire at a towed sleeve calmly and accurately in practice may be quite incapable of effective fire while they are being attacked. The terror, impotence and helplessness caused by sudden aerial attack has been testified to by many officers. We know how powerful its moral effect has been in Spain, not only on massed columns, but on troops dispersed in battle. And finally, small-arms fire is not very effective against air-planes. Every soldier should ponder the following figures: *in Ethiopia 259 Italian planes were hit, most of them many times, but only eight were shot down.*

Regardless of the effectiveness or ineffectiveness of defensive fires or the availability of pursuit support or anti-aircraft protection, no excuse exists for conducting movements in such a manner as to invite attack. The defensive fires of the troops should be the last resort for protection. The primary defense should be a manner of movement that will minimize the possibility of attack. So far our only answer—and not a very brilliant one—is to march at night. There are others. To develop them, it is necessary to investigate the tactics of ground attack and the inherent limitations of aerial action. An illumination of the aviator's problem will show that the ground forces possess the means, but have not recognized methods, that will nullify the air threat.

THE AIR PROBLEM IN ATTACK OF MOVEMENTS

A movement must be discovered before it can be attacked. This truism has more important applications than are visible at the outset. Discovery is simple in daylight. At night observation missions may be carried out by three general methods: first, on bright nights without the use of flares; second, by the use of flares by the observing plane; and third, when the observation plane is preceded by a flare plane or planes.

The area effectively illuminated by flares at altitudes from 1,000 to 4,000 feet is approximately a mile in diameter. Above 4,000 feet insufficient illumination is given

for observation. Below 1,000 feet the illuminated area decreases rapidly. At a flare altitude of 1,000 feet the illumination directly under the flare is twenty-five times as great as at the edge of an area 5,500 feet in diameter. In the opinion of most observers, visibility is better underneath the flare than above it. This is because the concentrated light source around the flare causes the eyes to adjust themselves to the brilliant light and the less brightly illuminated ground areas cannot be seen.

One observer reports that the most effective method for observation at night is to drop a flare at about 2,500 feet altitude. The pilot then immediately dives to an altitude of about 2,000 feet to get below the flare. The area lighted by the flare is then reconnoitered and if objects that appear to be troops, columns or trains are observed, the pilot dives the plane to an altitude of 1,000 feet over the suspected locality. Details are searched by shooting small flares from a flare pistol at this altitude. Little accuracy is obtainable from altitudes in excess of 1,000 feet. The observer has very little depth perception at higher altitudes, so he must base his first observation, or what arouses his suspicions, on two things: first, movement; second, color form. Six large flares can be carried by American observation planes, as equipped at present. The candlepower of the large flares varies from 300,000 to 1,000,000 and the time of illumination from one and a half to three minutes. Thus, one plane is able to observe for a maximum of 18



The air camera catches a cavalry column on the march.

minutes in darkness and can, during this period, see approximately six square miles. The observation plane, in daylight, in clear weather and at an altitude of 10,000 feet, can see movements for a distance of ten miles on either side of its line of flight. On a 200-mile observation flight, it thus can observe an area of 40,000 square miles. The same plane at night can observe six square miles during a flight, a difference of approximately 6,000 to 1. The relative danger of discovery of day and night movements may not be in the ratio of 6,000 to 1, but at least the danger of being seen at night is greatly lessened.

At night, observation will seek to discover movements made from areas where it is known that troops are bivouacked in daylight. Main highways, defiles and bottlenecks may also be observed. General searching missions over large areas at night are futile. When, however, the daylight bivouacs of troops are known it will be very difficult for them to leave the area without being discovered, particularly if the move is in our usual massed columns.

When a movement has been discovered, information must be sent to the combat aviation, the future position of the moving columns predicted, the attack planned on the map, and finally after take-off, assembly, flight to an initial point and break-up into attacking elements, the attack delivered. To estimate the time that will elapse between the discovery of a movement and the delivery of an attack on it, three different air situations should be considered. First, the normal situation, in which the combat aviation is on its base airdromes, from 125 to 200 miles from the front line. Second, when the combat aviation has moved forward to auxiliary airdromes from 15 to 50 miles from the front. Third, when the combat aviation follows the observation aviation in the air after a short time interval.

When combat aviation is on its base airdromes an attack cannot be executed until from two to three hours have elapsed after discovery of the movement. This delay is due to the time required to receive information, plan the attack and issue orders, take off and assemble at an assembly point, fly to an initial point, and separate into elements for delivery of the attack. The amount of delay will depend upon the degree of readiness of the unit, distance to be flown, and time required to receive information and develop plans. It is apparent from consideration of the time factor in this case that a movement which can be completed in less than three hours is in little danger of attack by combat aviation when it is on its base

airdromes. Whether or not such a movement could be attacked at all would depend upon how soon after its commencement it had been discovered.

When the hostile combat aviation has moved forward to auxiliary airdromes to await information from observation aviation, the time factor between discovery and attack is reduced to from one to two hours. Combat aviation will not be held habitually on auxiliary airdromes close to the front. To do so, would subject it to attack by the opposing aviation. It may move forward on occasions when, for example, a concentration from which movements are to be expected has been discovered, and there is

a reasonable certainty that an important target will be presented. Such occasions should be known to the friendly aviation and they should be prepared to attack the hostile aviation if discovered on forward airdromes.

At times combat aviation may be ordered to prevent movements for a limited period within a definite area. On such occasions the observation aviation may precede the combat aviation in the air by a short time interval, and an attack might be launched within a few minutes after the movement has been discovered. Such occasions will be rare, since they would

frequently lead to costly and futile flights without any assurance of compensating results. The common and thoughtless conception that combat aviation will operate constantly in the air, ready to attack the instant it discovers an objective, has no support in the tactics taught by any nation in the world. The targets of combat aviation, like the targets of artillery, must be discovered and reported before it goes into action.

These computations are not applicable in active forward areas. When ground battles are intense, air support may be almost continuous. Foreign pursuit aviation, as well as some foreign observation, is equipped to make ground attacks. Any target discovered by them in their supporting operations close to the front may be attacked. Such sporadic attacks will not be in mass and will be more in the nature of harassment than destruction.

The danger of attack on movements is lessened the farther to the rear they are taking place. The farther from the front the movement is being made, the greater is the area which must be searched to discover it. Within the combat area of an army to a depth of 50 miles, for example, there might be from 500 to 1,000 miles of roads to be observed. Observation of an area of this extent at more or less frequent intervals is within the capabilities of the observation aviation of the forces in the field. If, however,



An attempt to hide vehicles.

the area to be searched were 150 miles in depth with its width in rear expanded in proportion, the road net would involve something between 5,000 and 10,000 miles. It is obvious that any normally available amount of observation aviation would not be able to keep such an area under surveillance. Therefore, the discovery in distant rear areas of small movements in the daytime and of large movements at night would be fortuitous. An exception to this is presented by pronounced bottlenecks in the highway system and by defiles. Likewise, a few main highways might be observed at a considerable distance to the rear with some frequency. The distance factor, with reference to air attack, can be said to provide a zone of relative safety which begins 60 to 80 miles behind the lines in daylight and 30 to 40 miles behind the lines in darkness.

A single attack group is capable of a simultaneous attack on an entire infantry division on the road, either with machine guns and bombs or machine guns and gas. Daylight attacks will be made in mass to achieve the maximum destruction and delay. The attack is carefully planned. Observation reports the route of march of the columns. The point where they will be at the time the attack is to be delivered is predicted. Each three-plane element is assigned a definite portion of the column. The group flies to an initial point in mass and breaks up to deliver a simultaneous attack on the entire column. Flight is at treetop altitudes and advantage is taken of hills, woods and other cover to attack by surprise and deprive the troops of time to get ready to meet it with fire. Machine guns of the troops, as at present transported, are incapable of effective fire without warning. How much warning do they need? Two minutes? Then the warning must issue from guards eight to ten miles to the flank.

A mass attack, *once launched*, cannot be stopped by fire. It is vital that this should be understood, for defense plans are dependent upon this characteristic. Small-arms fire from the ground has no moral effect on the pilot, although its moral value to the troops firing is important. The pilot does not know the plane is being hit unless the hits interfere with its functioning. An attack can be said to be launched from 1,000 to 1,500 yards from the objective. At approximately this distance the pilot has located his target and aimed his plane. He is just as greatly endangered if he turns away as he is if he continues on. Individual planes may be shot down but the rest will carry through. Consequently, fire from the troop columns cannot stop the attack. If an attack is to be stopped, fire must be delivered

before the plane reaches the point where the attack is launched. The column without an outlying defense, has, for all practical purposes, no fire defense against attack.

Night attacks are another matter. Mass flight and attack are not practicable. It is difficult to reach the objective with certainty. Fear of running into high objects forces the plane to operate at higher altitudes and its bombing is less accurate. Thus, it is only possible to make attacks at night with single planes or small formations with a time interval between attacks. The object of night attacks is delay. There is little hope of serious destruction. One plane attacks and the troops scatter to fire at it. Five or

ten minutes later they have re-formed and started to march again when another plane attacks. This can be continued all night. The troops must either stop and get ready to fire, or else continue their march, helpless and impotent against an attacker who is gone too quickly to be fired upon.

TO NULLIFY THE AIR THREAT

The limitations of aerial observation and attack furnish the clue to avoidance of aerial danger. The methods by which attack can be avoided are three:

1. Avoid discovery by concealment, camouflage and dispersion, both in bivouac and on the march.
2. Take advantage of the time delay factor of air attack by speed of movement.
3. Discontinue marching in target formation, i.e., disperse on the march as on the field of battle.

Motors furnish the means of movement by which all of these requirements can be met. The gasoline engine in the airplane has made foot marches obsolescent, but the same engine in a truck supplies the key to nullification of the air threat.

Troops in motors are helpless against interference by hostile infantry or mechanized forces. In the discussions which follow, it is assumed that the movements are taking place behind a protected line. This line can be either troops in position and fighting, or a barrier established by mechanized forces well in advance of the troop movement.

Secrecy of movement assures security. An undiscovered movement cannot be attacked. The initial provision for security is the defeat of the hostile observation aviation either by active or passive means. Tactical considerations, the slow rate of march and the need for control ordinarily make daylight marches of foot and animal elements in dispersed formation and across country impracticable. Their mass makes them visible at great distances. Their



Another effort to hide vehicles.

rate of march is uniform and permits prediction of their future position with sufficient accuracy for the needs of aviation planning and attack. Once they have been discovered, they will not be lost. It takes an airplane only five minutes to fly over the entire route of a day's march of foot troops. Even though they are not observed continuously, an examination of the terrain will show where they are concealed, if they have left the road between observation flights. The only hope of safety for troops marching on foot, other than heavy air or antiaircraft support, is supplied by darkness and this becomes a less dependable protection as the night operation capacity of airplanes increases.

Secrecy and security of movement begin with secrecy of bivouac. If the opposing air service knows the location of the bivouac, the roads leading from it will be watched and the movement discovered. Consequently, movements should be made from area to area where concealment can be obtained during daylight. The best areas for this purpose are cities; next comes heavily wooded ground. Trained troops can be concealed in sparse woods, but vehicles must be concealed in buildings or heavy woods. Concealment should be checked by the friendly air service at daylight as a matter of routine. In the few experiments that have been made in our army it is notable how rapidly the troops have improved their concealment. In one such experiment conducted at Fort Meade in 1934, the observer reported: "It is interesting to note here that each day at the critique, the ground officers were told what the Air Corps had seen and why they saw it, and each succeeding night the Air Corps saw less."

The new bivouac should be selected well in advance of the time it will be occupied. Aerial photographs taken of it can be used to plan the assignment of troops to suitable concealment areas. Advance parties can go ahead, carefully lay out the bivouac and furnish guides for troops coming in, in darkness. By such methods, which can only be indicated in this article, movements can start with a chance of freedom from observation and attack.

In areas where concealment is scarce the lack of flexibility in the length of march of foot columns makes it difficult to secure concealed bivouacs. In this respect motor movements have a great advantage. Their march during a night can vary widely in distance, up to 70 or 80 miles, permitting the movement to end always in an area where concealment can be obtained. One night's march might be 50 miles between suitable concealment areas. The next night's march might be lengthened to 75 miles in order to obtain concealment. In spite of the greater difficulty of concealing vehicles, there is the paradox that they are easier to conceal than foot troops.

Dispersion to limit the damage of an attack, to make a movement an unsuitable target, and to aid in concealment, is ordinarily impracticable for foot movements. Motor movements readily permit it. Dispersion of motor movements can be lateral, by division into a number of columns, and longitudinal, by increasing the distance between vehicles. Lateral dispersion will be practiced to the

extent permitted by the road net and the allowable dispersion at the end of the movement. The lateral dispersion of a motorized unit can, however, be many times greater than that of a foot unit and the different elements still be close in time-distance. Two organizations of foot troops, five miles apart, are two hours apart in time. Two motorized organizations 20 miles apart in distance are less than an hour apart in time. Such computations only have application when the movement is being made without the prospect of hostile ground interference. But they are important in planning a motor movement for secrecy and security.

A motorized division, bivouacked 75 miles from its assembly area for battle, could be scattered in cities 50 miles or more apart. Its existence would thus be secret. A converging movement toward the assembly area could be divided into five to ten small columns. Discovery by the hostile air service of any one of these columns would give little indication of the size of the movement or its destination. The small target would offer small incentive for the expenditure of attack aviation. Wide lateral dispersion of a movement by foot marching is impracticable because the outside columns will have much farther to go than those that move by the more direct routes. The length of the march must be limited to that made by the column with the longest distance to go.

In dispersion (or extension) in length the motor column offers still greater advantages. For convenience in computation it will be assumed that a new type infantry division, when completely motorized for movement, will consist of 1,500 vehicles. It can be sub-divided into three combat teams of 500 vehicles each. Each team will consist of an infantry regiment and the proper proportion of supporting arms. If one combat team marches with a distance of 176 yards between vehicles (i.e. ten vehicles to a mile) the column would be 50 miles long. On a night march with a speed of movement of 15 miles an hour the time length of the column would be 3 hours and 20 minutes. In an 8-hour night the column would have 4 hours and 40 minutes of darkness in which to move and still permit the last vehicle in the column to reach its destination. At a column rate of 15 miles an hour, the column could march 70 miles in a single night of eight hours.

How would such a movement appear to the aerial observer? If he drops a flare on the road during the movement, he can see ten vehicles at one time. If the illumination last for two minutes, five more vehicles will have come within the lighted area. For each flare he will be able to see about 15 trucks, widely spaced. If he has the good fortune to drop all six of his flares on the route of movement he will have seen a total of 90 vehicles. He cannot determine if this is a supply movement or a troop movement. The dispersion of the column makes it an unsuitable target for attack aviation. The movement can be completed without danger of attack and with a very good chance the composition, destination, and size of the column will be unknown.

Compare this to a foot movement. The doughboy

slogging along at two and one-half miles an hour is on the road in close column for six hours for a march of 15 miles. Two flares will cover the entire length of the column. Its size, composition and destination can be seen or deduced. Attack aviation will have time to fly out and bomb the massed troops.

Marching at night affords the only hope of concealment for foot troops. But, the motor column, by still greater dispersion can move secretly in daytime. If the distance between vehicles in a column of 500 were increased to give an average spacing of five to a mile, the column would be 100 miles long. The time-length, in daylight at 30 miles an hour would still be 3 hours and 20 minutes. During 14 hours of daylight the column can move 10 hours and forty minutes or a distance of 320 miles. The movement would not be secret, but it would be relatively safe from attack. Secrecy might be obtained by spacing the vehicles two to a mile. This would give a column with a time-length of 8 hours and 20 minutes. In a 14-hour day the column could march 170 miles with complete freedom from attack and a very great chance of secrecy. The small number of vehicles in sight at any one time would give an aerial observer no reason to believe that a military movement was in progress.

Extension in length also provides the answer to the problem of cross traffic. With vehicles spaced at 100 yards or more at night and 200 yards or more in daylight, a traffic control post at the crossing used by the cross column can keep both columns moving at normal speed.

The military passion for uniformity in equipment makes the task of the aerial observer easier. If a variety of bodies and colors were employed in a dispersed column, the aerial observer would be unable to tell whether traffic in rear areas were military or civil. Our olive drab trucks, with every vehicle identical in shape, size and color, are instantly recognized as military. If we avoid uniform equipment and precisely spaced columns we can make large movements in daylight with secrecy.

This approaches an answer to the threat of aerial observation and attack. With the proper use of motors, secrecy from the ubiquitous aerial observer can be obtained. By dispersion the danger of attack is lessened and the effect is minimized. What further help does the speed of the motor movement afford?

Four nights on the road are required for a 60-mile march by a division on foot. The same march can be made in one night by motor. (Actually in four to seven hours, depending on the method of control.) The foot troops will be on the road from three and one-half to six times as long as the motorized troops. The danger of discovery in motors is thus lessened to a very great degree. In rear areas or on infrequently traveled roads the chances of discovery would be about in proportion to the actual times involved. On key highways, and in forward areas where observation is more frequent, the motor movement does not have as great a relative advantage in freedom from discovery. But the motor move has still another advantage; since it starts from concealed bivouacs, and com-

pletes its march in a single night, it dispenses with the three additional bivouacs required by foot troops for the same distance, thereby reducing the chances of discovery just that much.

The advantage of speed of movement is closely allied with the time delay factor between aerial observation and attack. It has been shown that a movement in rear areas which can be completed in about three hours is in small danger of attack, even if it is observed. The movement of motor columns with great distance between vehicles extends the length of the column so greatly that the time-length alone is often in excess of the three hours of safety. The 1,500 motor vehicles of our assumed division, moving in daylight at the rate of 30 miles an hour and spaced five to a mile, would have a time-length of ten hours. The time required by this column to complete a movement is the time-length of the column plus the time required to cover the distance involved. According to the figures of Captain Joseph I. Greene, in his study on "Highway Traffic and Modern War" in the *COAST ARTILLERY JOURNAL*, January-February, 1937, this same column with a vehicle speed of 40 miles an hour and a column rate of 30 miles an hour, closed up to safe driving distances between vehicles, has a time-length of 88 minutes. Marching as proposed by Captain Greene, a 50-mile movement could be completed in 3 hours and 8 minutes. By using the double-staggered method of marching, two divisions could make this march on a single road in the same time, or one division in two columns could complete it in 2 hours and 24 minutes. The vital conclusion can be drawn that one or two motorized divisions moving on a single 2-lane road, can travel distances up to 50 miles in rear areas with reasonable security from attack by aviation on base airdromes. But it should be noted that this method of marching foregoes secrecy; it provides only for security.

Speed is vital when movements are made with air support. It is impossible to keep airplanes in the air for long periods of time. But it is perfectly practicable for pursuit aviation to furnish close support for movements which can be completed in two or three hours.

According to recent studies and practical experimentation at the Field Artillery School the time-length of a motor column is almost constant at speeds above five miles an hour. For practical purposes, according to their computations, a column of 500 motors is an hour long regardless of speed. This constant time-length at all speeds is due to the increased spacing between vehicles, which is necessary for safety as the speed is increased. The Field Artillery School figures were arrived at by using the customary organizational type of control with increased distances between organizations. French instructions published December 16, 1916, state that 600 vehicles can pass a given point in an hour. According to Mr. Charles Gordon, as quoted by Captain Greene, "The figure of 1,500 vehicles per lane per hour for a highway with no grade crossings represents the practical maximum at satisfactory speeds." This applies to a 2-lane highway with vehicles moving in both directions. It has reference to *unorganized civilian*

traffic. Civilian traffic often exceeds this rate for short periods. This leads to the paradox that carefully controlled military traffic is able to move past a given point at only one-third the rate of uncontrolled civilian traffic.

The reason can be found in the type of control. The control of civil traffic is individual. The control of military traffic is by organization. Soldiers are so accustomed to thinking of control in terms of the compact military organization that they are often unable to visualize any other. Organization commanders like to advance in an orderly manner with perfect march discipline, and the idea of a vehicle which is not running very well falling behind the others, disturbs them; they would rather advance in a slower, but more sedate manner, with exact distances between vehicles according to the book. The thought of sending out 1,500 vehicles, one after another, with instructions to the driver to go by a certain route to a place 50 miles away is contrary to the essence of military habit. Officers who have been accustomed to thinking of 1,500 vehicles as a 40-mile column picture such a movement as resulting in inextricable confusion, congestion and delay. But twenty million drivers are making exactly that kind of movement every day on roads in the United States. If we accept the military viewpoint, we have to admit that what any group of civilians can do, cannot be done by soldiers.

Organizational control of military traffic brings on the congestion and delay it is intended to obviate. The anxiety to keep prescribed distances, causes frequent slowing down and as frequent speeding up. The difficulties of one vehicle are the difficulties of the whole group. The accordion action is constant. Close control reduces the speed of movement to one-half or one-third of the vehicle capacity.

The solution does not lie in improving control or in improving training. It requires adoption of a new type of control—of individual truck movement directed and controlled by a specialized traffic-control force. Traffic control implies more than merely stationing men along a road. It requires the same type of direction that is used in railway dispatching. Troops must be turned over to the traffic-control unit for movement, just as they are to the railway service for train movement. In permanent areas, control is exercised through a telephone net connecting traffic stations at every intersection and such other points as are necessary. In temporary installations the control posts are radio equipped. Traffic is diverted to alternative routes if the highway is blocked by air or mechanized attacks. The entire road net is operated like rail tracks, giving complete flexibility of movement and assurance of its completion. Individual movement at high speed with long distances between vehicles is perfectly practicable under such a system.

The French army has detailed regulations for traffic control. It is exercised by permanent units, CRA (*Commissions Regulatrice Automobile*), which control all the roads of their districts. Mobile control units which can be thrown into any area as needed are also provided. In ad-

dition, the larger military organizations are provided with traffic-control detachments. The CRA was born in the needs of the defense of Verdun. On February 22, 1916, the first CRA was established at Bar-le-Duc. The road: Bar-le-Duc—Verdun was limited to motors. During the 15-day period February 22 to March 8, 1916, a daily average of 13,000 men and 1,500 tons of ammunition were supplied over a single road. The average haul was 84 miles; the average number of trucks in use, 3,000. Much of this traffic went through in bad weather; there were even several days of snow and sleet.

The staff of the American First Army took a great deal of pride in the concentration for the Meuse—Argonne offensive. Four hundred and twenty-eight thousand men were moved an average of 48 miles in six nights by motor from St. Mihiel. "The concentration of divisions moved by motor transportation was handled by the D.S.A. (Direction of Motor Transport) French GQG" (Report G-4, First Army). It was controlled by the French CRA organization. Such an organization is essential for the fullest use of roads and the maximum performance of transportation. A war may be started without traffic control, but it will bog down unless control is established.

So far this discussion has dealt with the movement problem after the vehicles, by some legerdemain, have been loaded and placed on the highway in good order. The more difficult problem is the avoidance of massing, congestion and delay at the beginning and end of the movement. The problem is one of organization of loading and unloading areas. These also must be handled by a professional traffic-control unit. In France it is a function of the CRA. A movement has to start off a highway, end off it, and never stop on it. Everyone has seen the assembly of organizations on the side streets of a city for a 4th of July parade. On a wider scale, with the necessary dispersion over a large area, motor movements must start and end in a similar manner.

There are three practicable methods of military motor movement:

- 1st: The customary movement under *organizational control*;
- 2nd: *Traffic controlled mass movement* with minimum safe-driving distances;
- 3rd: *Traffic controlled individual movement* with greatly extended distances.

Each has its special advantages according to circumstances. The choice of which to adopt in any specific situation will depend upon the size of the movement, the time available, the need for secrecy, and the danger of aerial discovery and attack.

Movement under organization control is suitable for small groups and short distances in rear areas within which discovery and attack are improbable. It may have to be resorted to in areas where traffic control is not established. It can be used for very short distances when the time-delay element furnishes protection from attack. Its disadvantages are that it does not permit the maximum

speed of movement and road use; it does not provide freedom from aerial observation and attack; and its customary groupings delineate to the aerial observer the strength and type of organization.

Traffic controlled mass movement is suitable for large scale, high-speed movement in rear areas where the time and distance factors minimize the danger of discovery and attack. It is applicable to take advantage of the support of friendly aviation.

Traffic controlled individual movement with extended distances will be the normal method of movement close to the front and for marches ending in forward areas. It provides fair protection from aerial observation, relative freedom from mass aerial attack and artillery fire. It furnishes comparative secrecy because of the small number of vehicles that can be observed at one time, either in daylight or darkness. At night, in good weather and on good roads, it permits completion of movements up to 60 miles by a column of 500 motors.

Air power has ended foot movement off the battlefield. This is one of the outstanding lessons to be learned from the Spanish War. In the Battle of Brunete, Franco moved 40,000 men in by motor to counterattack. Not one marched in. They came in single trucks or in groups ranging from two or three to ten or twelve. An examination of Government air communiqués during the twenty days of this battle indicates that the largest group

of trucks seen by Government aviation was 35 and the average number in groups was under ten. Air support and heavy concentrations of antiaircraft artillery helped to protect the movement, but the principal protection was furnished by dispersion of the vehicles. The counter offensive force was assembled by motorized infiltration into areas close to the lines. No marching troops were located. The Government had to be given a final lesson of the danger of massed motor movement when they were rushing emergency reinforcements up to hold the Insurgent counterattack at Teruel. One hundred troop-carrying trucks hastening to the lines were attacked by Insurgent aviation and the column practically destroyed.

In comparison with movements by marching, motors offer a greater choice of concealment in bivouac, greater secrecy because they are on the road less time, greater dispersion to minimize air attack, greater speed to take advantage of the time-delay factor between observation and attack or the protection of friendly pursuit, greater flexibility in speed, movement in a fraction of the time of foot troops, decreased time use of roads, and delivery of fresh troops instead of tired troops at the end of the march. Motors furnish the answer to the air threat against troop movement. Through them can be regained the secrecy and chance of surprise that foot movements have lost. The army which first learns to use its motors has taken a long step toward victory.



This is Hollywood's concept of the war of the future as shown in the MGM film, "West Point of the Air."

THE PHOTO-ELECTRIC EYE

By Lieutenant Milan G. Weber, Coast Artillery Corps

MODERN TIMES mean that modern methods and equipment must be used by the modern army. The Coast Artillery Corps must keep pace with new ideas and newly-developed apparatus. We must take advantage of everything that has been developed by the vast research facilities of our commercial concerns. Who knows but what some of these developments, already proved for peacetime needs, may be useful in our game.

The purpose of this article is to explain simply one small item of such commercial development—the photo-electric cell or photo-electric eye as it is popularly known. We will try to explain how it functions and give some of its present industrial uses. Perhaps, on the slopes of Diamond Head or Cheney Ravine, there is an officer or soldier who will have other ideas whereby this new tool of industry can be used to advantage in our service.

First of all, then, what is the photo-electric eye? For the present, let us say merely that it is a device which causes or allows an electric current to flow in a circuit whenever light falls upon the apparatus. We shall modify the statement later. Suffice it to say that, with photo-electric equipment, we can not only tell when light falls upon the apparatus, but we can detect the slightest change in the intensity of the light.

What is such a device used for? Even now, industry has but scratched the surface of thousands of its potential uses. All of us are familiar with the exposure meter which tells us what setting to use on our cameras. Most of us, too, have seen doors open automatically as we approach. Both of these use photo-electricity. It is used to count articles as they pass on a conveyor, people as they go into a building. Moreover, by using two of these devices, we can count persons going one way and disregard those going in the opposite direction.

It is used for timing horse races and for measuring the rotation speed of shafts. It will separate black beans from white; it guards power presses and disconnects the drive when a person accidentally puts his hand nearby. It finds use as a burglar alarm, and detects gas in mines. It gives the alarm if water pressure goes too high. It is the basis of facsimile transmission of photos, maps, newspapers, and is practically the basis of sound pictures and television.

Now, then, what is the principle of this all-important aid to industry? How does it function?

We must first consider a few simple suppositions of the modern atomic theory. Briefly, every atom consists of an equal number of two types of smaller divisions, namely: PROTONS, or elements of positive electricity; and ELECTRONS, or elements of negative electricity.¹

In general, in every atom, *some* of the electrons and *all*

of the protons form a center or nucleus of the atom. The remaining electrons move around this nucleus in orbits just as the planets move in orbits around the sun. Ordinarily, these planetary electrons are confined within the boundaries of their own little atom.

If, however, sufficient energy from an outside source is communicated to these planetary electrons, one or more of them may break away from the confines of the mother atom. Since, as was said before, the atom originally consisted of an equal number of electrons and protons, and since some of the electrons (negative charges) have now broken away, we find the remainder of the atom with a preponderance of protons. Hence, the remainder is positively charged; it is then known as a positive ion.

Now, then, where does light enter the picture? Similar to heat causing the emission of electrons in a vacuum tube, light falling on the surface of certain metals exerts the energy required to cause some of the planetary electrons to escape from the parent atom. They then pass into the surrounding space. The freeing of these electrons and their movement through space make up what is known as the photo-electric current.

It must be pointed out here that all metals will free some of their planetary electrons in response to some wave motion. It remains now to find which of the metals will so respond when visible light falls upon them. Visible light is merely a form of wave motion between the wave lengths of 7,500 A.U. (deep red) and 4,000 A.U. (dark blue). To have a current flow which will indicate a change in light, we must find metals which will respond by freeing their planetary electrons when a wave motion between 7,500 A.U. and 4,000 A.U. strikes them.

The alkali metals: lithium, sodium, potassium, rubidium, caesium, strontium, and barium have been found to respond most freely when light strikes them. Each of these has a peak sensitivity at some wave length in the visible spectrum. These metals, then, will free some planetary electrons when light falls upon them.

So far, all that we've done is to liberate some planetary electrons by allowing light to fall on an alkali metal. The electrons are free, but as yet they have no place to go. If we now connect one of the above metals to a negative potential and provide nearby a piece of metal (not an alkali metal) connected to a positive potential to attract the (negative) electrons, we will have an electron flow, i.e., from the external negative pole through the external circuit to the alkali metal; thence the air gap between the light sensitive metal and the other metal; thence through

¹Some idea of the size of an electron may be obtained from the following: If a copper penny be enlarged to the size of the earth's orbit (189,000,000 miles in diameter), the distance between atoms would be 3 miles. The core of the atom would be 11 inches in diameter. Each electron would be about 3 inches in diameter.

A Barrier Searchlight Solution

the remainder of the external circuit to the positive terminal of the source.²

It must be remembered here that this current would not flow if no light were thrown on the apparatus. The metal would not free any of its planetary electrons and there would be no current flow.

What, then, will happen if the cell is suddenly covered up—that is, if no light is permitted to fall upon it? The metal cathode will not free any more electrons and the electron flow would stop. Similarly, if the amount of light is varied, more or less electrons would be freed and the current flow would vary accordingly. It is this current that can be amplified, measured, and instantly recorded.

We can now understand how doors are opened automatically upon the approach of a person. A beam of light is thrown upon a photo-electric cell. This beam is interrupted by the person in passing. The interruption of the beam of light falling upon the photo-electric cell causes a collapse of the current which the photo-electric cell has allowed to flow. The shutting off of the current causes a solenoid or relay to be released, thus starting the mechanical movements necessary to open the door.

We can also understand how the area of a hide can be measured by placing the hide against a translucent surface, evenly illuminated, and measuring the reduction in the total amount of light reaching a photo-electric cell.

An interesting use of the photo-electric cell, and one which might possibly be of military value, is that in connection with gas detection in mines, shafts, cellars, etc. Here, a chemical fluid is needed which will produce a visible reaction when exposed to a poisonous gas. When such a gas of sufficient concentration comes in contact with the fluid, the fluid changes color and thus varies the amount of light reaching the photo-electric cell which is facing the transparent container. The variation of light changes the current and causes an alarm to be sounded.

A use of this cell which strikes pretty close to home is the Lighthouse Service fog detector which is now under experimentation. At Fort Wool, halfway across the mouth of the James River from Fort Monroe, a small 25-watt lamp flashes at intervals of two minutes. Located at the lighthouse at Fort Monroe is a cylindrical tube which contains a photo-electric cell. As long as the light at Fort Wool flashes regularly and is picked up at Fort Monroe, nothing happens. But if the light does not flash at its regular interval or if fog prevents the beam from being picked up at Monroe, the lighthouse keeper is instantly warned by the ringing of an alarm bell. This apparatus can also be hooked up so that the fog bell itself will automatically start ringing when the light is not

picked up. The Lighthouse Service is doing much of its experimenting at ranges of about four miles or more.

Take a photo-electric cell (such as the thalofide cell) which is sensitive to radiations in the infra red band instead of in the visible spectrum; cover the lamp with glass which filters visible light but allows infra red rays to pass; make the apparatus sensitive to a ship's mast interrupting the beam—and, presto! our barrier searchlight problem is solved! Of course, it is not as simple as all that, but there is no reason why the idea could not be worked up. A direction finder, which has been experimented with for use on board ship, was tried out with an ordinary automobile lamp covered with a filter for excluding all rays except the infra red. The range obtained here was in excess of three miles. For our service, of course, a much stronger source of light would be needed. Such an apparatus should be effective at least as far as the light itself would be visible if it were uncovered.

The following are a few typical characteristics of various photo-electric cells: (1) Various metals reach their peak sensitivity at different wave lengths. In other words, one metal may be sensitive to red light; another to blue, etc. The thalofide (a preparation compounded from thallium, oxygen, and sulphur) cell, for example, is most sensitive to infra red which is outside the visible spectrum. (2) The photo-electric effect is about 60 times as great when the beam of light is polarized so that the rays strike perpendicular to the surface as when they are polarized parallel to the surface. (3) The metals which are suitable for photo-electricity experiment are, in general, quite susceptible to reaction with oxygen. Hence, such cells are usually vacuum or filled with a special gas.

So far, we have covered but one type of photo-electric cell, namely, one which *allows* a current to flow when light strikes it. It is to be noted that such a cell requires an external source of power. The cell acts merely as a valve to control the amount of current flow. You will tell me that your small exposure meter does not require batteries or any other external source of power to function.

The cell used in the exposure meter is what is known as a rectifier cell. If we coat a piece of copper with copper oxide by means of a special heat treatment, we have a copper oxide rectifier for converting alternating current to direct current. This unit acts as a rectifier because the electrons pass more readily from the copper to the oxide than in the opposite direction. Such rectifiers were in general use when it was discovered that, if the apparatus were exposed to light, it would actually generate a current of its own. In this case, however, the electrons pass from the oxide to the copper. This phenomena is, properly speaking, a photo-voltaic effect rather than a photo-electric one. The cell made from the unit is, however, usually discussed with photo-electric cells.

As I write this, I find the *Herald-Tribune* announcing that England has purchased television sets with a reported range of 250 miles for the detection of distant aircraft.

The photo-electric eye is the instrument of the future. It behooves us to be familiar with its uses in war.

²This seems to be contrary to the flow of current as most of us learned it. When electricity was first theorized, it was assumed that current flows from a positive source of potential through an external circuit to the negative potential of the source. We now know from the atomic theory that electrons actually flow in the opposite direction, i.e., from the negative potential of the source through the external circuit to the positive potential. Since much was written on the subject of the flow of current before the electronic theory was proved, the standard terms were not changed. It is now customary to say that *current* flows from positive to negative, but that *electrons* flow from negative to positive.

The Army of the United States

By COLONEL ADNA R. CHAFFEE, (Cavalry) G.S.C.

THE national policy of the United States is one of non-aggression and of military isolation. We neither seek nor expect any particular war, nor do we count upon military alliances. Our basic military policy which is shaped by the National Defense Act of 1920 is, therefore, defensive in character and must be completely self-sustaining. Our professional soldiers are but agents who are charged continuously with carrying out the laws and duties entrusted to them by the Congress to ensure the carrying out of the Army's part of the National Defense.

The Army of the United States has three major components: The Regular Army, a federal force in being at all times; the National Guard when called into the service of the United States; and the Organized Reserves, a skeletonized federal force, in being only for very limited periods of training.

In the Regular Army we have a small professional Army whose duties are to furnish the garrisons required at all times in the foreign possessions; to furnish part of the initial force necessary to cover the mobilization of further forces; to serve as a laboratory for the development of military material and equipment; and as the training school of the military art capable of producing instructors for all components of the Army. It provides the necessary overhead for all components. The Regular Army also is the force upon which, in the end, rests the maintenance of law and order *as prescribed by the Federal Government.*

The authorized strength of the Regular Army under the National Defense Act was 18,000 officers and 280,000 enlisted men. This has been reduced in appropriation enactments to 12,300 officers and 162,000 enlisted men. Of these approximately 44,000 men are in the foreign garrisons and 128,000 in the United States. Taking out service troops, there are approximately 90,000 Regular Army combat soldiers in the United States including the Air Corps. The Regular Army at its existing strength is available to take the field at any time.

The National Guard, which is primarily a State force, is equipped and is trained for a short period annually by the Federal Government. It has a present authorized strength of 200,000 officers and men. In an emergency it may be called into the service of the United States without great delay. It is organized into regiments, brigades, divisions, in the appropriate arms so that it may properly and rapidly fit into the organization of war armies. The National Guard at its present strength could be brought into the field within thirty days. While it is not to be expected that they shall be as efficient as professional troops, nevertheless the average training of the National Guard to-

day is good and a further short period of intensive training should make them dependable soldiers.

The Organized Reserves are comprised almost entirely of the Officers' Reserve Corps which has a strength of approximately 94,000 officers. The Enlisted Reserve is negligible. A great majority of these officers are young and have received four years' military training in the ROTC as part of their college courses. Thereafter, they have received two weeks practical training per year as often as the War Department has been able to finance such training. Reserve officers have assignments to fill the gaps in Regular Army units which will be necessitated by the detachment of a large number of regular officers for the organization and training of war forces; and some have assignments to fill gaps in National Guard units. They will be needed in the transition from peace to war strength of these units. The bulk of the remainder form the officer cadres of Organized Reserve units, the soldiers for which will be brought out as the emergency develops by recruiting or by the draft.

It is easy for you to see, therefore, that the American people have adopted a system which is not intended to undertake a major war at the drop of a hat. The small peacetime Army must be built up by two of these successive components and the bulk of the war armies must be trained after the emergency has been recognized. It certainly is not an Army shaped for aggression or militarism.

Tactically the Army is organized into regiments of the several arms and these are combined into brigades and divisions of the combined arms. The division is the great unit of combat team, capable of self-support and of conducting independent operations. It also is the command of a major general.

Decision in war is eventually gained upon the land, and decision in land operations is gained upon the ground. Recent wars have again amply demonstrated these truths. A determined army can not be shot out of position and a determined people can not be bombed into submission. Sea and air troops are essential to the conduct of war, but the land army in the end guarantees the imposition of the national will upon the enemy.

Since, as I have said, we do not have aggressive ideas in our national military policies, we do not organize or train to fight in any particular theatre selected in advance. Therefore, our peace army, the laboratory, must contain every type of troops which a balanced force might need in any theatre. An army is the highest exemplification of the team. If it is not trained and geared to work as a fine team it is inefficient.

An army requires in its team powerful, slow moving elements capable of advancing step by step in the face of the heaviest resistance, capable of holding doggedly when all else is gone, capable of occupying and remaining and living dominant in a locality or a theatre of war.

It requires lighter, faster moving elements for gathering information, screening against surprise, slipping around the flanks, through gaps, or overhead, to harass, slow up, or pin down the enemy until the slower moving elements can arrive to crush him.

It needs supply elements to keep its steady stream of food and munitions flowing.

It needs communication elements to bind all these together and it needs a brain and many subordinate nerve centers to activate and control its movements.

These basic elements have existed since the dawn of history.

A basic principle of combining organization and weapons is that every unit, from the smallest upward, shall have those weapons which it habitually needs in the execution of every mission, and that weapons which find occasional or periodic usage shall be grouped in special units to be farmed out when occasion demands.

Today as formerly the infantry forms the backbone of armies; it is the most numerous. The infantry soldier, basically, is armed with the rifle and bayonet. He can fight anywhere that he can stand up, on the mountain, in the desert, in the swamp. His basic necessities are rifle, bayonet, ammunition and water. He is a self-contained force in himself and can operate in any sized war from that of the individual to the Army. The most important man in all armies is the trained individual soldier. Seven out of eight combat infantry soldiers in our army use the rifle. The Springfield rifle which we had in the World War is outmoded and we are taking steps towards equipping our men with a new semi-automatic shoulder rifle which will enable each man to deliver five times as many aimed shots in a period of time as could the World War soldier. The eighth man in the infantry squad carries the Browning automatic rifle, the lightest and most portable type of machine gun. Defensively each man is equipped with a steel helmet and a gas mask which is a great improvement over World War types. These then are the weapons of the smallest permanent infantry unit, the company whose strength is 120 men.

Each infantry division has a brigade of field artillery. Its smallest unit is the battery of four guns with their ammunition-carrying vehicles. Artillery likewise is grouped into battalions, regiments and the brigade, so that if need be smaller elements may be detached to operate directly with the smaller elements of infantry, or the guns may serve the infantry division as a whole. The preponderant weapon of field artillery is the 75-mm. gun. We have taken that most excellent weapon, the French 75, of which we have many, and by utilizing the tube and recoil mechanism, and improving the carriage and adapting it for automotive traction, we have transformed it, at low cost, into a very efficient piece. From one position it could

formerly command a sector of one mile at a maximum range of 8,000 yards. It can now command a sector of twelve miles at a maximum range of 13,000 yards. In land operations it is not only necessary to have a quick firing accurate cannon to reach the enemy at a distance on the flat and on forward slopes, but to search out the ravines and the hollows; there howitzers and mortars find their places. In the World War we had the 155-mm. (6") howitzer, a regiment in the divisional field artillery brigade; we are replacing it today with the 105-mm. howitzer which has about the same mobility in traction as the 75-mm. gun. For its destructive power on enemy works we have improved and regrouped the 155-mm. howitzer so as to employ it in the Corps and Army artillery, reinforcing the artillery of the divisions. For our cavalry divisions we have developed the very mobile and efficient 75-mm. howitzer and we use it as a pack weapon, in draft, and with mechanized traction. The 155-mm. gun with a range of ten miles and the 240-mm. howitzer are the largest calibers ordinarily included in the mobile army.

And now we come to some of the elements which enter into these larger groupings in the Army, remembering that they may be detached at any moment to serve with a smaller grouping whose immediate mission and terrain demands and permits their utilization.

The first is aviation. In our service it has four recognized combat types; viz, observation, bombardment, attack, and pursuit. From the World War it has inherited a tactical nomenclature of its own: Flights, squadrons, groups and wings, but it could just as well conform to the established terminology of other arms and be called platoons, companies, battalions and regiments. Observation aviation in groups of three or more squadrons is assigned to the corps and the army, and its duty is the quick gathering and reporting of information and the adjustment of long-range artillery fire. For this purpose it utilizes the radio, panel, dropped message and photograph, and it is defensively armed. Enormous advance has recently been made in night photography. In the foreign possessions we maintain composite wings of all types of aviation. In the United States the largest grouping is the GHQ Air Force which is in reality an army or group of armies quota of aviation. It serves directly under the command of the general commanding a theatre of operations. We have recently seen in Spain and China that if the use of aviation does not contribute very directly to the attainment of the objectives of the ground armies, its effort is largely lost and serves but to arouse the resentment of the rest of the world. In the GHQ Air Force we find groups of bombardment, attack, pursuit, and long-range observation, assembled into wing commands.

Barring the fact that its operation and maintenance requires a high degree of technical skill, there is no mystery in military aviation. It has the romance, which cavalry formerly had, of comparative speed, of wide, sudden, unexpected movements, of battle, murder and sudden death. While in peace its dangers in training are comparatively more than the other arms, in war its percentage of casual-

ties is far less than those of the infantry, artillery and signal corps.

Bombardment aviation, tactically, is nothing more nor less than a grouping of very long range guns. The .30-caliber machine gun can fire 600 aimed shots per minute at an extreme range of two miles. The 75 can fire ten shots per minute at seven and one-half miles. The 16-inch seacoast gun can fire one shot in two or three minutes at more than twenty-five miles. The bombardment airplane can deliver one or two very large shots per day at the range of several hundred miles. Its primary targets are railroads, munitions factories, heavy defensive works, and especially in our case, naval ships at sea within its radius of action when the Navy may be absent on offensive missions. It is well trained in celestial navigation for operations over water. It can operate effectively by day or night.

Attack aviation is especially designed and equipped for the attack, by machine gun and small bomb, of enemy troops and light defenses. It is the cavalry of the air.

Pursuit aviation is the aerial protector of the other air troops. Its business, and it is so designed and armed, is the destruction of hostile aviation. Its airplanes are small, highly maneuverable, and speedy. Unfortunately it is not very effective at night.

To ensure our supply of pilots, we also necessarily have many airplanes designed for training; and we must have cargo airplanes to rapidly transport the Air Force necessities of maintenance and supply.

Ship for ship, I think, I may assure you that our Air Corps is as well equipped as any in the world today, and with this year's appropriation its material is adequate to meet our peacetime needs.

In point of numbers, our Army and Navy air forces combined rank about fourth in the World's air forces.

Aviation still has one great enemy—bad weather. There still are days when it is blind and cannot work to military advantage. It is getting more and more dependent on extensively prepared airdromes. It is helpless on the ground and its airdromes must have the constant coverage and protection of other troops.

For ground operations, as I said, we must have a quota of comparatively fast moving, mobile troops, and the differential in the speed of movement between the horse and the man, when you are trying to maneuver hundreds or thousands of individuals over rough ground under circumstances involving death in large quantities is just as important as it ever was. We cannot neglect our cavalry. The day of the lance, saber and cuirass is gone. But American cavalry never favored them much anyhow. Today it is armed with the same semi-automatic rifle, and the same machine guns as the infantryman. Indeed, it also has in quantity, a light air-cooled machine gun that adds tremendous fire-power. It has the peculiar adaptability of its pack horses to keep a large supply of ammunition up to its guns. It has a close assault weapon perhaps superior to the bayonet, but at any rate thoroughly American; each soldier has a .45-caliber automatic pistol. It is organized into regiments, brigades and divisions, like the infantry

and in its larger echelons it is similarly supported by artillery, engineers and other special troops. In rough terrain or in any theatre with poor roads it will be essential. Furthermore, we cannot afford not to use the great national asset of our animal industry which is the envy of many another nation.

However, in the matter of cavalry we have not been asleep. We have realized that the automotive engine has brought us to the point where guns and armor can be rapidly moved long distances and over a fair degree of rough country in some circumstances carry out the mobile missions of war even better than the horseman. We have organized and are rapidly perfecting our mechanized cavalry. We now have one brigade of two regiments supported by its specially equipped field artillery and we expect to expand this unit.

Its backbone is the fast light tank or combat car. This, in quantity, furnishes the offensive power. Machine guns in quantity in cross-country armored carriers furnish the defensive power, and it has specially designed and equipped units for scouting and reconnaissance.

The reconnaissance of cavalry is still essential to supplement that of aviation; its screening ability is necessary to conceal our own movements but above all its rôle is to carry on the mobile combat, on the flank, in the rear, or at a distance to pin the enemy down.

The tank, organized into companies and battalions on its own part has an additional rôle. It is an important and auxiliary of assaulting infantry, as it was in the World War, only it has enormously improved in power, radius and mechanical reliability. For this purpose we employ both light and medium tanks and the trend is now towards the latter. The very small light tank has not been successful.

The mobile army must contain engineer troops, equipped to enable them to build roads, bridges, railroads, camouflage, accessory defenses, and water supply. They are basically armed as infantry.

The signal troops operate the most complicated systems of wire and radio communications, reaching from the War Department almost to the front lines, of an army in the field.

One other arm deserves special mention. The Coast Artillery troops man and operate our seacoast artillery, our major caliber antiaircraft artillery, and, when necessary mine our harbors.

Our important harbors of strategic importance must be protected, particularly those wherein naval bases are located. Your Navy, despite its power and might and cost, is no good to you unless it can get to sea. Wars have repeatedly shown the ability of a few ships to lock up greater forces in a harbor once they have caught them there by surprise. Our coast artillery armament has the purpose not only of preventing hostile ships from entering our harbors, but of keeping hostile ships far enough off shore so that our own squadrons may debouch from the channel and deploy before battle. As the British fleet learned at the Dardenelles, shore guns are more accurate than naval

guns and they are better protected. To neutralize the heavy shore gun navies have brought forward the aircraft carrier, which can stand several hundred miles off-shore and release its bombardment planes with high explosive or gas. To our pursuit aviation and antiaircraft guns falls the lot therefore of protecting the heavy seacoast armament. In antiaircraft artillery have come some of the most remarkable improvements since the World War. It is really uncanny to watch the fire of a well-directed battery. And these developments are going on apace. We will have to have antiaircraft protection also for many other localities, installations, and manufacturing plants which are essential to war production and which are in the zone of probable attack. All antiaircraft equipment now being made is mobile and can easily be moved from place to place.

The Military Academy at West Point is the cradle of the Army. It is not a university as some would have it, but an institution designed to produce a second lieutenant for the Army. Its graduate is a physically fit young man with a good general education particularly on the technical side, but, above all, with a Spartan military character. He can command in the future because he has learned to obey. But he has only barely commenced his military education.

The Army repeatedly is used as the instrument of relief in internal disaster and catastrophe, supplementing and frequently making possible the more effective use of the Red Cross and similar agencies, and bringing together as in the case of the last Ohio and Mississippi floods the effort of the municipality, state, and nation.

The Army is big business. It has in its ranks or employs almost every known profession: Doctors and dentists; preachers and lawyers; architects and builders; engineers of every category; financial experts and accountants; office managers and clerks; metallurgists and chemists; airplane pilots and ship's crews; railroad men and motor experts; grave diggers and movie experts.

The military estimates of the War Department now before Congress are \$459,713,719 for the fiscal year 1939. The department overhead costs \$5,600,387. The civil activities are estimated to cost \$157,479,387. We have an expensive military system for the numbers afforded. Nevertheless, it is the system chosen by the American people. We pay our soldiers a wage instead of a conscription pittance. Every sock and shoe, every sack of beans or potatoes, every gun, every airplane, and every round of ammunition is the product of highly paid American labor.

At that, your National Defense, as represented by the Army including its Air Corps, and including the supplemental program of the President this year, costs you but \$3.39 per year per capita as against \$10.33 in Great Britain; \$12.73 in France; \$10.88 in Germany; \$16.20 in Italy; and \$6.60 in Russia. In Japan, the normal rate is \$6.69; including the China incident, it is estimated to be \$21.86.

Our business is to give to the nation for its money the most National Defense under the existing system that we can, and to improve that system as much as we can under the law.



Antiaircraft Organization

In the March-April number of the JOURNAL attention was invited to the fact that the British after trying various plans for the organization of their artillery had finally transferred all means for antiaircraft defense, except aviation, to the artillery. These changes, with other changes in the British Artillery organization, led us to conclude that our present organization is basically sound and will meet the test of war.

It has been reliably reported that the defense against air attack in the Spanish Loyalist forces which has, heretofore, been under direct control of the aviation branch of the Army has been transferred away from them to the land armies. In other words they are, after a wartime test, adopting a plan for the defense against air attacks, which is quite similar to our system. The Spanish War has resulted in a strong indication that the services which constitute the defense against air attack should not be placed under the control of the aviation branch of the Army.

Castello de San Lorenzo



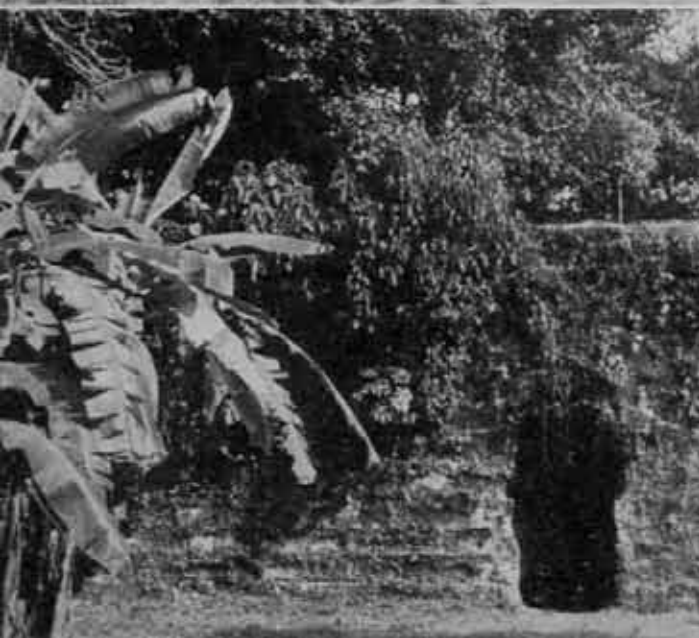
FORT SAN LORENZO, near Fort Sherman, Canal Zone, is one of the old forts constructed during the reign of Philip II of Spain who ruled from 1566 to 1598. Immediately following the exploration period of the early fifteen-hundreds, Spain began building for the defense of the riches discovered in the new country. So rapidly had the traffic in gold, pearls, and slaves developed that Philip decided to establish forts for the protection of the traffic. The Chagres River already had become firmly established as an important highway for transportation of this wealth from old Panama. The defense of the Chagres was therefore of very great importance. The historian Anderson says "San Lorenzo was erected by the engineer Juan Antonelli by order of Philip II of Spain," which would date the erection of the fort approximately 1575. However, the exact date of completion is not known.

A map published by the historian Jeffers, in his history, the *West Indies*, published in 1762, shows a plan of the construction. Esquemelin the historian for the buccaneers describes this castle:

"This castle is built upon a high mountain, at the entry of the river, and surrounded on all sides with strong palisades or wooden walls; being very well terreplined, and filled with earth; which renders them as secure as the best walls made of stone or brick. The top of this mountain is in a manner divided into two parts, between which lies a ditch of the depth of thirty foot. The castle itself



Left—The outer fort after it had been cleared
Lower left—Entrance to troop quarters, main fort
Below—Troop quarters. Note candle blocks on walls



has but one entry, and that by a drawbridge which passes over the ditch aforementioned. On the land side it has four bastions, that of the sea containing only two more. That part thereof which looks towards the South is totally inaccessible and impossible to be climbed, through the infinite asperity of the mountain.

"The North side is surrounded by the river, which hereabouts runs very broad. At the foot of the said castle, or rather mountain, is seated a strong fort, with eight great guns, which commands and impedes the entry of the river. Not much lower are to be seen two other batteries, whereof each hath six pieces of cannon, to defend likewise the mouth of the said river. At one side of the castle are built two great store-houses, in which are deposited all sorts of warlike ammunition and merchandise, which are brought thither from the inner parts of the country. Near these houses is a high pair of stairs, hewed out of the rock, which serves to mount to the top of the castle. On the West side of the said fortress lies a small port, which is not above seven or eight fathom deep, being very fit for small vessels and of very good anchorage. Besides this, there lies before the castle the entry of the river, a great rock, scarce to be perceived above water, unless at low tide."

For nearly a century Fort San Lorenzo held a position of strategic importance guarding one of Spain's richest highways of commerce and became one of the main trans-shipping points between the old and new world. Second only to Porto Bella it became the objective of pirates and buccaneers. It was only logical that it should become the goal of Sir Henry Morgan in his plans for the conquest of Panama.

*Right—Old ammunition gathered and stacked
Lower right—Troop quarters, officers' quarters, and
old well*

Below—The old well after clearing and draining



AA TRIAL SHOT SLIDE RULE

By Captain Ralph W. Russell, C.A.C.

LEWIS CHARTS have served well the purpose for which they were developed. Their use, however, during inclement weather is somewhat difficult. Also there are occasions when the trial shot points fall short of the area covered by the charts. The slide rule described in this article overcomes many of the difficulties experienced when Lewis charts are employed.

In addition to dealing effectively with problems capable of solution with Lewis charts, this slide rule has a much broader scope and is more dependable. Moreover, it is compact and easy to handle, and it can be used efficiently under all weather conditions. During the last outdoor training season it was given a practical service test with satisfactory results.

The first year advanced ROTC students, in training at Fort Barrancas, employed the instrument for the solution of trial shot problems in all antiaircraft firings. Battery A firing a mobile battery, used the ruler effectively. During four record courses, from one to six hits were obtained on each course before any adjustment corrections were made. Camera observations were used. On several occasions the battery, for logical reasons, selected Trial Shot Point No. 2, in using a base line 5,606 yards long. In these instances the horizontal range to the Trial Shot Point was less than 0.6 of the length of the base line. The Trial Shot Point fell short of the area covered by the Lewis charts. With the slide rule the results obtained were superior.

In order to test the simplicity of operation of the rule during these firings, an operator familiar with the theory involved was selected, although he did not know how to operate an ordinary slide rule. He received only one hour of instruction the night before he fired his first problem. In general, he ordered the necessary correction within one minute after the last burst was observed.

Prior to discussing the purpose of the slide rule, it is desired to invite attention to Figure 1. This form is so designed that it can be easily followed. Most entries can be made before any shots are fired. For example, as soon as a base line has been established a convenient azimuth to the Trial Shot Point may be selected and the form completed through line 20 for each of the three Trial Shot Points.

PURPOSE

The general purpose of the Russell Slide Rule is to solve rapidly and with the required degree of accuracy, the azimuth of the Trial Shot Point from the distant observing station (O_2), and the angular height of the Trial Shot

Point from the O_2 station. These data, obviously are essential to the proper setting of the observing instrument at the O_2 station. The data having been obtained, the slide rule provides a means for determining, with speed and within accuracy of five to ten yards, the horizontal range deviations of bursts from the Trial Shot Point for ranges between 1,000 yards and 10,000 yards.

Furthermore, it can be used to advantage for many other purposes, including the solution of antiaircraft and seacoast gunnery problems. For angular measurements the instrument makes use of the "Mil." However, angular measurements in mils may be readily converted to degrees and hundredths of degrees on it by simple division.

CONSTRUCTION

The various parts of the Russell Slide Rule can be identified as indicated below (see Figure 2):

1. Base—All that portion of the slide rule that is fixed.
2. Upper Base—That part of the base on which is constructed the A Scale.
3. Lower Base—That part of the base on which appears Scales D, T_3 , T_2 , and T_1 .
4. Slide—That sliding part of the instrument on which appears three scales on each side.
5. Front Slide—The side of slide on which appears scales C, S, and L.
6. Reverse Slide—The side of slide on which appears scales B, O_1 , and L.
7. Runner—The movable glass portion with reading line through center.

The construction is based on logarithmic scales L and D, twenty inches in length. Scale A, is a square root scale as will be found on an ordinary "Duplex Slide Rule." Scales C and S represent angles of which Cosines and Sines respectively may be read from scale L, the three scales having a fixed relation. Scale B, is a tangent scale for angles from 800 to 1,500 mils. Scale O_1 , is graduated (from 200 to 1,600 mils) to represent the included angle in solving for other values of a triangle when two sides and the included angle are given, making use of the "Law of Tangents." Scale T_1 is a tangent scale for angles having tangents of less than .1000; scale T_2 is a tangent scale for angles having tangents between .1000 and 1.000, and scale T_3 for angles having tangents greater than 1.000.

OPERATION

Before a sample trial shot or calibration problem is con-

Practical ♦ Convenient ♦ Efficient

T.S.P. No. M.V.= f.s.

Lines 1 to 20 incl. and 30, 32 and 35 to be completed before opening fire.

1 Azimuth of Base Line (O_1 to O_2)..... = _____

2 Azimuth of T.S.P. from O_1 (selected).. = _____

3 Angle $O_2 O_1 T$ in Horiz Plane (C)..... = _____ (X)

4 Horizontal Range O_1 to T.S.P. from F.T.(a)..... = _____ (X)

5 Length of Base Line in Yards(b)..... = _____

6 $a \cos C$ (from S.R. using lines 3 and 4) = _____

7 $b - a \cos C$ (Line 5 - Line 6)..... = _____ (X)

8 Angle $O_1 O_2 T = A = (4 \times 3 \div 7)$ Sin Scale..... = _____ SR

9 Azimuth T.S.P. from O_2 = _____

10 Altitude T.S.P. above O_1 (F.T.)..... = _____

11 Elev. O_1 in Yards..... = _____

12 Elev. O_2 in Yards..... = _____

13 Difference in Elev. between O_1 and O_2 . = _____

14 Altitude T.S.P. above O_2 in yds = (h) = (10 \pm 13)..... = _____ (X)

15 $A + C = (8 + 3)$ = _____ (X)

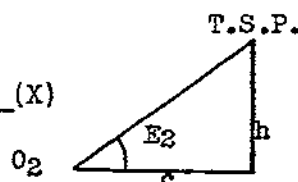
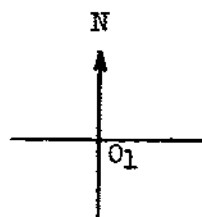
16 Length of B.L. from 5 above (b)..... = _____ (X)

17 Angle C from 3 above..... = _____ (X)

18 Horiz.Range to T.S.P. from O_2 or side (c)..... = _____ (X) SR

19 Angular Height T.S.P. from $O_2 = h/c = 14/18$ (SR) = ϵ_2 = _____ SR

20 Angular Height T.S.P. from O_1 (F.T.) = ϵ = _____



21 Observed deviations in Mils

dR = Deviation Horiz.Plane

Shot No.	O_1				O_2	
	L	R	A	B	L	R
1						
2						
3						
4						
5						
Total						
Mean						

ds = Dev. Incl. Plane.

dR = $\frac{ds}{\cos \epsilon}$

$A_1 = A \pm dR$

$C_1 = C \pm dR$

22 $dR = \frac{ds}{\cos \epsilon}$

23

24

25

26

27

28

29 Lateral Deviations converted to horizontal plane

30 $C =$

31 $C_1 =$ (X)

32 Length of B.L. (b) from line 5 = _____ (X)

33 $A_1 + C_1$ (both values obtained from Line 31) = _____ (X)

34 Horiz.Range to C.B. = a_1 (from S.R. using 31, 32, 33) = _____

35 Horiz.Range to T.S.P. from F.T. = (a) = _____

36 Range deviation in yds (show sign \pm) = _____

37 Mean Vertical Deviation with sign changed = _____

38 Scaled on ΔEV (Show sign) = _____

39 Quad.Elev.Correction in Mils ($d\phi$) (add lines 37 and 38 algebraically) = _____

40 Muzzle Vel.Variation (use dV scale, apply 39 on $d\phi$ scale) = _____

41 Percentage Alt.Correction (use % H scale, apply 39 on $d\phi$) = _____

42 Items 40 and 41 both not required. Consider equipment in use.

43 Az Correction (Line 31, Change sign lat.dev.obs. from O_1) = _____

NOTE

- * Item 3 = difference in items 1 and 2, except when difference is greater than 3200 m, in which case 6400 is added to smaller quantity and the difference is taken.

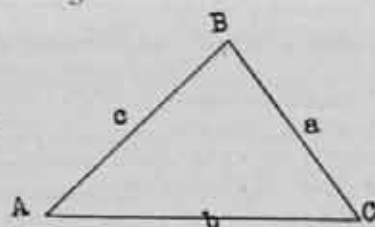
(X) Set values on proper scales of slide rule

1. When O_2 station is on left. Back Az. base line minus A (except when Back Az.B.L. is less than A, in which case 6400 is added to the smaller and the difference is taken)
2. When O_2 station is on right. Back Az. base line plus A (except when the sum exceeds 6400, in which case the value is diminished by 6400.)

sidered, it is believed well to first consider a few operations in the solution of the following simple equations.

Construct a triangle with angles A, B, and C, and sides a, b, and c, opposite the respective angles. Given: Angle C and sides a and b; Find Angle A.

$$\tan A = \frac{a \sin C}{b - a \cos C}$$



Move runner to a on D scale

Move slide until one is under runner line

Move runner to Angle C on C scale and read the product of (a cos C) on D scale.

The above constitutes merely the simple step of multiplying. Subtract the value obtained for (a cos C) from b, then multiply a by sin C using scales D and S, and divide the product by the value obtained for b - a cos C, using scales D and L and read angle A on the appropriate tangent scale constructed on the lower base. The scale on which angle A is read will obviously depend upon the figures involved in the process of dividing. For example, $30/15 = 2.000$; therefore, remembering what has been stated above, angle A must be read from Scale T₃, which is graduated for angles having tangents greater than 1.000. Likewise $30/150 = .2000$ and angle A must be read from scale T₂; and $30/1500 = .0200$, in which case Angle A should be read on scale T₁.

Angle A can also be obtained by use of the Reverse Slide and solving by the "Law of Tangents."

$$\tan \frac{1}{2} (A - B) = \frac{a - b}{a + b} \times \tan \frac{1}{2} (A + B)$$

$$\tan \frac{1}{2} (A + B) = \tan \frac{1}{2} (3200 - C)$$

$$\text{Angle } A = \frac{1}{2} (A - B) + \frac{1}{2} (A + B)$$

Remember that a, b, and C are given.

Obtain values of a - b and a + b. Locate a - b on scale D, locate a + b on scale L and move values opposite each other. Move runner to value of included angle C on the C scale and read $\frac{1}{2} (A + B)$ on scale B, and $\frac{1}{2} (A - B)$ on appropriate tangent scale of lower base.

In the use of this equation it must be remembered that when a (which represents the horizontal range to T.S.P.) is smaller than b, (which represents the base line), a - b will give a negative quantity and, therefore, angle A, will actually be the difference between $\frac{1}{2} (A + B)$ as read from B scale and $\frac{1}{2} (A - B)$ as read from the appropriate T scale. It is also necessary, and with practice will be a simple matter, to keep in mind the approximate value of fraction which will be produced by dividing a - b by a + b. Also remember that this value is being multiplied by the tangent of $\frac{1}{2} (A + B)$ which appears on the B scale. When $\frac{1}{2} (A + B)$ is smaller than 100 mils, the tangent is less than .1000, when less than 800 mils the tangent is less than 1.000 and when greater than 800 mils the tangent is greater than 1.000. When the angle is greater than 1130 mils the tangent is greater than 2.000, when the angle is greater than 1280 mils the tangent is greater than 3.000 and when greater than 1360 mils the tangent is greater than 4.000.

Using the same triangle referred to above, we may now find side c opposite angle C by using angles A and C and

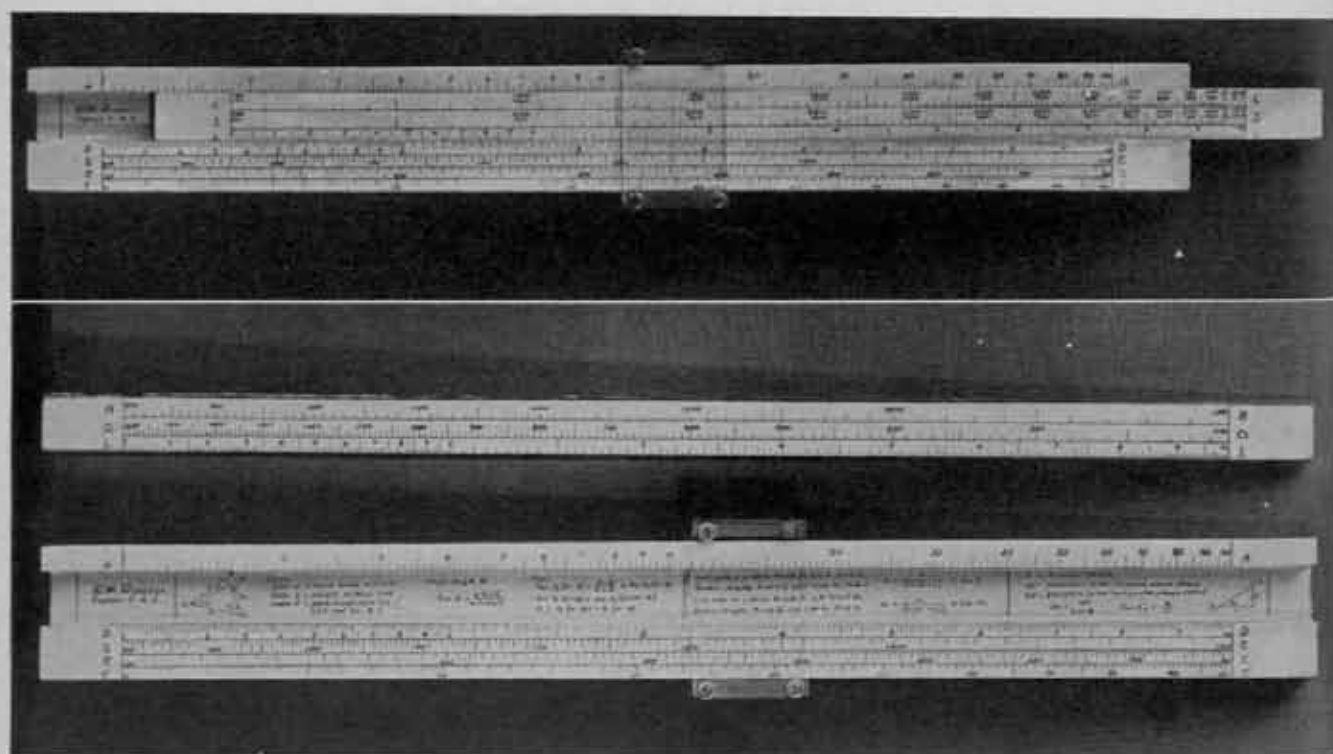


Figure 2

the included side b . (Let side c represent the horizontal range to T.S.P. from O_2 .)

$$c = \frac{b}{\sin(A + C)} \times \sin C$$

Locate $(A + C)$ on S scale and place it opposite the value of b on D scale, move runner to angle C on S scale and read side c on D scale.

Having determined the altitude of T.S.P. above O_2 station (see line 14 Figure 1) and the horizontal range to T.S.P. from O_2 station (see line 18 Figure 1), the process of determining the angular height of T.S.P. from O_2 station requires merely the operation of dividing the altitude above O_2 (h) by the horizontal range from O_2 (c), reading the angular height (ϵ) on the appropriate tangent scale of the lower base.

To convert angular deviations in the inclined plane to the horizontal plane:

Let dR = Deviation in the horizontal plane

dS = Deviation in the inclined plane

ϵ = Angular height of T.S.P.

$$dR = \frac{dS}{\cos \epsilon}$$

Locate angular height (ϵ) on C scale and move it opposite dS on D scale, move runner to one on L scale and read dR on D scale.

Let $A_1 = A \pm$ angular deviation observed from O_2 converted to the horizontal plane.

$C_1 = C \pm$ angular deviation observed from O_1 converted to the horizontal plane.

b = Base line

a_1 = Horizontal range to center of burst (CB) from O_1 .

$$a_1 = \frac{b}{\sin(A_1 + C_1)} \times \sin A_1$$

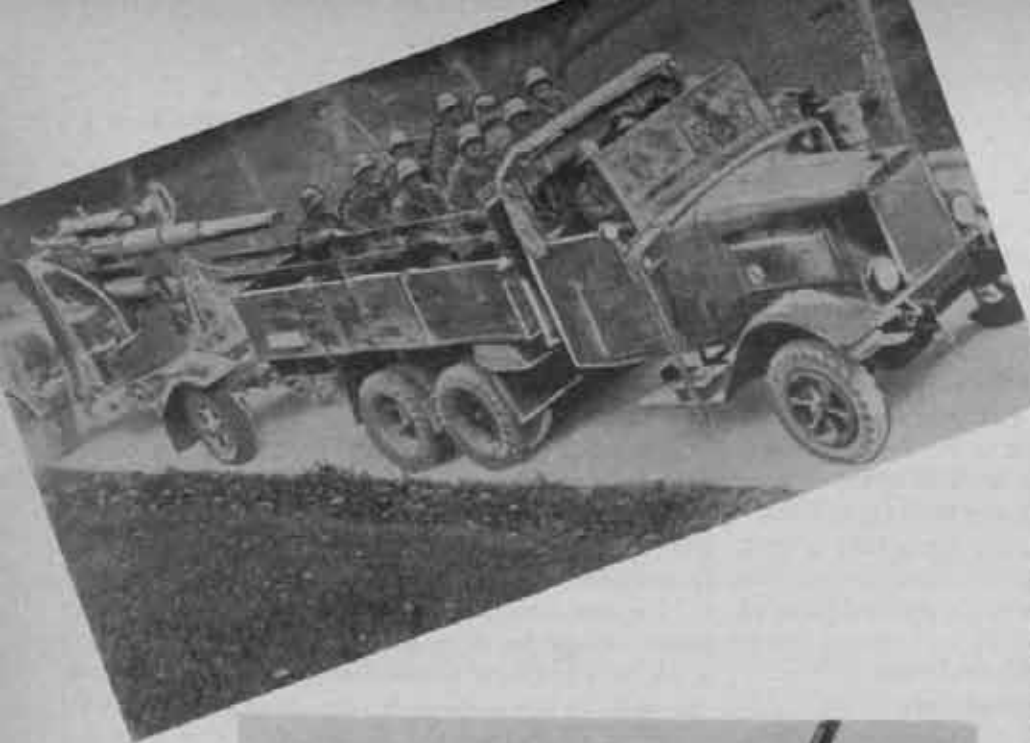
Solve in the same manner explained above for determining side c , or horizontal range to T.S.P. from O_2 .

Using the "Log range sheet," place dividers on the values of a and a_1 , and apply this distance to the $\Delta \epsilon v$ scale, measuring up from zero for overs and down for shorts. Continue the operation as explained in lines 39 to 43 inclusive, Figure 1.

Note that a mimeographed sheet showing overlapping sections of the log range scale is used. It is advisable to mark with a colored pencil, before trial shots are fired, the point on log range scale representing the horizontal range to T.S.P. from O_1 . Immediately after obtaining horizontal range to Center of Burst, the point on log range scale representing that value may be marked with black pencil. This process will practically eliminate the probability of measuring the deviation on the $\Delta \epsilon v$ scale in the wrong direction.



IT IS WELL KNOWN TO EVERY VIGILANT OFFICER that discipline can be maintained by legal means. Other resorts are, in the end, always destructive of good order and subordination. The general deportment of officers towards juniors or inferiors will be carefully watched and regulated. If this be cold or harsh, on the one hand, or grossly familiar on the other, the harmony or discipline of the Corps cannot be maintained. The examples are numerous and brilliant, in which the most conciliatory manners have been found perfectly compatible with the exercise of the strictest command; and the officer who does not unite a higher degree of moral vigor with the civility that springs from the heart, cannot too soon choose another profession. Government not only reposes "special trust and confidence" in the patriotism, valor, fidelity and abilities of Army officers, as is expressed on the face of commissions; but also in their self-control, respect for law, and gentlemanly conduct at all times.—MAJOR GENERAL WINFIELD SCOTT.



Ger

Experts say that German AA we show some of the equipment

To begin with, we give a brief officer candidate. First he gets Then he spends 5 months at a tactics and is trained as an observer school, after which the candidate Then he is commissioned. He will course in the gunnery of various

The Germans divide AA into light and heavy. The light is equipped with quick-firing. The calibers now in use are 20-mm. guns of 75-mm. or larger caliber.

The picture, *center left*, shows a mobile 88-mm. gun in travel. It is not of the latest type; the latest is a prime mover and troop carrier.

Bottom left, we see a 20-mm. gun. It has given excellent results in S. tracers, and armor-piercing shells with super-sensitive impact fuses; the

Upper center we see a 37-mm. gun. It has a bucket seat and has four assistants: a finder operator, separator and target

The range-finder operator and target operator are supported by their shoulders. *center*.

For a late model of the German



any

the best in Europe. On this page
army of the Third Reich.
the training of the German AA
topic training as an infantryman.
where he learns bombardment
comes 9 months at an air force
to his command for 2 months.
the AA school for a 2- or 3-month
period.

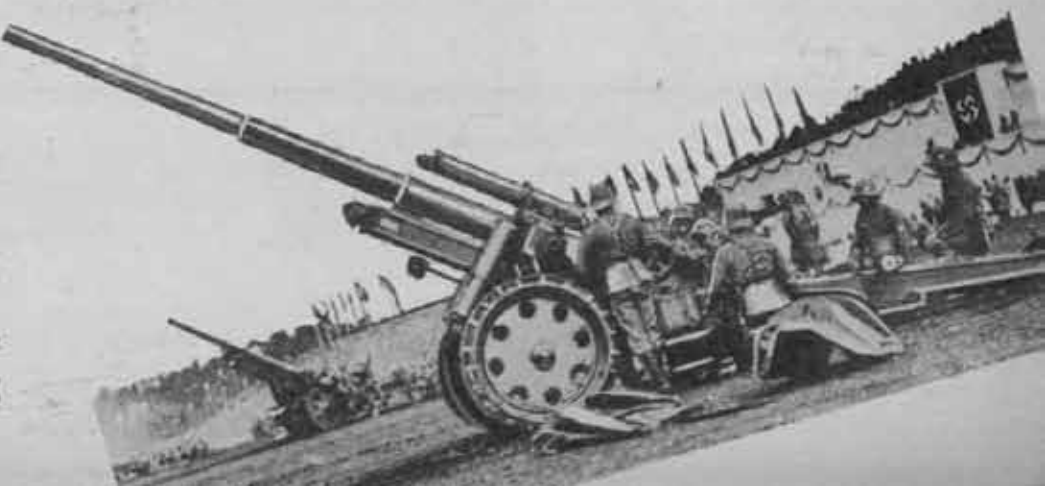
two types: light and heavy. The
of calibers smaller than 75-mm.
mm. The heavy AA artillery has
in current use is the 88-mm.

88-mm. AA gun. *Upper left* we
see. The prime mover shown is
(*upper right*) is a combination
m cross-country tractor.
in action to the 37-mm.; both
7-mm. gun fires high-explosive,
and tracer are fitted with nose
self-destructing feature.

with crew. The gunner sits in
better, gunner's assistant, range-
estimator.

and target-speed estimators are
case stereoscopic range finders,
shoulder supports are shown *right*

gun, see *bottom right*.





Above—This barrette-mounted heavy gun forms part of the armament of the coast defenses at Plymouth, England.

Below—The Japanese Army uses a Sperry searchlight in a recent demonstration.



British Territorials using sound locators and searchlights during recent maneuvers.



Below: These 20-mm. Oerlikon AA guns were part of the equipment of the former Austrian Army.



A portion of the Italian Army passes in review in trucks carrying AA automatic equipment



This is a British 3-inch AA gun on a 4-wheeled mount.

The Royal Army and the French Revolution

By **LIEUTENANT ROBERT J. WOOD, C.A.C.**

MEN HAVE ALWAYS fought, but their manner of fighting has not always been the same. As civilization has changed, so have weapons, formations, and methods of warfare. A student of such changes is struck by the fact that for every variation in arms, in armor, in the makeup of armies, a change in society occurred first.

Thus, the story of Europe's emergence from the dark ages is the story of the rise of national states and marked the rise to power of the absolute monarch over the feudal lords. It also marked the rise to perfection of the standing army over the feudal levies; the professional, recruited, army with which the rulers of the day waged their more or less personal wars. This movement culminated in the royal standing army of the eighteenth century, best exemplified, perhaps, by the efficient, well-drilled forces of Frederick the Great.

When Frederick died in 1786, he believed that he had left Prussia a strong and powerful state. Yet, even as he was laid to rest, a new civilization was imminent, a new idea in government was being voiced, a new society was about to be born. This new era was to be characterized by the revolutionary catchwords of "Liberty, Equality, and Fraternity." With it would be identified liberal democracy. Out of it would come new principles—the foundation stones of modern warfare.

Since the time of Frederick, armies have undergone radical changes. Today, every nation at war, calls, not a few volunteers, but *all* its able-bodied citizens. No longer is war a question of fights between monarchs; it is a question of fights between whole peoples. This characteristic of present day warfare is aptly called "the nation in arms," and its development may be traced back to the time when the French nation threw off the royal yoke of the Bourbons and, after a few riotous years of indecision, bore the imperial eagles of Napoleon across the length and breadth of Europe.

Despite the backwardness of the French state, the army of Louis XVI was not hopelessly antiquated. In common with other European armies, it had imitated that of Prussia,

which was recognized as embodying all the principles of war in perfect form. To be modern in military lines—particularly after Frederick's success in the Seven Years' War,—was to be Prussianized. In 1763, French drill and organization adhered closely to the Prussian model, and the French had attained virtual perfection in the use of the weapons of the period in the performance of all the complicated maneuvers thought necessary by the military minds of the day.

A successful army clings to the forms which have brought it victory. A winning abracadabra is long venerated. Even today the Germans have not entirely abandoned the Prussian shibboleth. So much more so in 1763, when the Prussians

under Frederick rested on their laurels of accomplishment and flattered themselves on having originated most of the type of warfare in which they were certainly Europe's outstanding exponents. In the years of peace which followed, they made no efforts to seek out improvements. It took Napoleon in 1806 to shake them out of their lethargy.

To the credit of the French, however, it must be said that considerable change along purely technical lines took place between the end of the Seven Years' War and the outbreak of the Revolution in 1789. There were officers who realized, during this period, that Frederick's methods had reached a peak, and that, if warfare was to progress, new methods must be developed. Particularly, Marshals de Bourcet, de Broglie and Guibert foresaw changes, and while all they taught did not receive immediate practical adoption, later events were to prove their foresight.

Progress in the art of war is determined by changes which may be divided roughly, and arbitrarily, into two classes: (1) Changes in *strategy*, in the arts of marching and combining the movements of armies, which changes arise from the improvement of organization, of communication, and supply; and (2) Changes in *tactics*, in the art of fighting, the development of which has its material cause in the improvement of weapons. In both of these classes, advances were made in France between 1763 and 1789.

*593 generals were
made, and broken,
in six months* ♦ ♦ ♦

While teaching at the military school at Grenoble, in 1764, General Pierre de Bourcet wrote *Principes de la Guerre des Montagnes*, in which he fought imaginary campaigns in that very part of the Alps where later Napoleon was to fight two campaigns. He enunciated the doctrine that an army operating in such terrain should carry its own supplies or else live on the country, thus rendering obsolete the depot-based tactics of the royal standing armies.

The writings of de Bourcet were incorporated into regulations for the French army and approved by the commander in chief, de Broglie. It was de Broglie who experimented with self-supporting mixed bodies of infantry and artillery, able to maneuver separately and to carry out tasks in action. Such units, tested in maneuvers in the field, and in actual combat in America under Rochambeau, are the true forerunners of the division.

Following these reformers came Guibert and Du Teil, who pointed out the necessity of dividing armies into units, of rapidity of movement under fire, of the use of superior force at the time and at the point it was needed. As complicated formations gave way to simpler ones, Guibert predicted the use of larger armies in the future, practically foretelling the nation in arms.

Changes in weapons were not as great as those noted in strategy. Except for minor modifications, Napoleon used the same flintlock as had Frederick. Changes in artillery were of somewhat more importance. The so-called "new artillery" of the period was the work of Gribeauval, who shortened the guns, thereby making them lighter and easier to move. At the same time, he increased the range by reducing what was then called "windage"—the clearance between the ball and the interior of the piece. He also standardized a variety of sizes into three: 12-pounders, 8-pounders, and 4-pounders. He put the horses two and two instead of in single file and so reduced the lead of the teams. It is said that these improvements enabled Rochambeau's artillery to march from New England to Yorktown in record time and without the loss of a gun.

On the eve of the French Revolution, then, the royal army of Louis XVI, from a standpoint of technical development, was ahead of its day. Its drill books had been repeatedly revised. New ideas in movement and organization had been tested and found good; the infantry weapon had been improved, the guns of the artillery modernized to increase their range and mobility. The army should have been in splendid shape to put down civil war or rebellion.

What happened, then that this army went to pieces, that this new science and art of war was lost; and, after seven years of oblivion, reappeared only with the advent of a new general identified with the new order who, with these same weapons, this same strategy, astounded the world?

Technical changes alone will not remake an army. What the reformers lacked was a new spirit in the service and a leader of genius, both of which, because of their own background, they could not supply. It took the Revolu-

tion to give birth to these essentials, which formed the French nation into one of the greatest fighting machines the world has ever seen.

An army is a society within a society; its characteristics are derived from the community in which it lives. There was nothing wrong with the army of Louis XVI except that it reflected the diseases and disorders of the French nation. France was divided sharply into two classes: nobles and commoners; so was the French army. From the noble class came the great majority of the officers; from the "third estate," the non-commissioned officers and enlisted men.

The officers were divided into three groups: (a) the court nobles; (b) the noble country gentry; and (c) soldiers of fortune or former enlisted men.

The first two classes held more than 95% of the commissions. The nobility of France was essentially a military class; it had always been that. "The priests pray, the nobles fight, the commons pay for all." Such was the theory of the feudal state. True, since feudal days nobility had degenerated into a parasitic growth; but the nobles were still, traditionally, the officers of the royal armies. The reformers who have been mentioned were all of noble birth, and they were excellent officers. But there were too many bad ones. In fact, there were too many officers for the size of the army—35,000 as against 150,000 enlisted men. In 1787, many were eliminated, most of them being court nobles whose names were "carried on paper" and who spent their time at Versailles.

About the same time, however, a reactionary order provided that applicants for commissions should show four generations of nobility on the paternal side. This caused dissension among the several hundred non-noble officers (who, interestingly enough, were assigned to the low-ranking branches, the artillery and the engineers). They felt that the next step would be their elimination.

Even with the reduction in the number of officers, there were still many holding commissions who spent little time on active service. Unfortunately for the army, most of these were court nobles who secured their appointments through favorites of the King, and who, naturally enough, monopolized the higher grades. (There were nearly 1,000 generals, or one for every 150 privates.)

The officers who really worked with the troops were, in general, members of the impoverished country gentry who were looked upon by their more fortunate brethren as "poor relations." They spent most of their lives attaining the grade of lieutenant colonel. While they agreed with the court nobles that officers of the army should come from the noble class, they disapproved of the monopoly of the court nobles on the ranking positions, and were willing to side with the common people in the hope that this tradition could be changed.

The army of Louis XVI consisted, in 1788, of 163 regiments, this being the highest peacetime unit. Of this number, 23 regiments were mercenary troops—Swiss, Irish, and German. The native regiments were recruited largely by what was called "voluntary" enlistment, the

period being for eight years, but the recruits were by no means sure of getting a fair discharge at the end of that time. The men who comprised this soldier material were the poorest and least settled, the dregs of European life.

Methods of enlistment are described by Taine in *The Ancient Regime*:

. . . The recruiting agent, who is paid so much a head for his recruits, and so much an inch for their stature above five feet, holds court in a tavern and treats his prospective recruits. . . . He pushes around the glass, and if need be, yields his mistress. After a few days debauchery, the young men, with no money to pay their score, are obliged to sell themselves. . . . Strange fellows, these, for the protection of society . . . down-trodden peasants . . . social outcasts . . . disheartened, excited, and easily tempted, who become at one time rioters and at another soldiers. . . .

The lot of the soldiers was not an easy one. The pay was poor, the bread was often uneatable, the meat bad. Barrack accommodations were so scanty that regulations had to be issued forbidding *more than* two soldiers to sleep in one bed.

As for uniform, here again the Prussian influence was noteworthy and "fuss and feathers" was in its glory. The soldier of France was dressed to fight in a uniform several times more uncomfortable than a West Point cadet's full-dress parade uniform. Made entirely of Bourbon white, with colored trimmings which varied according to the regiment, it was capped by the triangular cocked hat of the period which stood well out over the ears but hardly shaded the eyes. Beneath the hat, the hair was powdered, or rather pasted, for the powder was sifted on to the wet hair and caked in the process. The condition of the mass after a rainy night at the campfire may be imagined. White cross belts were a feature, breeches were tight-fitting, and linen gaiters were buttoned on and held up by a superfluous number of garters.

In some regiments, the wearing of the moustache was required, and those soldiers whom nature had not supplied with such an ornament were obliged to put on a false one, fastened with pitch. Sometimes a fine uniform color was produced in the moustaches of a whole regiment by means of shoe-blackening.

However—and here again is the point of the story—the condition of the common soldiers of France was no worse than that of the common people of France. The army but reflected the life about it. The men were certainly not entirely satisfied, but as long as the people expressed no violent dissatisfaction, the soldiers were not likely to mutiny simply to raise their own standard of living.

Discipline in the French army had been good, but discipline in any army, or for that matter, in any body, civil or military, depends much less on regulations than on the men who exercise command. If officers are inefficient, there is no compulsion for soldiers to be otherwise. What upset discipline, what subverted the French army, was no more than what upset and subverted France.

Today, we would call them "dangerous thoughts." In the 18th Century of Rousseau and Voltaire, they were the

ideas of natural rights, of the brotherhood of man, of revolt against absolute monarchy. The "Intellectual Revolution" was sweeping Europe and, because most of its prophets were French, because the Bourbon monarchy was ripe for disaster, Frenchmen gave ear to the new doctrine. The soldiers in the army of Louis XVI listened too.

The officers helped in the destruction of discipline and loyalty. The larger group—the country gentry—looked upon the new ideas of reform as a means of achieving the downfall of the court nobles. They believed that, once their own ends were achieved, the court nobles reduced to their own level, it would be a simple matter to dominate the common people. Even the court nobles looked with tolerance upon the new learning, thus plainly labeling their heads for the basket of Madame Guillotine. At court it became fashionable to dabble in the new thought, to consider it the fad of the moment.

Thus the interest and credence of the enlisted men was made easy by the attitude of their officers. They attended meetings of the new political clubs springing up over France and in which they fraternized with many officers.

All of this culminated in a lowering of morale and discipline. Guibert became the object of satire and epigram. The younger officers conspired to spoil his maneuvers in 1788. The situation was particularly bad in Paris, where *La Garde Française* became infected with the spirit of revolt. And so, in the late spring of 1789, the army, the King, and the French people came face to face with the first rumblings of the Revolution. The field had been ploughed, the seeds sown, and now the crop was ripe for harvesting.

It was on the 8th of May, 1789, that Louis XVI gave orders for the suppression of the *Parlements*, those French supreme courts whose duty it was to register the royal laws and who, by now refusing to do so, had taken the lead in opposing the royal rule. Many court nobles felt that the new administrative reforms of the King were "unenlightened." The country gentry, and the populace, too, were in favor of the stand taken by the *Parlements*. The army, thus influenced, soon shared the feeling of antagonism to the government.

The King ordered troops to arrest the judges, but a mob formed and made ready to attack the soldiers. The officers, in sympathy with the mob, gave orders not to fire. A fresh regiment was brought in, but its officers resigned. The news spread, and similar incidents multiplied all over France.

Disaffection increased, discipline grew weaker and weaker. By July of 1789, the royal army was ready, not only to fail in its duty of putting down the revolt, but to aid in its success. Whole regiments refused to obey orders. Many members of *La Garde Française* took part in the attack on the Bastille, the fall of which was the signal for the collapse of the old order. As the Estates-General constituted itself the National Assembly, so committees of soldiers were formed to pass on orders issued.

Riots flamed in Paris, the mecca of all who were with

out homes, family ties, wealth or belongings. The failure of the grain crop caused an influx to the cities of poor people who hoped to take advantage of the charities there. In Paris, they became willing disciples of agitators who fomented unrest.

With native troops in Paris believed untrustworthy, the mercenary regiments were ordered concentrated nearby. But they were withdrawn when their presence seemed to inflame the people even more. In this emergency, the old feudal structure of the city collapsed entirely. The property owners of Paris met and took steps to form a bourgeois police force, a civic guard of 48,000 men. This was the beginning of what was to be called the National Guards. Today, in the modern parlance of revolution, we would call it the black-shirt, or the brown-shirt army. It was the army of the people as opposed to the regular army of the old regime.

The next few months saw the organization of National Guards in every town and parish of France. This should have been warning enough to the government. Two military forces cannot exist in one state. One or the other will dominate, either as a result of civil strife or through a process of absorption. The National Assembly approved and sanctioned these organizations.

In February, 1790, the fundamental decree of the new military constitution laid down that every citizen was admissible to every rank. Hereditary nobility itself was soon abolished. These measures opened the eyes of the officers to what was taking place. Here was an end to monopoly of officer rank by the nobles. This healed the breach between the country gentry and the court nobles. Both now realized the seriousness of their positions.

By June, 1790, no less than two and a half million National Guards had been enrolled, and on the 14th of July, 1790, the first anniversary of the fall of the Bastille, the "National Federation" was celebrated at Paris.

On the first of January, 1791, new regulations were issued for the army. The old, traditional names of the regiments were exchanged for serial numbers. All useless and ornamental commissions were taken away. The number of general officers was reduced to 34!

The Constitution of 1791 took away the officers' last means of enforcing discipline by introducing into military courts juries composed of privates and noncommissioned officers. The handwriting was now on the walls in letters too clear to misunderstand. If the officers could not read it, there were those who would read it to them. Yet, the officers remained loyal to Louis XVI. They now hoped the Revolution could be stopped by instituting a constitutional monarchy.

And then, on the 21st of June, came the bombshell of the ill-advised flight of the King, his capture at Varennes and return to Paris. From this moment, the position of the officers of the old army became intolerable; humiliations were their daily lot; suspicion and danger hung over their heads. They had hitherto stood fast at their posts because they believed in the King. Now they saw that the mainspring of the monarchy had slipped; the King

himself desired to leave France. Now, it was clear to them that their only hope of salvation lay across the border. They began to emigrate, joining the army which the princes of Europe were forming on the frontier of France to come to the aid of the French monarchy.

By the end of 1792, the officers of the old army were, to use a modern expression, pretty well "liquidated." Most of those who remained were soldiers of fortune or men who had risen from the ranks. What few officers of noble parentage who stayed on, like Davout, Dessaix and Bonaparte, either through love of country or hopes of promotion, were exposed to many hardships. Any who indicated sentiments inconsistent with equality and liberty were suspended. The execution of the King, the treason of Dumouriez, the revolt in La Vendée, raised to the highest pitch the violence of the passions directed against all former nobles. Some idea of the temper of the times may be found from the information that 593 generals were made and broken during the first half of 1793.

Yet, somehow, a few of the old officers carried on, and with the fall of Robespierre in July of 1794, the tension was lifted.

With the elimination of the noble officers as a problem, other difficulties arose to plague the legislative body, now the National Convention. The fundamental problem was the same which confronted the nationalist leaders of Germany and Italy in recent years, the amalgamation of the new volunteer army—the people's army—with the remnants of the once basically well-trained army of the old regime. In addition, replacements had to be found for the officers who had deserted, an adequate supply of trained man power had to be provided to meet the wastage of war, and finally, discipline had to be established in the National Guards and reestablished in the old army.

The wholesale emigration of the officers, had, by its very danger, brought about its own cure. It compelled the government to enforce, and the army to accept, the principle of selection and promotion by merit. The obtaining of adequate manpower was of course bound up with the problem of amalgamation. The National Guards were mustered into active service, being at first kept separate from the old army, but both were put on the march towards the frontier. Due mostly to the ineptitude of her opponents, France somehow won the victories of Valmy and Jemappes, but due to the liberal volunteer rules which allowed National Guardsmen to return to their homes after campaigns, (all of which were by law ended on the first of December) the volunteer commands were soon decimated.

In 1793, Carnot, the "Organizer of Victory," made his appearance on the scene and called for new levies. This time a rough fusion was attempted between the Volunteers and the old army. Differences in pay were abolished. The Bourbon white was abandoned for the new blue *sans-culottes* and jackets of the Republic. In August, 1793, the Convention decreed the "*Levy en Masse*," placing all Frenchmen in permanent requisition for conscription. A

few months later the final amalgamation was completed and France had a Republican army of over 750,000.

Carnot supplies the final necessary link between Frederick and Napoleon, between the theories of Guibert and the practical leadership of the French Emperor. His instructions to his generals insist on the offensive, on the use of force at certain points, on swift marching to decisive victories. It was he who gathered up the ideas developed by the old army before the Revolution and presented them to the greatest general of the era.

The system of promotion by merit had the advantage of carrying with it the responsibility for discipline. The Convention sent out deputies who, to enforce its orders, set up the guillotine in every camp and cashiered men from privates to generals who showed the slightest tendency towards treason. By the end of 1793, discipline and obedience were beginning to be established.

Just as the French nation in 1795 seemed imbued with a new spirit, so the new amalgamated army of France

truly reflected the same attitude. The old royal standing army had fought for limited things in a limited manner. It had attempted no fundamental changes in society, it had fostered no struggle of ideas, it had been conducted on behalf of known and limited interests for known and highly limited objectives. It had, however, maintained a high measure of technical skill in the art of war. Its drill and its weapons were sound.

The new army of France retained, thanks to Carnot, the military fitness of the old order. The ideas of Guibert, Du Teil and Gribeauval lived on in the new levies of the Republic. But in addition, the Revolution had added that integrating spirit, that fire to conquer, which the white cockade of the Bourbons had never known. When this army came under the leadership of a young general inspired with its own spirit and drilled in its own formations, crowns were to fall all over Europe and a new principle in military annals, that of "the nation in arms" was to be recorded for future generations.



Left: Latest type British sound locator. Note the three-horn arrangement. Right: Latest type British director.

ANTIAIRCRAFT COMMUNICATIONS

By Captain L. W. Bartlett, C. A. C.

IN SEACOAST artillery, *fire direction* may be performed by group and groupment commanders. In anti-aircraft artillery the large area over which a battalion and regiment will be dispersed, the high speed of the target and the fleeting time during which the target can be engaged make the performance of fire direction by commanders above the gun battery, the machine-gun platoon and the searchlight platoon absolutely impossible. In fact, the gun battery commander must give up one of the most important functions of command, that of fire direction of his battery, when he leaves the vicinity of his director.

Telephone lines are not used for command purposes except to a very limited extent. The telephone is much too slow; the gun battery commander assigns targets by means of a siren and a pointing arm. The machine-gun platoon commander seizes a machine gun and points with tracers. The searchlight platoon commander may use his telephone net to concentrate his searchlights on a single target, to disperse them when additional targets are in his sector or to direct his outer lights to search for new targets while the inner lights are carrying the leading target. The last case is the only one in anti-aircraft artillery where telephone lines are used for command purposes. The above facts lead us to the conclusion that *the primary purpose of anti-aircraft artillery communications is for the transmission of intelligence*. During slack periods telephone lines may be used for miscellaneous purposes but such conversations have no priority and should be interrupted whenever an intelligence message arrives.

An important characteristic of mobile anti-aircraft artillery is *mobility*. An examination of the new tables of allowances shows the following amounts of field wire issued to the anti-aircraft artillery regiment:

Wire, W-110 (on DR-4 spools) (miles)

Regt Hq	22
Bn Hq (2)	44
SL Btry	47
Gun Btry (3)	51
MG Btry (4)	68

Total 232 miles

Weight on DR-5 spools 36,424 pounds
or 16.26 tons

Cost on DR-5 spools \$8,207.23

This table is included here to show how a field wire system may limit mobility. In any major war, as in the last, we may expect an acute shortage of field wire. Therefore we cannot abandon our wire when moving to a new

position. Picking up from two to three hundred miles of field wire will slow down movement considerably. *We should lay no more field wire than absolutely necessary.*

As stated above, the primary purpose of anti-aircraft artillery communications is for the transmission of intelligence. We should then design the field wire system to facilitate the transmission of intelligence. It is particularly important that the information reach the individual who is to use it and reach him in the minimum of time. During daylight hours the person who is to use the information is the commander of the gun battery nearest to the target, others will find out all they have to know when he fires his first shot. At night the information will be used by the section leader of the searchlight nearest the target, others will see the searchlight beam and be on the alert.

Anti-aircraft artillery intelligence may be divided into two classes; that originating outside the regiment and that originating within the regiment. Intelligence originating outside the regiment will normally be furnished by the aircraft warning service to the regimental message center. The wire system should permit quick delivery of the information to the gun battery or searchlight platoon whose sector covers the direction of approach of the enemy. Information originating within the regiment normally comes from the advanced observation posts which are located from five to eight miles beyond the outer ring of searchlights. The wire system should lead this information to the nearest searchlight, then to the searchlight platoon and then to the nearest gun battery. If time permits, the information may then go to other units but as stated before, others will know about it anyway when the first beam appears in the sky or the first shot is fired.

Many ingenious switch devices have been designed to parallel a large number (in some cases, all) of the telephone lines of a regiment so that flash messages can be broadcasted throughout the unit. Such devices are a mistake because they make it less sure that the message will get to the person who uses it. A field telephone can generate only a limited amount of electrical energy. If this limited amount of energy is divided among several telephones some of them will not receive enough to make speech understandable. This may operate to prevent the message ever reaching the person who is to use it or, by making repeats necessary, delay the message until it is worthless.

Many systems paralleling telephones for transmission of flash messages have actually worked but only because of the small units available in peacetime. As far as the

Get the information to the man who uses it

writer knows, no full strength antiaircraft regiment has ever been assembled. The regular army antiaircraft "regiment" in the Second Army maneuvers consisted of a headquarters battery, one gun battery with three guns, a searchlight "battery" with four searchlights and one machine-gun battery of two platoons. It is obvious that conclusions reached by the employment of a "regiment" of this size may be erroneous.

A flash message should be as brief as possible. One originating within the regiment should consist of from one to three words such as "BOMBERS!" or, if the location cannot be inferred from the telephone line over which the message comes, words such as "BOMBERS STONY POINT!" should be used. Such a message can be relayed by telephone and switchboard operators without the time-wasting formality of recording. The words "FLASH! FLASH! FLASH!" are unnecessary and time-wasting. A message originating outside the regiment should contain more detailed information. Such messages are in the nature of general warnings serving to alert the command rather than messages requiring immediate action.

Message centers are highly overrated. The message center should not be confused with the information center of the aircraft warning service, but it does have the important function of evaluating and disseminating intelligence originating outside the regiment. Its function with regard to intelligence originating within the regiment is merely to record the messages. Any information originating within the regiment which has to pass through the message center to get to a firing unit will arrive too late to be of any value. Since its primary function is intelligence, the regimental S-2 should be placed in charge of the message center. This will make it possible for the communication officer properly to supervise the technical operation and maintenance of his far-flung wire system. The message center is then:

- (1) The location of the regimental switchboard.
- (2) A place from which the wire chief can supervise the wire net.
- (3) An office of record for intelligence messages.
- (4) A place for the cipher clerk to work.
- (5) The station of regimental S-2.
- (6) A place where messengers and telephone trouble shooters are held in readiness.

A battalion message center, unless the battalion is detached from the regiment, is merely the battalion switchboard, a place from which the wire chief can supervise the wire net and a place where messengers and telephone trouble shooters are held in readiness.

The field wire lines that normally will be installed in a permanent or semipermanent position are:

- (1) Installed by the regiment—lines from the regimental switchboard to each battalion, the radio station and the command post.
- (2) Installed by the first battalion—lines to each gun battery.
- (3) Installed by the gun battery—a line to the search-

light platoon CP, which should be at the nearest light, and lines to each flank spotting station.

(4) Installed by the searchlight platoon—a line to each searchlight and a line from each advanced observation post in the platoon sector to the nearest searchlight in the outer ring.

The second battalion wire net will consist of lines from the battalion to each battery and lines from each battery to its platoons. Since the battery usually covers a comparatively small area, the line connecting a battery with its platoons may be a party line. This wire system serves to deliver intelligence originating outside the regiment to units of the battalion. Batteries or platoons establish observation posts outside the outer platoons to give quick warning of the approach of low-flying planes. Each observation post should be connected by wire to the nearest platoon. In some cases it may be desirable to connect isolated batteries or platoons to the nearest element of the first battalion to facilitate the reception of intelligence and save wire.

The unit which has the biggest wire-laying task is the searchlight platoon. The platoon has fifteen miles of wire for its own use plus from fifteen to twenty-four miles additional for advanced observation posts (see note 3). It has five reel units RL-31 for laying wire from trucks. Its communication detail consists of a corporal, three switchboard operators, a truck driver and four linemen. When a platoon moves into a new permanent or semipermanent position where a complete wire net is to be established it follows a procedure similar to the following. Assume that all lights come in convoy to the location of the platoon command post. Here one of the lights falls out and goes into position. The communications corporal and the three switchboard operators unload the switchboard and set it up. Each of the other four sections has a lineman, from three to four miles of field wire and a reel unit RL-31 mounted on the tail gate of the truck carrying the portable power plant. The searchlight truck, towing the sound locator, goes ahead to the light position. The truck carrying the power plant follows, laying wire from the platoon command post to the searchlight position. In the meantime the cargo truck assigned to the communication detail has delivered the additional wire for advanced observation posts to the positions of the three searchlights in the outer ring. Upon the arrival of the power plant truck at the position of a searchlight in the outer ring the power plant is unloaded and the truck proceeds to lay wire to the advanced observation post. Thus by division of duties among the different searchlight sections, the entire wire net may be laid in a minimum length of time.

Let us see how the system above outlined would work in practice. A flight of bombers is observed and reported by the aircraft warning service some 75 to 125 miles from the objective. Warning of the approach of the enemy bombers is transmitted to the regimental message center by the information center of the aircraft warning service about 15 or 20 minutes before their arrival over the outer limits of the regimental area. The message center im-

mediately transmits a warning to the gun battalion, where it is relayed first to the gun battery whose sector covers the direction of approach of the enemy and then to the other gun batteries. The gun battery immediately relays the message to the searchlight platoon where it is relayed to each searchlight and by the outer ring of lights to the advanced observation posts. This message serves to alert the command and get the men out of bivouac to their posts. When the enemy planes are spotted by one of the advanced observation posts the message "BOMBERS," goes to the nearest searchlight in the outer ring. The sound locator searches in the vicinity of that observation post and the message "BOMBERS!" goes to the platoon CP. The platoon switchboard operator sends "BOMBERS STONY POINT!" to the adjacent searchlights and to the gun battery. Everyone who really needs the information now has it. The gun battery switchboard operator then relays the message to the gun battalion where it is relayed to the other gun batteries and the message center.

During daylight hours the searchlights are withdrawn to concealed locations. The platoon switchboard must be manned and observers left at the positions of the searchlights in the outer ring to relay messages from the advanced observation posts and to form an inner ring of observation posts. The message originating at the advanced observation post is handled the same as at night

except that the platoon switchboard operator relays the message to the gun battery only and not to the positions of the adjacent lights.

In case the bombers approach down the boundary line between sectors they will normally be observed by advanced observation posts on both sides of the line and simultaneous messages will flow inward to the two gun batteries concerned.

Note that there is no evaluation of intelligence originating within the regiment by any intermediate agency. The searchlight section leader and the gun battery commander must evaluate the information at their disposal and decide instantly whether or not to put a light into action and whether or not to open fire. Messages requiring immediate action cannot be delayed by evaluation by any intermediate agency without destroying their usefulness.

In summary, the following important rules should be followed in planning, establishing and operating wire communications for antiaircraft artillery:

- (1) The primary purpose of antiaircraft artillery communications is for the transmission of intelligence.
- (2) There should be no duplication of wire lines, one line for command and the other for intelligence.
- (3) Get intelligence quickly and surely to the man who is to use it.
- (4) Lay no more field wire than absolutely necessary.



65th Coast Artillery Reconstituted

The 65th Coast Artillery (AA) has been reconstituted as an active regiment with station at Fort Winfield Scott, California. Secretary of War Woodring announces that the 65th will be a full-strength antiaircraft organization. Action is now under way to provide the regiment with the necessary personnel and equipment.

This action marks a long step forward toward the hoped for goal of providing San Francisco with proper aerial defenses.

United States Coast Artillery Association



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 cooperation among all arms, branches and components of the Regular Army, National Guard, Organized Reserves, and Reserve Officers' Training Corps.

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COAST ARTILLERY JOURNAL

MAJOR AARON BRADSHAW, JR., *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 the Chief of Coast Artillery or any other 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.

Improvement in Morale

Secretary Woodring's action in recommending legislation to abolish the General Staff Eligible List is most gratifying. Its heartening effect on officer morale will be far reaching. This well advised action is probably as important as any recent decision of the War Department in its efforts to maintain officer morale at a high level. Secretary Woodring deserves the thanks of all officers, especially of those who have been discouraged by the requirements of the existing law.

As Mr. Woodring pointed out to the Congress, the notation of such eligibility in the Army Register has resulted in undue emphasis being attached to textbook general staff qualifications. This standard for General Staff assignment is illogical and has produced an effect other than that intended.

Major General George A. Lynch, Chief of Infantry, and Brigadier General Lorenzo D. Gasser, Assistant Chief of Staff G-1, testified in support of the bill prior to its passage by the Senate. General Gasser pointed out that the present arrangement has led to the belief that a general staff assignment is far more important than a command assignment. Furthermore, he said that the War Department is aware that morale has suffered by the operation of the present law and that many officers feel themselves stigmatized by the omission of their names from the Eligible List. In point of fact, omission from the list does not indicate lack of ability but is the result of circumstances over which the officer has no control.

General Lynch feels that many officers, regardless of how capable they may be, would be barred from important assignments for the remainder of their service under the law as it now reads. He said that the maintenance of the eligible list humiliates a large number of deserving officers, restricts the War Department when it selects officers for certain important assignments, and contributes nothing to efficiency.

Staff duty is important and that importance should not be minimized. However, a soldier's ultimate usefulness is the successful command of troops in battle. Therefore all peacetime assignments and training should have as their final objective adequate preparation for such duty.

The passage of this act will give a new lease on life to many well informed and capable officers who, through no fault of their own, have been denied the privilege of attendance at Leavenworth. It is unfortunate that the requirement has had so much weight in the past. Work well done should be the future guiding factors in selections for important assignments.

There can be no question that this combined action of an able Secretary of War and an understanding War Department will prove a powerful stimulus to morale. For the action shows that high quarters realize that scholastic achievement should not be the exclusive criterion when weighing a man's fitness for an important job.

News and Comment

Newcomers to the 100 Percenters

With this issue of the JOURNAL we welcome two acquisitions to the small but growing number of regiments that subscribe one hundred per cent to their Corps' magazine. The additional organizations that now subscribe lock-stock-and-barrel are the 60th Coast Artillery (AA) and the 64th Coast Artillery (AA). The 60th Coast Artillery is stationed at Fort Mills, Philippine Islands and is commanded by Colonel James H. Cunningham, long a stout booster for the Coast Artillery Association. The 64th Coast Artillery holds forth at Fort Shafter, Hawaii, and is under the command of Colonel Ralph N. Mitchell, another consistent supporter of the Association.

The two Regular regiments that have joined the ranks are in excellent company. They follow closely on the heels of three National Guard units that have been signed up one hundred per cent for some time. These National Guard regiments are the 202d Coast Artillery (AA), Illinois; 243d Coast Artillery (HD), Rhode Island; and the 250th Coast Artillery (TD), California. At the moment, our ambition is to bring a Reserve regiment into the select company of the one hundred percenters. When this ambition is achieved we shall have gone a long way toward strengthening the bond that holds the three components together.

However, the five regiments that are now lined up behind us can well be joined by many of the others who are not in one hundred per cent company. If each issue of your magazine announced two new acquisitions to the one hundred per cent class, the editor's circulation troubles would soon vanish.

You can help to bring us to this desired state of perfection. All you have to do is to ask your fellow Coast Artilleryman whether or not he subscribes. If he does, he reads a good magazine; if he doesn't, you can sign him up.

The "sign 'em up" clause is particularly applicable at this time of the year, for we are moving into the summer camp period of the year. During the summer months, officers of all components will gather at summer camps the length and breadth of the country. Odd as it may seem to you, a good many of them have never heard of the JOURNAL, and need but to be shown a copy of the current issue in order to get their names on the dotted line.

If you want to help let us know about it. To every volunteer subscriber will go sample copies of the JOURNAL and a supply of subscription cards. The officers on duty with civilian components are in a particularly lucrative field, a field that has scarcely been touched.

Moreover, you are doing more than merely boost membership in the Coast Artillery Association. You are

making it possible for your fellow officer to stay in touch with the best of current military thought. He will thank you for it.

* * *

Statement of General Craig before the Military Affairs Sub-committee of the House of Representatives Appropriation Committee

SEACOAST DEFENSE

A program for the augmentation of seacoast installations for the defense of the Pacific coast, Hawaii, and the Panama Canal was inaugurated by the Congress in 1937 and continued by appropriations for the current year. Its completion will require subsequent appropriations of about \$25,000,000. Of this total approximately \$10,000,000 is for antiaircraft armament and equipment which is included in the antiaircraft program previously referred to.

ANTIAIRCRAFT EQUIPMENT

When I appeared before your committee last year I stated that our most urgent need in ground equipment is antiaircraft armament and equipment. I wish again to stress that fact. It is anticipated that, in an emergency, the demand for antiaircraft artillery for defense against hostile aviation will be immediate and enormous. Our present stocks of antiaircraft artillery are entirely inadequate to meet the most urgent demands for the protection of vital objectives on or adjacent to our coasts. The manufacture of this material in the quantity needed requires many months, extending into years. In consequence its procurement can not be delayed until an emergency arises. Thorough studies have been made of the additional antiaircraft equipment and ammunition that should be available upon the outbreak of war for a defense of the continental United States and the overseas possessions.

* * *

Television Shows Air Raid

The following article from the Manchester *Guardian* of April 19, 1938, is of interest because it describes one of the progressive means now being utilized to further the rapid development of the antiaircraft defense of London. The present plans for the defense of London include 23,000 enlisted men. It is reliably reported that when the British Government's new schemes are announced, probably within the next few days, an additional 23,000 men will be needed.

ANTI-AIRCRAFT WARFARE

As Seen by Television

For forty minutes last night viewers had a demonstration of anti-aircraft warfare. The display was given

by the Territorial Army's First Anti-Aircraft Division and the R.A.F. co-operated in producing an air attack on Alexandra Palace.

Trawlers at sea sounded the first notes of warning. Patrol 'planes told of the gradual approach of enemy bombers to their objective. Spotters of the Anti-Aircraft Brigade took up the work of vigilance. One of the latest anti-aircraft guns, which can be rushed to any spot of attack and dismounted from its carriage in four and a half to seven and a half minutes, was ready for action. Its accompanying searchlight, with a penetration of three and a half miles, swung around as the sound locator indicated the positions of the attacking bombers.

The predictor, the "brains" of the gun, revealed not only the position of the 'planes but the fuse which must be used so that the shells from the anti-aircraft gun might work their greatest havoc against the invaders. At last the sweep of the searchlight revealed the 'planes almost overhead.

There followed the crash of the anti-aircraft gun, which fires twelve rounds per minute, the rat-a-tat of the Lewis gun (which protects the twelve men forming the crew of the ten-ton unit from low-flying aircraft), the shriek of the shells, and behind all the incessant drone of the bombing 'planes as they zig-zagged to escape the eye of the searchlight. Then a fresh note, as a fighter 'plane came into action, soaring and swooping upon a bomber.

The entire demonstration came over on the screen with scarcely a hitch.

* * *

Antiaircraft Defense

In the January, 1938, *Journal of the Royal Artillery*, Major J. A. L. Deane, R. A. gives a comprehensive discussion of the rôle, organization and training of antiaircraft groups with a view to their employment to the best advantage in forward areas and bases overseas. He believes that the offensive power of the air arm is still far ahead of ground and air defense and that the menace must, and will be met, but that there is still an urgent need now for practical ideas.

As Major Deane sees it, one of the fundamental difficulties in bringing defensive measures to a par with aviation offensive measures is the attempt to combine two functions in one type of equipment. He contends that one set of equipment for fixed defenses and another set for mobile defense units should be provided. The failure to have a line of demarcation between these two essential types of equipment has resulted in confusion of thought, which has brought AA artillery into most of the difficulties it faces today. Therefore he strongly advocates two separate and distinct types of equipment and avers that not until they are provided will any real progress be made.

He holds that a full scale of permanent AA defenses will have to be established. Base ports call for AA artillery armed with powerful guns of a low degree of mobility and provided only with the minimum transport for administrative and communication purposes. Since the guns

will not be required to move, provision should be made for the protection of personnel and ammunition. Major Deane contends that the necessity for mobile AA ground units arises the moment the base port is left behind. But, he thinks that doubtless many points in the line of communication area may, in time, and in certain circumstances, attain such stability that fixed defenses may become desirable, although in initial stages mobile equipment will be essential.

As a basic principle, all bodies of ground troops should be responsible for their own defense against dive-bombing and low-flying aircraft and these units should be equipped with light machine guns on AA mounts, in addition to their rifles. Also, that defense against low-flying aircraft should be supplemented by machine-gun batteries equipped with large-caliber guns—possibly a twin-gun, mounted on a truck or on a caterpillar-track vehicle.

He suggests that the forward area antiaircraft machine gun might be placed in lightly armored tanks with twin guns in an overhead turret. These weapons should be highly mobile, easily transportable over any reasonable ground, and protected against long-range rifle fire, bomb splinters and the like.

For protection on the march he advocates AA guns, and machine guns in position along the route. He is especially impressed with the power of large-caliber machine guns for use against low-flying aircraft and dive-bombing. He believes that light machine guns mounted on moving vehicles are of small value and that greater results will come from the fire of rifle squads where these squads are placed in position on the ground.

In conclusion, he strongly advocates the simplification of fire control methods especially those pertaining to mobile artillery units. He believes that we might achieve results more in keeping with every day reality by abandoning many of our present mathematical concepts and concentrating instead on the development of simpler machines and methods.

* * *

1938 Practices, 4th Coast Artillery

By Major T. J. deCamp

When, on February 23, 1938, the 4th Coast Artillery completed the last primary AA gun practice for the year, it was realized that some sort of a Panama Department record had been made. Here are a few items of interest in connection with the practices.

We show a tabulation of antiaircraft gun firings for the year 1938, as proof of where we are heading. Note that we include the firings completed February 23rd, which shows that the armament functioned when called upon. There was only one delay chargeable to matériel, and two postponements on account of clouds. The battery commanders fired on courses as the plane came in, and on the day set weeks ahead. All practices were marked by the quiet, efficient conduct of personnel. Each succeeding battery commander profited by the experience of the or-

ganization firing ahead of him and fired at an increased altitude. The whole culminated in the practices of Battery "A" when all caution was thrown to the winds and the towing plane was told that the sky was the limit.

So herewith is the table and herewith too is Panama—1938 model (Pacific Sector)—

Battery		Average Slant Range	Average Altitude	Score
Battery "A"	Day	6,985	4,901	183.1
	Night ..	6,496	4,997	190.8
	Day	7,101	4,999	164.1
Battery "B"	Day	6,771	4,423	195.2
	Night ..	7,413	4,213	174.9
	Day	6,606	4,112	80.1
Battery "F"	Day	6,528	3,412	81.2
	Day	6,257	4,160	142.8
	Night ..	5,335	3,912	104.4

Secret Guns Guard London

The following item recently appeared in the London *Daily Express*. Although the author may appear somewhat overenthusiastic, he is in all probability not in error when he mentions the scores made. The logical restrictions on the publication of our AA potentialities precludes matching his story with a tale of our own prowess.

* * *

"Round Britain's south-east and east coasts is slowly being built an anti-aircraft defence network that will be so deadly when completed as to make an attack by enemy bombers a hazardous win-or-lose-all gamble.

"Backbone of the plan, I am authoritatively informed, will be hundreds of guns of various sizes, of which the new wonder 3.7 inch mobile unit will be most numerous. This gun (unfortunately not yet available in any quantity to the Territorial Army, which will man the whole defence) is the most efficient one of its type in the world.

"Note this comparison:

"In Spain the greatest danger to Government warplanes is the German-manned German-made anti-aircraft gun. Trustworthy observers in insurgent Spain report that it actually scores one hit in every twenty-seven rounds fired.

"Guns of early 1915 had to fire 17,000 rounds to bring down a plane; by 1918 it was reduced to 4,000.

"20 SHOTS, ONE HIT

"Tests recently in Territorial Army camps at Weybourne (Norfolk) and Watchet (near Minehead) have shown that other types of British guns average one hit in every twenty rounds—reducing wastage to seven rounds fewer than the German gun with, of course, higher accuracy.

"Also the British 3.7 inch gun is more powerful with a very high muzzle velocity (speed at which shell leaves gun).

"Supporting the 3.7 will be an even more powerful weapon of 4.5 inch calibre. It is of the same general de-

scription as the 3.7 gun which can be taken off its wheels and prepared for action by a good crew in seven minutes."

1 1 1

American Military History Foundation

We have before us No. 1, Volume II, of the *Journal of the American Military History Foundation*. This little quarterly, young in years but far reaching in purpose, in a short twelve months has demonstrated that it has a real purpose in life. Moreover, it bids fair to enlarge its scope and usefulness, if the past numbers set any standard for the future.

The *Journal* is one of the results of a meeting held some five years ago in Washington when a group of officers decided that it was high time that American military history was represented by an organization. From that meeting grew the American Military History Foundation, and it in turn fathered the *Journal*. The Foundation's purpose is to stimulate the study of all that pertains to war with especial emphasis on the American scene.

It goes without saying that a land as rich in war history as is ours, needed the services of a corps of technical historians, trained not only in the methodology of their craft but also possessing some military background. The Foundation's workers fill the bill and the fruits of their labors appear quarterly in their *Journal*.

To give you an idea of the *Journal's* normal bill-of-fare we touch briefly on two articles in the current issue. The first tells the story of the Battle of the Crater—one of the most dramatic events of the Civil War. If your Civil War history is rusty, this article will burnish it a bit with its tale of the large-scale mine explosion under the Confederate earthworks at Petersburg in 1864.

The second noteworthy article in the current *Journal* is a short sketch of the life of a man who left his impress on the United States Army's administrative procedure—the sometime Adjutant General and stormy petrel Major General Fred C. Ainsworth. Students of military administration will find much of interest in the Ainsworth career. The soldier who is not interested in administration should, however, find something to marvel at in the life story of a man who came to the Army to find it more or less innocent of a record system and left it a legacy of several million meticulously filed index cards.

The readers of the COAST ARTILLERY JOURNAL have some foreknowledge of the new editor of the *Journal of the American Military History Foundation*. He is Doctor H. A. DeWeerd, Professor of History, Denison University, and a steady contributor to the JOURNAL. The scintillating sketch of the life of von Hindenburg (which appeared in our March-April number) will give you some slight idea of his qualifications for the job of editor of the only U. S. publication devoted to purely military history.

All in all, the *Journal* of the Foundation is worth the \$3.00 it asks for membership. You can cooperate by joining the Foundation. Send your application (a letter will do the trick) and check to Captain Frederick P. Todd, Secretary, Box 382, Benjamin Franklin Station, Washington, D. C.

Coast Artillery Activities

OFFICE OF CHIEF OF COAST ARTILLERY

Chief of Coast Artillery
MAJOR GENERAL A. H. SUNDERLAND

Executive
COLONEL JOSEPH A. GREEN

Personnel Section
MAJOR CLARE H. ARMSTRONG

Matériel and Finance Section
MAJOR C. W. BUNDY
MAJOR H. B. HOLMES, JR.
MAJOR S. L. MCCROSKEY

Organization and Training Section
COLONEL HORACE F. SPURGIN
MAJOR AARON BRADSHAW, JR.
MAJOR W. H. WARREN

Plans and Projects Section
LIEUTENANT COLONEL JOHN L. HOMER

Notes from the Chief's Office

1. *Small-arms training and ammunition allowances.*—A memorandum issued by the War Department dated March 1, 1938, is a compilation of the changes to date in A.R. 775-10, "Qualification in Arms and Ammunition Training Allowances." The following paragraphs pertain to small-arms firing by Coast Artillery organizations: 20, 22, 32, 40, 41, and 43. The pertinent Field Manuals that apply are:

Basic Field Manual, Volume III, Basic Weapons, Part Six, Chapter 2. The revision of this manual was distributed in April, 1938.

Basic Field Manual, Volume III, Basic Weapons, Part One, Chapter 1.

It is hoped that every effort will be made by all organizations to conduct all the authorized small-arms training during the calendar year 1938.

* * *

2. *Charts and tapes.*—Coast Artillery ROTC instructors, when submitting requests to the President, Coast Artillery Board for charts or tapes, authorized under Table IV-G, paragraph 28, AR 145-20, "Reserve Officers' Training Corps, Supply and Equipment," should state the caliber and model of gun or mortar, including sub-caliber gun, and the weight of projectile and type of charge to which the articles requested apply.

* * *

3. *Antiaircraft target practices.*—Tentative plans contemplate the assembling of all Regular Army antiaircraft units in the United States, except the 63d Coast Artillery (AA) stationed at Fort MacArthur, California, at Fort Bragg, North Carolina, this fall for the purpose of con-

ducting annual target practice. The reservation at Fort Bragg, with its extensive firing range, presents, within certain limits, facilities for trying out tactical problems involving actual firing. Except for a limited amount of firing conducted by a battery of the 62d Coast Artillery (AA) in the fall of 1937, this will be the first antiaircraft firing ever held over land areas in the United States. It is believed that much valuable information involving both the technique of fire control and the tactical disposition of antiaircraft artillery will be gained.

* * *

Recent War Department orders announce the relief of Colonel Horace F. Spurgin from duty in the Office, Chief of Coast Artillery and his subsequent retirement. Colonel Spurgin's retirement is a real loss to the service and to the Organization and Training Section which he has headed since September, 1937.

Born at West Point, where he graduated in 1906, Colonel Spurgin later graduated from the Coast Artillery School, the Army War College, and the Command and General Staff School.

He has served a tour as senior Coast Artillery instructor at West Point and at Fort Leavenworth.

Colonel Spurgin was a sound artilleryman—results are what he wanted and what he succeeded in getting, without any frills. No better examples of his leadership can be cited than his organization and training of the first battalion of GPF's manned by Americans in the A.E.F., and his two-year tour of duty (1935-37) as commanding officer of the harbor defenses of Chesapeake Bay.

It is the sincere hope of his host of army friends—both

his contemporaries and the junior officers in whom he always took special interest—that he will not forsake us entirely, but will locate near an Army post and continue his interest in Coast Artillery.

The departure of two other capable officers whom it has been a pleasure to work and associate with is announced with regret. The fact that their relief is necessitated by their professional advancement is somewhat of a consolation. During the summer of 1938 this office loses Lieutenant Colonel John L. Homer and Major Charles W. Bundy.

Colonel Homer has been the plans and projects main-spring. Those familiar with similar work in the field know how valuable his services have been during the past two years. Since his graduation from the Military Acad-

emy in 1911 he has had a great variety of service, all in the Coast Artillery Corps. The experience he gained during his twenty-five years of service furnished the foundation for the excellent work he has done in his present assignment.

Major Bundy is completing four years of constructive work in a vital position. During his tour of duty he has exercised a great influence on Coast Artillery progress. The commendable manner in which he has performed his duties clearly shows that he has lost no opportunity to acquire professional knowledge during his service with the Corps.

The best wishes for continued success go to Colonel Homer in his year at the Army War College and to Major Bundy in his year at the Naval War College.

Fort Monroe

BRIGADIER GENERAL JOHN W. GULICK, U. S. Army, *Commanding*

COLONEL W. E. SHEDD, JR.

*Commanding Harbor Defenses of Chesapeake Bay
and 2d Coast Artillery (HD)*

COLONEL EUGENE B. WALKER

Commanding 51st Coast Artillery (TD)

LIEUTENANT COLONEL FREDERIC A. PRICE

Commanding 52d Coast Artillery (Ry)

By Lieutenant W. J. Worcester

PERSONNEL

The post is pleased to learn that Lieutenant Colonel W. R. Nichols, executive, Third Coast Artillery District and Lieutenant Colonel F. S. Clark, assistant commandant of the Coast Artillery School, have been promoted to colonels.

On March 28, General Gulick presented Staff Sergeant F. C. Lynch, Coast Artillery School Detachment with the Soldier's Medal at a regimental parade. Sergeant Lynch earned the decoration some months ago when, with utter disregard for his own safety, he plunged off the dock at Fort Monroe and rescued a sailor who had fallen overboard and become entangled with the propeller of the Norfolk ferry. Sergeant Lynch held the sailor afloat until the two men were pulled to safety.

Hundreds of civilians visited Fort Monroe on Army Day. Barracks were open for inspection while 155-mm. guns, machine guns, searchlights, mine equipment, railway guns, and field kitchens were displayed to the visitors. The 2d Coast Artillery Band played from 2:00 P.M. until 4:00 P.M. At 5:00 P.M. there was a regimental parade, followed by an exhibition searchlight drill.

Captain J. H. Rosseau, Jr., commanding officer of Battery "D," 52d Coast Artillery and Captain E. R. C. Ward, commanding officer of Battery "A," 2d Coast Artillery have arrived on the post. Captain Rosseau, however, leaves for the Philippine Department after but one month's duty here.

TROOPS

All batteries are engaged in preparation for the move

to Fort Story where they participate in the battle practice of the Coast Artillery School and remain to fire their individual record battery practices. On April 27, the instructors, students, and technical assistants from the Coast Artillery School go to Fort Story. On May 6 they will be followed by the 51st Coast Artillery and on May 12 by the 52d Coast Artillery. Colonel E. B. Walker will be camp commander and commanding officer of harbor defense troops. Antiaircraft guns, 75-mm. guns, 155-mm. guns, 8" guns, and 12" mortars will be fired. Terrain exercises, searchlight drills, camouflage demonstrations, convoys, selection and occupation of positions, communication problems, and chemical demonstrations will be included in the course of training at Fort Story. The Coast Artillery School personnel and harbor defense troops will return to Fort Monroe early in June.

ATHLETICS

Lieutenant Colonel Hartman and Lieutenants R. W. Moore and J. L. Reifsnider accompanied the Fort Monroe boxing team to the corps area boxing tournament at Fort Belvoir. The corps area championship was won by Fort Hoyle, Maryland.

Baseball is the main sport on the post at this time with tennis as a runner-up. Each battery has its own baseball team and is trying to win the Fort Monroe championship. At present, Battery "B," 51st Coast Artillery, Battery "D," 52d Coast Artillery, and the Coast Artillery School Detachment lead the field.

At a regimental parade on April 25, General Gulick presented cups to representatives of:

Battery "A," 51st C.A.—Winner of the Fort Monroe open boxing tournament.

Battery "B," 51st C.A.—Winner of the Fort Monroe novice boxing tournament.

Fort Monroe Bowling Team—Winner of the Fort Monroe-Langley Field bowling trophy.

Fort Monroe YMCA Bowling Team—Winner of the Army-Navy YMCA bowling trophy.



Staff Sergeant F. C. Lynch being decorated with the Soldier's Medal by General Gulick at a regimental parade at Fort Monroe.



Hawaiian Separate Coast Artillery Brigade

BRIGADIER GENERAL PHILIP B. PEYTON, *Commanding*

COLONEL ROBERT ARTHUR, *Chief of Staff*

MAJOR F. A. MACON, *Adjutant General & S-1*

CAPTAIN W. H. DUNHAM, *S-2 & Gunnery*

LIEUTENANT COLONEL W. D. FRAZER, *S-3*

LIEUTENANT COLONEL A. E. ROWLAND, *S-4 & War Plans*

CAPTAIN L. D. FLORY

Com. and Engineer Officer

CAPTAIN S. E. WHITESIDES, JR.

Chemical Warfare Officer

CAPTAIN W. H. KENDALL

Sec. Atb. Officer

LIEUTENANT W. A. CALL

Ordnance Officer

COLONEL H. C. MERRIAM

Commanding Harbor Defenses of Pearl Harbor

COLONEL RALPH M. MITCHELL

Commanding 64th Coast Artillery (AA)

COLONEL G. A. WILDRICK

Commanding Harbor Defenses of Honolulu

By Captain W. H. Dunham

ALL BUSY ON PACIFIC FRONT

On March 1st the brigade commander became Major General James A. Woodruff.

The hopes of the brigade that General Woodruff would retain his command were dispelled when Major General Andrew Moses sailed from Honolulu on March 16. For as General Moses departed, Major General Charles D. Herron took command of the Hawaiian Department and General Woodruff replaced General Herron as division commander at Schofield Barracks. This shift took General Woodruff from his lovely beach home at Fort De Russy to quarters at Schofield Barracks.

Coincident with the departure of General Woodruff, the Hawaiian Department maneuvers began and Brigadier General Clement A. Trott was assigned as commanding general of the Coast Artillery Brigade for the period of the maneuvers only. When the maneuvers ended on March 30th, General Trott returned to his infantry brigade at Schofield Barracks and Colonel Henry C. Merriam assumed command of the brigade.

Speculation as to whom would replace General Woodruff ended when War Department orders assigned Brigadier General Philip B. Peyton to command the Hawaiian Separate Coast Artillery Brigade.

General Peyton assumes a triple command, since he is to be south sector commander and department artillery officer as well as commanding general of the Hawaiian Separate Coast Artillery Brigade. He will renew acquaintances with a host of friends who have been rejoicing not only because of his good fortune in having been selected for such a fine post but also because the brigade is to be directed by such an outstanding officer.

TARGET PRACTICES COMPLETED

Several target practices were completed during the first two months of 1938. These scores were made:

SEACOAST

Organization	Score
D-55 (TD) 155-mm. guns	89.4
E-55 (TD) 155-mm. guns	124.7
F-55 (TD) 155-mm. guns	122.1

3-INCH AA GUNS

Organization

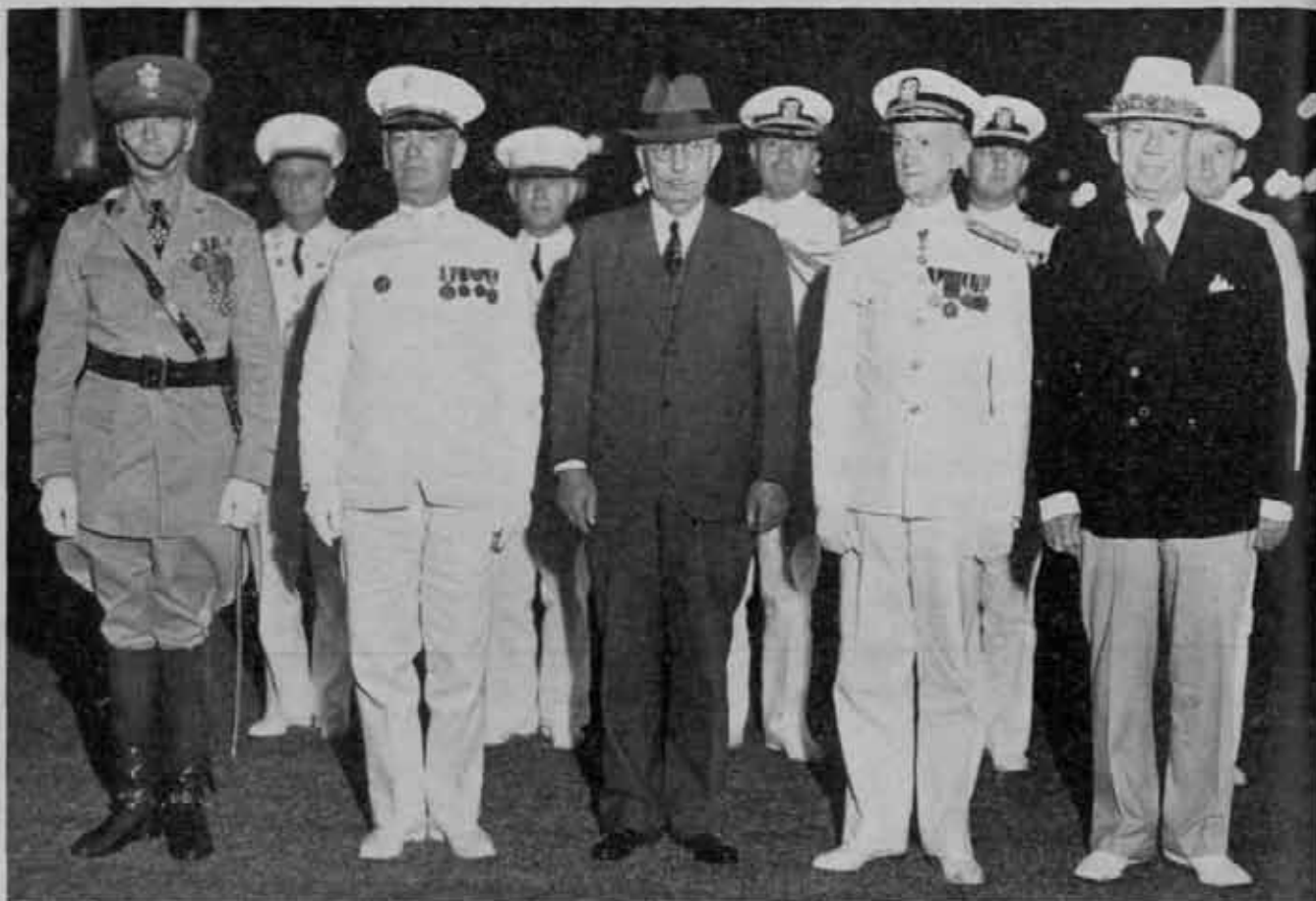
Organization	Score
A-15 (HD) (1917 guns)	136.6
B-15 (HD) (1917 guns)	104.9
C-15 (HD) (1917 guns)	116.4
A-41 (Ry) (1918 guns)	42.7
B-41 (Ry) (1918 guns)	92.4
A-55 (TD) (1918 guns)	49.1
B-55 (TD) (1918 guns)	71.8
C-55 (TD) (1918 guns)	68.1

AA MACHINE GUNS

Captain Fred Hayden took Battery I of the 64th Coast Artillery to Bellows Field again this year for antiaircraft machine-gun target practice. A total of fifteen practices were fired during February. Three of these were night practices without searchlight illumination. The scores were:



Colonel Ralph M. Mitchell, 64th Coast Artillery (AA) (right) points out the lines of attacking and defending troops during an infantry problem as Brigadier General Clement A. Trott (left) looks on.



REVIEWING PARTY AT BRIGADE SEARCHLIGHT REVIEW

Front row left to right: Major General James A. Woodruff, Major General Andrew Moses, Governor Joseph B. Poindexter, Rear Admiral Orin G. Murfin, Mayor Fred G. Wright of Honolulu, Rear row: Capt. C. M. Thirkeld, aide, Colonel T. D. Osborne, Chief of Staff, Hawaiian Department, Commander E. W. Tod, aide to the Governor of Hawaii, Lieutenant Commander John M. Reynolds, aide to Admiral Murfin, Lieutenant D. W. Bernier, aide to General Moses.

.50-caliber, all day firing

No. 1	84.3
No. 2	110.5
No. 3	117.3
No. 7	134.7
No. 8	124.4
No. 9	165.0
Average	122.7

.30-caliber, night

No. 4*	24.4
No. 5*	19.3
No. 6*	37.2

.30-caliber, day

No. 10	162.5
No. 11	128.3
No. 12	186.9
No. 13	229.0
No. 14	152.0
No. 15	179.4
Average	173.0

*Not counted for record of Battery.

ANOTHER BRIGADE SEARCHLIGHT REVIEW FOR GENERAL MOSES

Clad in slacks for the first time as a brigade the Coast Artillery turned out at 8:30 PM on March 10th to present a searchlight review to Major General Andrew Moses.

The spectacle of three regiments and the massed band lined up beneath the beams of 34 searchlights has never failed to stir the spectators.

General Moses addressed the troops before the march in review. He expressed his appreciation of the splendid support given him by the members of the brigade during his service as department commander.

With the reviewing officer were Joseph B. Poindexter, Governor of the Territory of Hawaii, Mayor Fred G. Wright of Honolulu, Admiral Orin G. Murfin, Commandant of the 14th Naval District and their personal staffs.

Major General James A. Woodruff commanded the troops during the review.

1938 MANEUVERS

The annual Hawaiian Department maneuvers for 1938 have been completed. Though the weather did its best to

dampen the ardor of the participants it was unable to make a penetration and its effect was only skin deep. From March 17 to March 30 the battle raged at one or more points on the Island of Oahu.

We had hoped to have a maneuver in which both Army and Navy would participate, but circumstances did not permit.

The Naval exercises resulted in one tragedy and one near tragedy. Fortunately the Army was able to lend a hand to lessen somewhat the effect of the distressing accidents.

On the night of March 28th a seaplane was forced to the surface of Kailua Bay and although the visibility was bad, the ship was picked up in the beam of a searchlight of the 16th Coast Artillery. The searchlight commander, Corporal Louis Ransom, continued to illuminate the plane and by moving his light beam guided a rescue boat to the scene. When the plane had been made fast to the boat Corporal Ransom used the searchlight to guide the boat through the rock infested area to deep water.

Just a little more than twenty-four hours later a Navy seaplane fell into the water off Makua Beach on the west coast of Oahu. Five of the crew of seven were lost. Members of the 41st Coast Artillery, warned of the crash, searched the beach and found one of the crew lying exhausted on the shore. He was sent to a nearby Army dispensary and before long had completely recovered from the shock. Another of the crew reached shore and was able to report the accident to the commanding officer of the fleet air base.

THE U. S. FLEET "OCCUPIES" OAHU

A large part of the United States Fleet steamed into Pearl Harbor on April 7th and 8th. The aircraft carriers *Saratoga*, *Lexington*, and *Ranger*, did not enter the harbor, but took up a position just off the shore of Waikiki Beach.

The usual courtesies were exchanged between naval commanders and both military and civilian officials on shore.

John Private met his brother Jim Seaman for the first time since they both enlisted at Podunk.

The hula girls at Waikiki did their part and each afternoon groups of the visitors gathered in the vicinity of various studios to witness their practically continuous performances.

The fleet sailed away in two detachments. The first left on April 18 and was followed by the second group on April 21st.

NEW OFFICERS IN THE BRIGADE

Captain Granger Anderson, 15th C.A., Fort Kamehameha.

Major W. J. Gilbert, 16th C.A., Fort Ruger.

Chaplain J. R. Wright (Lt. Col), Fort Ruger.
Lieutenant E. M. Lee, 15th C.A., Fort Kamehameha.
Lieutenant H. P. Persons, Jr., 55th C.A., Fort Ruger.
Lieutenant Benjamin M. Warfield, 16th C.A., Fort Ruger.

DEPARTING OFFICERS

Major Evans R. Crowell, 15th C.A., Fort Kamehameha.

Captain Clem O. Gunn, 55th C.A., Fort Kamehameha.

Captain Paul A. Harris, 15th C.A., Fort Kamehameha.

Captain William G. Holder, 16th C.A., Fort Ruger.

Captain Nathan A. McLamb, 64th C.A. (AA), Fort Shafter.

Lieutenant Theodore J. Dayharsh, 41st C.A., Fort Kamehameha.

Lieutenant Victor H. King, 16th C.A., Fort DeRussy.

Lieutenant Russell M. Nelson, 55th C.A., Fort Kamehameha.

Lieutenant Harry S. Tubbs, 16th C.A., Fort DeRussy.

HSCAB SPORTS

As predicted, the Luke Field Fliers ran away with the Sector-Navy basketball title for 1938 and Fort Kamehameha proved to be the best of the three units in the brigade by annexing third position in the final league standing. Fort Shafter was close on their heels in fourth place and the Green Wave basketeers from the harbor defenses of Honolulu wound up in sixth place.

The Luke Field Fliers journeyed to Schofield Barracks for the Hawaiian Department championship and defeated the 3d Engineers, Hawaiian Division representatives, in two out of three contests to win the department title.

At the end of the inter-post boxing competition, won by the AA men from Fort Shafter, the Sector boxing council selected the individual champions in the nine weight divisions as follows: Private R. W. Barr, Fort Shafter, bantamweight; Private First Class John Schneider, featherweight, Honolulu; Corporal J. C. Tobias, junior welterweight, Fort Shafter; Corporal W. J. Brinkley, lightweight, Honolulu; Private J. Dufala, junior welterweight, Fort Shafter; Corporal C. H. Maples, welterweight, Honolulu; Corporal G. E. Merrill, middleweight, Honolulu; Private First Class E. J. Rios, light heavyweight, Fort Kamehameha; Private M. F. Clark, heavyweight, Fort Shafter.

The Sector fighters did not fare so well at Schofield Barracks during the Hawaiian Department individual championships. The boxers from the inland post proved to be too powerful, winning every one of the scheduled nine bouts in all weight divisions.

At present, every post in the Sector is engaged in inter-battery baseball contests and track meets, with prospects in both sports very encouraging.

Corregidor

BRIGADIER GENERAL WALTER K. WILSON, *Commanding*

COLONEL T. A. TERRY, *Executive*

COLONEL GEORGE RUHLEN
Commanding 59th Coast Artillery (HD)

COLONEL J. H. CUNNINGHAM
Commanding 60th Coast Artillery (AA)

LIEUTENANT COLONEL WILLIAM C. KOENIG
Commanding 91st Coast Artillery (PS) (HD)

LIEUTENANT COLONEL ALBERT H. WARREN
Commanding 92d Coast Artillery (PS) (TD)

By Major R. E. Phillips

An official edict of the Commonwealth Government says the hot season has arrived and indications are that the weatherman intends to conform.

Another sure sign of the approaching hot season is the flood of applications from officers who feel they have earned recuperative detached service at Camp John Hay. Twenty-five lucky families will take off for the mountains during the next week or two.

Our tired artillerymen cast appraising eyes at the white blanket of haze lying along the 10,000-yard arc and heave sighs of relief that annual target practices are now history. As a matter of fact, poor visibility forced an extension of firing programs for seacoast and antiaircraft artillery a full two weeks to the middle of March.

A change in post commanders invariably stirs and stimulates a garrison and this occurred when the February transport arrived bringing Brigadier General Walter K. Wilson to command the harbor defenses. On March 1st, we gathered on the North Dock to bid General and Mrs. Bishop a typical Army farewell. The General moved over to Fort William McKinley to command the Philippine Division. Our regrets at losing old friends are tempered by the fact that they are to remain relatively nearby.

The Navy was unable to participate in any joint maneuvers this year so the first week of our annual war condition period was devoted to reconnaissances by officers on the Bataan Peninsula. Three officer groups of approximately equal size were formed and each spent two days of the week March 21-26 inspecting the terrain on the mainland of Luzon immediately north of the harbor defenses. This was the scene of Philippine Division maneuvers last fall and guides from the division conducted our officers over the ground.

Our first real opportunity to earn the approval of the new harbor defense commander arrived during the following week when combat troops moved to their action stations at the armament. Then came a series of simulated naval and air attacks followed in which five harbor boats represented the Black navy, and Philippine Department aircraft represented enemy aircraft.

The department commander decided to make his annual tactical inspection during this period. In the two days allotted to this inspection we did our best to demonstrate the varied character of the activities which fill the training year here. It was a strenuous two days for all concerned but we feel fully repaid by the complimentary remarks anent our efforts, made in a letter General Hughes sent the post commander on completing his inspection.

Just as our target practice season ended we received notice that two places in the 1937 Knox Trophy contest had been

awarded to us—but that is a regimental story outside the territory allotted your correspondent. We have two or three likely entries for this year's contest. Along this same general line—look below in 59th Coast Artillery section of our news letter and note where the Coast Artillery Association Trophy honors for 1937 went.

FIFTY-NINTH COAST ARTILLERY

Record service practices for the 59th Coast Artillery were completed during the months of February and March with very pleasing results. The scores disclosed that three of the batteries made scores well in excess of 100.

Battery F, commanded by Captain Crim exceeded last year's high score despite the new scoring formula. Battery C, commanded by Captain Kleinman, led the regiment and in addition had a very spectacular shoot with seven bow-on and five broadside hits for a total of twelve out of twenty possible. This battery won second place in the Knox Trophy contest for the calendar year 1937.

Congratulations are being received by the 59th Coast Artillery for having won the top honors in the Coast Artillery Corps with the award of the much coveted U. S. Coast Artillery Association Trophy for target practice in 1937. Batteries B, C, E, and G achieved ratings of excellent for that year and hopes are entertained for equalling or surpassing this record for 1938.

The war condition period was held from March 21st to April 1st, with all firing batteries encamped near their armament. The department commander made an inspection during this period and expressed himself as being highly gratified with the excellent cooperation and efficiency prevailing among the officers and enlisted men of the whole command during these maneuvers. Two day reconnaissance trips to the Bataan Peninsula were taken by all officers in the regiment.

Headquarters Battery repeated its unusual performance of last year by taking the baseball championship of the 59th Coast Artillery, thereby winning the privilege of playing against Battery "A," of the 60th for the post championship early in April. Under the capable pitching of Staff Sergeant Ingle the team was able to win eighteen out of twenty-one games. The regimental team has been partially organized under Captain Trødennick and prospects look quite favorable for a repeat of last year when the regiment won the post and department tournaments. Softball and volley ball teams are practicing at present and the regimental league will soon go into action. The *esprit* of the regiment has never been higher and it is expected that several additional athletic trophies will be added to the now overflowing trophy cabinet which contains over

30 cups as evidence of the athletic prowess of the men in this regiment.

Lieutenant G. L. Kushner and his mother Mrs. Kushner were the only members of the 59th C.A. to leave the department for the States on the March transport. Several new arrivals joined the regiment from the March transport. Lieutenant Colonel E. O. Halbert and Major J. B. Hafer were assigned to regimental headquarters, Major Hafer taking over the position of regimental adjutant. Captain R. R. Hendrix and Lieutenant W. H. Jordan were assigned to Battery "G," at Fort Hughes. Lieutenant H. D. Lind was assigned to Battery "E," at Fort Drum, and Lieutenant G. F. Leist to Battery "B."

Colonel Ruhlen, Captains Crim, Kleinman, Tredennick, and Gill, will spend a brief period of detached service at Camp John Hay, Baguio, during April. During the absence of Colonel Ruhlen, our regimental commander, Lieutenant Colonel Halbert will be in command.

SIXTIETH COAST ARTILLERY

Upon the arrival of the USAT *Grant* on February 21, the regiment's officer personnel was increased by the addition of Major Allison W. Jones, Captain William C. McFadden and Lieutenant Foster LeR. Furphy. No officers of the 60th Coast Artillery departed on this transport, but upon the departure of the May 18th transport, the regiment will lose Captain William L. Richardson and Captain Forrest J. French. Captain French and his family left Fort Mills on April 1st for Camp John Hay at Baguio, on detached service and leave until the departure of the May transport. Lieutenant George E. Keeler, Jr., has been transferred to the 60th Coast Artillery from the 92d Coast Artillery (PS), after a year's service with the 3d (Guard) Battalion.

The interbattery baseball season was completed on March 19, 1938, Battery "A" leading the league with the loss of only one game in twelve played. The regimental baseball team has been formed. The 60th team has already played advance games with Nichols Field and Sternberg General Hospital, and shows great promise for the Department League. Lieutenant Alfred Ashman was a player in the Philippine Department Army tennis team which defeated the Navy, winning 2 out of 3 of his matches. Lieutenant Colonel R. T. Gibson won the Corregidor Club Monthly Medal Golf match for February with a net score of 59.

On March 12, 1938, the gun battalion completed its annual target practice, each battery firing two day and one night practices, at sleeves towed by high-altitude bombers from Nichols Field. The machine-gun battalion (Battery "E" and Battery "F"), which completed its practices last November, has received radio notice from the War Department that both batteries were rated "excellent" for the calendar year 1937. Battery "E" was commanded by Captain Joy T. Wrean, and Battery "F" by Lieutenant Harry R. Hale. The gun battalion practices are now being analyzed and reports prepared for forwarding.

The target practice season was completed just in time to enter the war condition period, March 21-April 1, 1938. Units took their field positions, and defended the Rock against attack and bombing missions from Nichols Field and Clark Field. Three Air Corps Officers, Lieutenant Colonel Thomas S. Voss, Lieutenant Frederick A. Pillett and Lieutenant William M. Canterbury, were attached to the regiment for the period.

NINETY-FIRST COAST ARTILLERY (PS)

Recent arrivals in the regiment are Captain Glenn Newman, formerly of this regiment during a previous tour, assigned to Headquarters Battery; and Lieutenant Joseph B. Yost, assigned to Battery F. Lieutenant Richard L. Matteson returned to the United States on the February transport.

Seacoast target practices have been completed by all batteries and excellent results attained. Battery "D" will be well up in the 14-inch DC gun group with a score of 183.8. Captain Krueger is battery commander. A letter from the Office of the Chief of Coast Artillery advises that Battery B, 91st CA(PS) won third place in the Knox Trophy contest for 1937.

Batteries A and G are now in the midst of mine practice having started the test phase.

Athletic efforts in the 91st during the past two months were concentrated on baseball and track. The inter-battery baseball league has a month to run, the present line-up of the batteries being G, E, B, A, C.

During the past two month period, the 91st track men under the direction of Lieutenant Norman A. Skinrood, trained for and took part in the Post Track and Field Meet for Filipino Troops held March 2d. The final team scores were:

91st CA(PS)—89 points,

92d CA(PS)—38 points.

Inter-battery volleyball will dominate athletics in the 91st during the period following the current baseball season, the sport being in great favor with Filipino troops.

NINETY-SECOND COAST ARTILLERY (PS)

The month of February saw the completion of 1938 seacoast practices at the 92d. We point with pride to Battery C, Captain McKinney, commanding, which fired its 155-mm. GPF's for a score of 151.7.

On March 2d, the repeatedly postponed track and field meet was held between the 91st and 92d. The 91st gave us a good licking to the tune of 89 to 38. As far as the 92d was concerned, the highlight of the meet was the tug-of-war contest in which we were represented by a team of veterans from the Guard Battalion. At the starting gun these huskies sat down and pulled their opponents over in eleven seconds.

The 92d was represented at the Philippine Amateur Athletic Federation meet held in Manila on March 5th. Private Avelino Catamen of Battery B, 92d came away with first place in the javelin throw with a heave of 184 feet and almost broke the Island record.

Panama Canal Department

COLONEL EDWARD A. STOCKTON, JR.
Department Artillery Officer

COLONEL FORREST E. WILLIFORD
*Commanding Harbor Defenses of Balboa and
4th Coast Artillery (AA & HD)*

COLONEL WILLIAM T. CARPENTER
*Commanding Harbor Defenses of Cristobal and
1st Coast Artillery (AA & HD)*

LIEUTENANT COLONEL OLIVER L. SPILLER
Commanding Fort Randolph

FORT AMADOR

By Captain J. H. Kochevar

The annual maneuvers for the Panama Canal Department were completed in March. The entire command profited from the training. The experience gained and the success of the maneuvers was due to the cooperation of all branches of the service. The constructive criticisms brought out by the critique helped materially to increase the unit's efficiency.

Battery "C," commanded by Captain Ola A. Nelson, has completed its searchlight practice making an average score of 80. During the record practice, the plane was illuminated on every course and the period of illumination allowed ample time for a gun battery to register on the target.

Battery "A," under Captain R. A. Ericson, has completed its 3-inch AA gun practice, the average score made being 179, which was the highest score made by any of the three AA gun batteries.

Captain H. A. Toftoy, commanding Battery "D," came out with a perfect score of 150 in the battery's annual mine practice.

At present Battery "E," a newly formed organization, under Captain M. A. Hatch, is firing record machine-gun practice.

Battery "G," under Captain R. H. Grinder, is using a high-speed spouting target and expects to fire its practice at the maximum range of the 14-inch railway battery.

Battery "I," 4th CA (AA), commanded by Captain R. L. Miller, won the Amador Trophy for excellence in target practice. The trophy is awarded annually by Senora Marie Osse, Viude de Amador Guerrere, in memory of her husband, Doctor Manuel Amador Guerrere, the first president of the Republic of Panama, in whose honor the post of Fort Amador is named.

SPORTS

In the sector baseball league Amador was nosed out of the championship by Fort Clayton. These two teams played some of the best and most exciting baseball ever witnessed on the Isthmus. After a very successful season, Amador came out with an excellent track team winning the Sector meet by 8 points. In the sector golf matches, both the officers' and enlisted men's teams were victorious. At this time, Amador is leading in the sector tennis matches. The inter-battery basketball league will soon be under way. This season should be an unusually interesting one to follow since all teams are about evenly matched, and are displaying a brand of basketball equal to that met with in college.

FORT SHERMAN

By Captain Warren C. Rutter

The training year ended with the department maneuvers in March. Troops from Fort Sherman moved to the Pacific Sector and took part in the maneuvers on that side of the Canal Zone. The troops of Fort Randolph remained in the Atlantic Sector. Though the Coast Artillery maneuvers lasted only about a week they were intensive and interesting.

On March 7, a review of all troops of the Atlantic Sector was held at France Field in honor of Major General F. H. Rowell prior to his departure from the Atlantic Sector. Immediately after the foot troops and mounted elements had passed in review the 19th Wing presented an aerial review.

Army Day was similarly observed by a review of troops of the Atlantic Sector by Brigadier General F. H. Smith, the department commander.

On April 12th a regimental review was held at Fort Sherman in honor of Major George W. Whybark. Major Whybark is retiring upon his own request after more than thirty years' service. He sailed for New York on April 13 and he and his family are keenly missed at Fort Sherman. They carried with them the best wishes of the command.

The 11th Engineers returned to Corozal from Fort Sherman and Fort Randolph on March 31, 1938. During their three months' stay in these harbor defenses they did excellent work in building new roads and trails and repairing old ones. Their stay was greatly appreciated and the work they have accomplished is of great benefit to everyone.

The new movie theater was opened on April 3d. A special showing was given in celebration of the opening night. The new theater presents a pleasing and attractive picture in its setting of tropical trees.

The three new tennis courts near the mine dock are nearing completion. A tennis tournament is under way and it is hoped that some of the final matches can be played on the new courts.

The Post Interbattery Basketball season will start with the opening games on May 10th. Each organization claims its team will be the 1938 champions.

There have been no new arrivals among the officer personnel since the last news letter.

FORT RANDOLPH

On March 5th a battalion parade and review was held in honor of Sergeant John L. Lewis, Battery "E," who was placed on the retired list after completing thirty years' service. Colonel Carpenter, the harbor defense commander

was present. At noon of the same day Battery "E" tendered Sergeant Lewis a farewell dinner and presented him with a traveling bag.

On February 27th the new movie theatre was officially opened and large crowds attended the three shows. A special film was secured for this opening night and there was a record attendance.

The old theatre is now being converted into a squad-room for Headquarters Battery, 1st Battalion, 1st Coast Artillery and will be ready for occupancy by April 30, 1938.

* * *

Sacramento Chapter

At a recent election of the Sacramento Chapter, United States Coast Artillery Association, the following named members were chosen to fill the chapter offices:

President, Major A. L. Engler, CA-Res.; Vice President, Captain H. H. Fisk, CA-Res.; Secretary-Treasurer, Lieutenant George R. Fay, CA-Res.; Executive Council, Captain C. J. Lutgens, CA-Res., Lieutenant Winston McBain, CA-Res., and Lieutenant George R. Fay, CA-Res.

The headquarters offices of the chapter are located at 432 San Antonio Way, Sacramento, California. The chapter now has an active membership of 12 and plans to add to this number. The coming activities include CMTC recruiting, provision for guest speakers at meetings, social affairs, and a membership drive.

* * *

West Point

With the approach of June Week and the customary cessation of all social activities during the summer months, the West Point Chapter of the Coast Artillery Association brings to a close the most active and friendly period we have had at the Academy in many years. Since its revival and reorganization last fall the Chapter has not been permitted to again languish. On January 22d a tea was held at the West Point Officers' Mess, our first meeting attended by the ladies. On March 12 a tea-dance was given in the Blue Room of the Mess, followed by a supper after which the meeting adjourned to the New Gymnasium to witness the 1938 Hundredth Night Show. In April an impromptu reception was held for Major General Sunderland, who was at West Point on a brief visit. And on May 28th, we have scheduled another tea-dance at the Officers' Mess, to which all early Coast Artillery arrivals for June Week are cordially invited. Music will again be furnished by a selected six-piece orchestra from the West Point Band, with rhythm in swing style, waltzes prohibited, and a supper of scrambled eggs and bacon to follow the dance. This dance will conclude our social activities until next September.

The past winter, too, has been professionally busy for many of the Coast Artillery officers on duty here. A very thorough course of instruction, completely revised this

year under the direction of Major A. H. Campbell, was given to the members of the second class, who will visit Fort Monroe during the summer. The course comprised thirteen lessons and included fire adjustment in both sea-coast and antiaircraft, the organization of the harbor defense, and the organization and tactics of fixed and mobile artillery, antiaircraft, and submarine mines. Daily classroom instruction was supplemented by five lectures, and a minimum of nine grades was given to each cadet, the grades being based on brief but comprehensive classroom work-sheets.

Officers who have not visited West Point in some time will be interested to hear of the many construction projects now nearing completion. The old Polo Flats have been filled in and graded, and are now the site of one of the best outdoor track fields in the country. At the south end of the field, rapidly being completed, stands the new and huge armory and field house, large enough to accommodate the entire Corps of Cadets for an indoor drill or parade (and augurs woe for the old winter deadbeat free from all formations but Saturday inspection on the stoops of barracks!) On the plains proper, a new academic building, too, is finished as to exterior construction and is receiving final interior refinements. This building stands behind the library and will be connected to the old east academic building. Across the parade ground, new barracks have risen on the side of the old north guard house, and today, North Barracks has a completely enclosed area like that of Central (formerly called South) Barracks. Further improvements, too, are being made in the old gymnasium, and even the mountains to the west have changed their configuration in the form of a lofty, rising roadway, blasted from the rock, to replace dangerous Storm King highway at an early date.

The West Point Officers' Mess has also been undergoing renovation. The old pool room is being made over into a lounge which will be opened to the ladies of the post as well as to the officers. The old barber shop will be made into a ladies dressing room. The former offices will become a "Snack Bar" equipped to serve short orders. And down the hall, in previously unused space, has been completed a modern, black and white tiled barber shop, complete with all modern facilities. New and up-to-date equipment has also been installed in the kitchens of the Mess.

A further point of interest, particularly to officers being ordered to West Point in the immediate future, concerns the wearing of the blue uniform. For a time, there was some apprehension that the blue uniform might be required for daily wear at all classroom instruction, and that more than a minimum of blues would be required. Such, however, seems definitely beyond contemplation; the standard olive drab uniform continues in use as at other stations. Incidentally, too, a recent order has permitted optional wearing of the olive drab cotton shirt under the blouse; heretofore, the white shirt has been compulsory.

One final item of cadet life will also be of interest. No longer do radio antennas hang stealthily under the cover

of ivy; and no longer does the forbidden voice of a radio announcer issue weirdly forth from chimneys, laundry bags, and desk drawers. The radio has become authorized! The harassed tacs may linger now in any room, searching as of old for the delinquencies of old—rather than for the elusive source of WEA and Benny Goodman!

* * *

Southern California Chapter

Activities of an alien fishing fleet, ostensibly snagging sardines and other piscatorial specimens, were vividly described to about 100 Regular Army, National Guard, and Reserve officers of the Coast Artillery Corps attending the April 9 meeting of the Southern California Coast Artillery Officers' Association at San Pedro. Layl Kane, Chairman of National Defense for the Fourth Area, Department of California, American Legion, was the speaker.

Circumstances of more than mere coincidence which have occurred many times in recent years, in which alien craft have been concerned, have convinced those on the alert for such activities that a well-organized and dangerous threat to the Southern California coastal area exists in the operation of this alien fishing fleet, according to Kane's picture of the situation.

Kane presented maps, photographs and statistics accumulated over a period of years as an observer and investigator, to drive home his message.

The speaker was introduced by Captain Paul Van Amburg, who was chosen by Captain L. E. Salisbury, toastmaster, to present Kane to the officers following a dinner served in the National Guard Armory.

Captain Salisbury, Secretary of the Coast Artillery Officers' Association, was assigned the rôle of toastmaster by Lieutenant Colonel George W. Oertly, President. Lieutenant Colonel Oertly announced that a second meeting of the Association was scheduled at Ventura during the summer field training period of the 251st Coast Artillery (AA), in August and a third meeting would be held in Los Angeles in November at which time Colonel Richard A. Williams, executive for Reserve activities in Southern California would be complimented upon his retirement.

Other distinguished officers introduced were Lieutenant Colonel A. J. French, Major Lawrence, Colonel Holden, Colonel F. H. Evans, Colonel McReynolds, Colonel Frank Baum, Lieutenant Colonel L. E. Rolfe, Major Ben Blair, Major Fred Wright, Captain V. Rapp and his officers, First Lieutenant Fred Thompson and First Lieutenant Dan Gulko, attached for training. The latter three were host officers for the affair.

* * *

Washington Coast Artillery Club

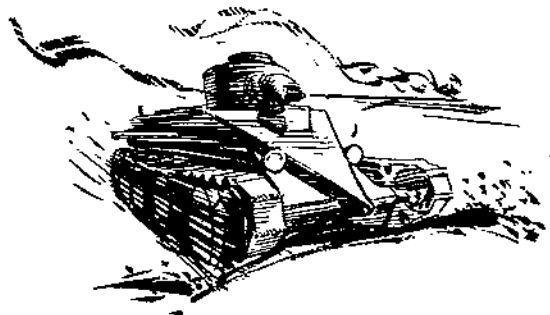
The Chief of Coast Artillery recently addressed the Washington Coast Artillery Club on "The Problems and Progress of the Coast Artillery Corps." The attendance was exceptionally large and all present enjoyed General Sunderland's interesting and instructive talk. The meeting was preceded by a dinner in General Sunderland's honor at the Army and Navy Club.

General Sunderland talked quite informally and answered many questions regarding current problems. Among these, he stressed the desirability of an antiaircraft automatic gun to fire an explosive shell approximately one inch in diameter. Although such a gun has advantages over the present .50-caliber machine gun, General Sunderland explained that there were difficulties in making an immediate change.

Our present three-inch antiaircraft gun he considers as effective as any weapon available—dollar for dollar and pound for pound; although he noted the fact that the 90-mm. and 105-mm. gun possess some advantages. He also pointed out that the mobility of the railway gun was strategic, rather than tactical. He mentioned also the recent developments in matériel and fire control.

General Sunderland touched on the increase of funds for the Coast Artillery Corps recently provided by the Congress and mentioned the responsibilities that go with the increase.

That the Chief's presence contributed much to the success of the meeting was shown by the many questions asked and the heightened interest of those attending.



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 problems that properly may be considered by the Board. Communications should be addressed to the President, Coast Artillery Board, Fort Monroe, Virginia.

THE COAST ARTILLERY BOARD

COLONEL WILLIAM S. BOWEN, C.A.C., *President*
MAJOR GORDON B. WELCH, Ordnance Dept.
MAJOR FRANKLIN E. EDGEComb, C.A.C.
MAJOR HUGH N. HERRICK, C.A.C.

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CAPTAIN CORTLANDT VAN R. SCHUYLER, C.A.C.
CAPTAIN CHARLES E. SHEPHERD, C.A.C.
CAPTAIN EDWIN W. CHAMBERLAIN, C.A.C.

ANTI-AIRCRAFT DIRECTOR M4 (PROJECT NO. 1102). The director was received by the Board for test on March 11, 1938, after a long delay due to difficulties experienced in the manufacture of this, the pilot model. It was moved to Fort Story at once for the tests which included drill, the solution of a large number of static problems and target practices. It was originally intended to combine the test of this director with the test of the T9 gun on T4 mount, using the ammunition provided for each project in one long series of firings for a thorough test of both new devices. Due to non-delivery of the gun, the test of the director had to be concluded after the expenditure of a rather limited amount of ammunition.

The tests had just been completed as this issue of the JOURNAL went to press, hence there has not been sufficient time to analyze the results obtained. Mechanical difficulties experienced with the director were of a very minor nature and were confined to one mechanism. Training of the operators was found to require somewhat more time than with previous instruments because more careful operation is required. The results obtained during the target practices appeared to show steady improvement throughout the tests. Target practices were fired on crossing, incoming and gliding courses.

REVISION OF TR 435-55 (PROJECT NO. 1107). Since the last issue of the JOURNAL the Board has been engaged in a revision of TR 435-55, War Department, June 1, 1934, Coast Artillery Target Practice. The new regulations will include the changes necessary to make them conform to present doctrines and teachings. Information now published in Training Memorandum No. 1, War Department, October 1, 1937, Instructions for Coast Artillery Target Practice—1938, that does not apply to the computation of scores of target practices, also will be included.

One proposed addition to the revised regulations, is the inclusion of a *detection phase* in the annual record service practices of gun batteries of Regular Army anti-aircraft regiments. This detection phase is designed to afford

training in daytime surveillance of the normal zone of a gun battery and to test the ability of a gun battery to detect targets in sufficient time so they may be met with fire as soon as they come within the maximum range of the guns. No actual firings will be done in this phase. The battery may use any or all of the intelligence agencies which would be available to it if it were part of a normal area defense. Such agencies include:

a. Observers in the anti-aircraft artillery intelligence service or at searchlight listening posts.

b. Observers at searchlight positions. Sound locators may be used. The following will govern the conduct of this phase:

a. An objective will be selected and a 60-degree defensive sector will be laid out about this objective. (Note: This phase may be conducted in conjunction with anti-aircraft searchlight practices if desired. It need not be conducted in conjunction with the firing phase nor from the battery positions occupied during the firing phase.)

b. The battery conducting the service practice will report its readiness to begin the practice to the battalion commander.

c. After such report the battalion commander will request the plane director to begin the practice. No information concerning the movements of the plane, other than information furnished by the agencies referred to above, will be given to the battery except that it may be informed that the target plane has taken off.

d. Twelve separate daylight attacks will constitute the service practice.

e. Each attack will start beyond sight or hearing of the outer line of anti-aircraft artillery intelligence observers and will end when the attacking plane reaches the bomb release line.

f. Attacks will be made at altitudes as follows:

- (1) Three at approximately 9,000 feet.
- (2) Three at approximately 12,000 feet.
- (3) Three at approximately 15,000 feet.
- (4) Three at approximately 18,000 feet.

g. No restriction will be placed upon the movements of the attacking plane other than that attacks will be made within the defended sector at the altitudes prescribed above. Attacks will conform as to type, however, to those which might be expected from a loaded bomber.

For the detection phase only, two disinterested officers, in addition to those officials normally required for record keeping for antiaircraft gun target practices, will be designated as umpires, the senior being chief umpire. The data necessary for the analysis of this phase will consist of that necessary to define the target's location at the instant the chief umpire announces the battery to be on the target. These data will be determined as follows:

a. The chief umpire stationed at the director will, by means of the spotting telescope, verify the fact that the director has picked up the target.

b. The assistant umpire stationed at the height finder will, by looking through the stereoscopic observer's eyepiece, verify the fact that the height finder has picked up the target. The assistant umpire will inform the chief umpire when the height finder is on the target.

c. When both instruments are on the target the chief umpire will report ON TARGET to the officer in charge of records. The officer in charge of records will note and record the pick-up time.

d. As soon as the observers in the record section have picked up the target the officer in charge of records will give the command STAND BY FOR TIME ZERO, READY, TAKE. He will give the command CEASE RECORDING when sufficient data have been recorded to insure a reliable determination of the course and speed of the target.

In order to locate the point of pick-up the vertical projection of the target's course is plotted on a special form, using horizontal ranges and altitudes from the O_1 station. The ground speed of the target is determined from this plot. The point of pick-up is obtained by laying off, in the proper direction along the course of the target, a distance equal to the ground speed times the pick-up time. The plotted course of the target will be extended if necessary to locate this point.

It is assumed that a period of 15 seconds will elapse after the director and height finder are on the target, before the battery will be ready to open fire. This 15 seconds represents the time necessary to measure an altitude, set that altitude into the director, generate data and fire the guns. The position of the target when fire is opened, is plotted by measuring along the target's course and toward the battery a distance equal to the ground speed times 15 seconds.

The point at which the initial bursts will occur is determined from a trajectory chart by successive approximations. The horizontal range to this point is determined and compared to the horizontal range corresponding to a fuze range of 30 seconds and the altitude of the course. The ratio of these two horizontal ranges is a measure of the ability of a battery to detect targets in sufficient time to bring such targets under fire as soon as they reach the

maximum effective range of the guns. For scoring purposes this ratio will be multiplied by a factor, K, the value of which will be published annually in Training Memorandum No. 1, "Instructions for Coast Artillery Target Practice. . . ."

It is proposed that for the first target practice year in which the new regulations are in effect, the annual target practices will include the detection phase. Scores for the detection phase will be computed and complete reports will be submitted; however, the scores will not be considered in determining the battery rating. Thereafter, the battery rating will be based on the performance and scores obtained during both firing and detection phases.

COWEN TRAINER FOR SOUND LOCATOR LISTENERS (PROJECT NO. 1122). The original plan for this instrument was submitted to the Coast Artillery Board by Major E. G. Cowen, Coast Artillery Corps, together with a report of a preliminary test of an early model used by Battery D, 1st Coast Artillery at Fort Randolph. A description of this first instrument appeared in the COAST ARTILLERY JOURNAL for November-December, 1937. After a study of the documents submitted, the Board concluded that a need exists for a training device of this nature and recommended that one such instrument be manufactured by the Ordnance Department and submitted to the Board for a service test. Accordingly, the Chief of Ordnance proceeded with the manufacture of a suitable pilot model. When completed, this instrument was shipped to Fort Monroe and is now undergoing test by the personnel of Battery A, 2d Coast Artillery.

The trainer is intended for use in the advance training of sound locator listeners under conditions which closely simulate those of actual aircraft tracking. It is especially useful to those organizations which find it difficult to secure the desired number of flying missions for the thorough training of their listening personnel.

While the older Binaural Training Instrument M1 is well adapted to the selection and preliminary training of listeners, it does not possess the characteristics desirable for advanced training. An important phase in this training is in identifying and centering the airplane tone under actual tracking conditions, in the presence of a varying amount of back-ground noise. The present instrument provides opportunities for doing this. Furthermore, it allows training with the sound locator itself, permitting the men to acquire the "feel" of their equipment and to gain confidence in their instrument and their work.

The present Cowen Trainer consists essentially, of a loud speaker, a phonograph turntable and an amplifier with suitable electrical connections. Provision is made for moving the loud speaker along an overhead wire at varying linear velocities. A phonograph record of an airplane in flight is reproduced through the amplifier and loud speaker and, when suitably controlled, presents a very close approximation of the actual sound of a plane. A volume control is also provided, which can be manipulated to simulate an incoming or an outgoing target. The instrument

operates on 110-volt, 60-cycle alternating current.

In operation the trainer is set up out of doors at any convenient point, the overhead wire for the loud speaker being strung between two trees or poles. Three hundred feet of cable are provided between loud speaker and amplifier. The desired number of sound locators with their crews are placed in position several hundred yards from the loud speaker, which is started on its course at the instant the "target" is assigned. Directions of courses can be varied by moving the sound locators from one position to another or by attaching one end of the overhead wire to a vehicle which can be readily moved to new positions.

SMALL ARMS ANTI-AIRCRAFT FIRING (PROJECT NO. 1124). The Board conducted comparative tests during April to determine the relative efficiency of the new semi-automatic rifle, caliber .30 M1 and the Browning automatic rifle, M1918 when used against aerial targets.

The tests consisted of firing these two weapons at a towed sleeve target on some one hundred and twenty separate courses, a total of 6,000 rounds of ball and tracer ammunition being used. The target was towed directly toward the firing point at low altitudes and attacks simulated, as far as consistent with safety, those to be expected from low flying aircraft using hedge hopping tactics. For comparative purposes tracer ratios varying from no tracer to 100 per cent tracer were used.

The Board has not completed its study of the results of these firings as yet. Preliminary studies indicate however that the Browning automatic rifle is superior to the M1 rifle for use against such targets.

TERMINAL STRIPS TM-184-T1 AND T2 (PROJECT NO. 1131). The Board tested these two new types of terminal strips during the month of April. Terminal strips TM-184-T1 and TM-184-T2 differ only in over-all length and in binding post spacing. The T1 model is 12 inches long by $2\frac{7}{8}$ inches wide with a $\frac{13}{16}$ -inch vertical spacing between binding posts. The T2 model is $15\frac{1}{4}$ inches long by $2\frac{7}{8}$ inches wide with a $\frac{1-1}{16}$ -inch vertical spacing between binding posts. Seven pairs of TM-175 binding posts are strapped across the terminal plate of each model to seven smaller pairs of binding posts, thus providing seven through circuits. A canvas cover, with a Talon fastener and draw string, is provided with each model as protection against dust and moisture. Suitable means of mounting the terminal strips are provided.

The tests consisted of mounting the terminal strips, connecting circuits through them, testing the efficiency of such connections and testing the protection afforded the connections by the canvas cover.

The Board found Terminal Strips TM-184-T1 and TM-184-T2 to be superior to present standard types of terminal strips in the following particulars:

- a. Two more through circuits are provided.
- b. Binding posts are more efficient and connections are more easily made.
- c. Connections can be made without stripping the wire.
- d. The canvas cover provides considerable protection from dust and moisture. The Board recommended that certain minor changes be made in the design of these terminal strips and that they then be given an extended service test with a view to standardization.



"THE COUNTRY'S DEFENSE is the responsibility of its entire citizenry. This responsibility is placed on the shoulders of the individual citizen not only by the Constitution of the United States but by the Constitution of every State in the Union." . . .

The army exists by the will of the citizen. The Army is one of the means instituted by the citizen to maintain and transmit to posterity the blessings of liberty, prosperity, and happiness. . . .—PATRICK J. HURLEY.

The Contributors

Lieutenant Colonel A. C. M. AZOY, Coast Artillery Corps Reserve, graduated from Princeton in 1914 with the degree of Litt.B. His military career began with the First Officers' Training Camp at Fort Myer, from which he was transferred to the Coast Artillery School, Fort Monroe. While at Fort Monroe he was commissioned second lieutenant, Coast Artillery Corps, and assigned to Fort Hancock. He served in various line and staff capacities at Fort Hancock, finally being appointed head of the NCO's Training School at that post. Upon the inauguration of the CMTC in 1921, Colonel (then captain) Azoy was one of the four Reserve officers selected to serve with the Regular Army in running the first camp. Since then he has served in various posts on active duty training. At present Colonel Azoy is assigned as executive of the 529th Coast Artillery (AA). His vocation and avocation is writing, his work having appeared in the leading periodicals of the country. He is the author of *The Reserve Officers' Handbook* published by McBride's in 1928. Colonel Azoy is a member of the editorial staff of *Town & Country*.

1 1 1

Captain LAURENCE W. BARTLETT, Coast Artillery Corps, was born in Ohio. His first service in the army was as a private and private first class, Company D, 1st Engineers, Ohio National Guard and 112th Engineers during the World War. He enlisted in May of '17 and was discharged in May '18 to accept appointment as a cadet, United States Military Academy. He won his commission in 1920, being assigned to the Coast Artillery with which his service has been continuous. He is a graduate of the Basic (1921), Battery Officers' (1933) and Advanced Technical (1934) courses of the Coast Artillery School. Captain Bartlett is an instructor in the Department of Engineering at Fort Monroe.

1 1 1

Colonel ADNA R. CHAFFEE (Cavalry), General Staff Corps, makes his first contribution to the JOURNAL in this number. Since graduation from the Military Academy with the Class of '06, his service has included troop, staff, and school duty. In addition to attending the service school of his arm, Colonel Chaffee has graduated from the School of the Line ('21) and the Army War College ('25). He holds the Distinguished Service Medal for serving with distinction as G-3 of the 81st Division, III Corps, and VII Corps during the World War.

Colonel Chaffee is completing a tour as War Department Budget and Legislative officer to take command of the 1st Cavalry (Mechanized).

Lieutenant Colonel ROGER B. COLTON, Signal Corps, is a native of North Carolina. He entered the Army in 1910 as a second lieutenant, Coast Artillery Corps, transferring to the Signal Corps in 1930. He has served a detail with the Coast Artillery Board and with the Ordnance Department. Colonel Colton is a graduate of the Sheffield Scientific School of Yale University and holds the degrees of Ph.B. (Yale '08) and M.S. (Massachusetts Institute of Technology '20). He spent a year at Columbia University majoring in fire control optics. He is a graduate of the Coast Artillery School, the Command and General Staff School, and the Army War College.

1 1 1

Major THOMAS R. PHILLIPS, Coast Artillery Corps, instructor at the Command and General Staff School, has contributed to the JOURNAL for a number of years. He is a graduate of the Coast Artillery School, the Air Corps Tactical School, and the Command and General Staff School. He has had a number of articles published in other service journals and in various general magazines. His most recent article "Preview of Armageddon," appeared in the *Saturday Evening Post* of March 12, 1938.

1 1 1

Captain RALPH W. RUSSELL, Coast Artillery Corps, hails from Mississippi. He entered the army as a 2d Lieutenant, Coast Artillery Corps in 1923, after graduating from Mississippi A. and M. College with the degree of B.S. He is a graduate of the Coast Artillery School Battery Officers' Course, 1933. At present Captain Russell is on duty with the ROTC, University of Alabama.

1 1 1

Lieutenant MILAN G. WEBER, Coast Artillery Corps, was born in Wisconsin and graduated from the Military Academy with the Class of 1931. He is a graduate of the Coast Artillery School Regular Course (1937) and is now a student in the Advanced Technical Course at Monroe. His current article is his first in the JOURNAL, and is a by-product of his hobby—research in the sciences.

1 1 1

1st Lieutenant ROBERT J. WOOD, Coast Artillery Corps, hails from Petersburg, Virginia. After graduation from Petersburg High School and a year at Randolph-Macon, he entered the United States Military Academy with the Class of 1930. At present he is an instructor in history at West Point. This is his third appearance in the JOURNAL. His first two contributions concerned themselves with personnel administration and a trip to Baguio.

Coast Artillery Orders

(Covering the Period March 1 to April 30, 1938)

Colonel R. W. Collins, from 11th, Fort H. G. Wright, to 4th C.A. Dist.

Colonel W. M. Colvin, from 4th C.A. Dist., to Inspector General's Dept., 2d Corps Area.

Colonel R. E. Guthrie, from 1st C.A. Dist., to 3d, Fort Rosecrans.

Colonel W. W. Hicks, from Historical Section, Army War College, to Inspector General's Dept., Hawaii, sailing New York, June 10.

Colonel Sanderford Jarman, from member, General Staff Corps, War Department, to Hawaii, sailing New York, October 20.

Colonel C. T. Marsh, from Michigan State College, to Panama, sailing New York, July 28.

Colonel G. T. Perkins, from Org. Res. 9th Corps Area, to recruiting, San Francisco.

Colonel E. K. Smith, from Panama, to Univ. of New Hampshire, Durham.

Colonel R. H. Smith, from instructor, Brazilian Army, Rio de Janeiro, to 1st C.A. Dist., Boston.

Colonel F. H. Spurgin, to home, and await retirement.

Colonel G. A. Wildrick, from Hawaii, to Michigan State College.

Lieutenant Colonel R. D. Brown, from student, Army War College, to Panama, sailing New York, September 1.

Lieutenant Colonel F. S. Clark, promoted Colonel April 1.

Lieutenant Colonel J. H. Cochran, from C.A. representative, Ordnance Board, Aberdeen Proving Grounds, to Va. Polytechnic Institute, Blacksburg.

Lieutenant Colonel W. K. Dunn, from student, Army War College, to the Philippines, sailing New York, September 9, assigned to General Staff with troops.

Lieutenant Colonel E. H. Freeland, from Panama, to Org. Res., 4th Corps Area, Jackson, Miss.

Lieutenant Colonel R. C. Garrett promoted Colonel March 1.

Lieutenant Colonel R. T. Gibson, from the Philippines, to Org. Res. Sixth Corps Area, Chicago.

Lieutenant Colonel R. E. Guthrie promoted Colonel March 5.

Lieutenant Colonel S. F. Hawkins, from 52d, Fort Hancock, to instructor, Va. Natl. Guard, Lynchburg.

Lieutenant Colonel P. H. Herman promoted Colonel April 1.

Lieutenant Colonel Charles Hines, from student, Army Industrial College, to office of the Assistant Secretary of War.

Lieutenant Colonel J. F. Kahle, from student, Army Industrial College, to Coast Artillery representative, Ordnance Board, Aberdeen Proving Ground.

Lieutenant Colonel E. L. Kelly, from 3d, Fort Rosecrans, to 2d, C.A. Dist., New York.

Lieutenant Colonel K. B. Lemmon promoted Colonel April 1.

Lieutenant Colonel J. H. Lindt, from member General Staff Corps, Washington, D. C., to Hawaii, sailing San Francisco, November 12.

Lieutenant Colonel J. D. McCain, from 62d, Fort Totten, to Hdqrs. 4th C.A. Dist.

Lieutenant Colonel F. A. Mountford, from 2d C.A. Dist., New York, to Org. Res. Ninth Corps Area, Portland, Oregon.

Lieutenant Colonel H. LeR. Muller promoted Colonel April 1.

Lieutenant Colonel W. R. Nichols promoted Colonel April 1.

Lieutenant Colonel J. T. H. O'Rear, from San Francisco, port of embarkation, Fort Mason, to 6th, Fort Winfield Scott.

Lieutenant Colonel O. H. Shrader promoted Colonel March 2.

Lieutenant Colonel L. L. Stuart, from student, Army War College, to member of the General Staff Corps, July 1.

Lieutenant Colonel R. L. Tilton, from student, Army War College, to Panama, sailing New York, July 28, assigned to General Staff with troops.

Lieutenant Colonel O. C. Warner promoted Colonel April 1.

Lieutenant Colonel L. B. Weeks, from 2d, Fort Monroe, to student, Army War College, Fort Humphreys, September 1.

Major T. J. Betts, from student, C. & G.S. School, to office Chief of Coast Artillery, Washington, D. C.

Major George Blaney, from instructor, Maine N.G., Rockland, to Hawaii, sailing New York, August 25.

Major O. B. Bucher, from student, C. & G.S. School, to Org. Res. 2d Corps Area, New York.

Major R. T. Chaplin, from Panama, to 2d Corps Area, Governor's Island.

Major H. W. Cochran, from Student, Army Industrial College, to Washington University, St. Louis.

Major E. T. Conway, from student, C. & G.S. School, to 69th, Fort Crockett.

Major C. E. Cotter, from student, Army War College, to the Philippines, sailing San Francisco, October 1.

Major W. M. Cravens promoted Lieutenant Colonel March 1.

Major E. R. Crowell, from 6th, Fort Winfield Scott, to student, C. & G.S. School.

Major D. L. Dutton, from student, C. & G.S. School, to student, Air Corps Tactical School, Maxwell Field.

Major H. F. Grimm, Jr., from Panama, to University of Illinois, Champaign.

Major V. W. Hall, from Org. Res. 4th Corps Area, to instructor, C.A. Maine National Guard, Rockland.

Major C. S. Harris, from 69th, Fort Crockett, to student, C. & G.S. School.

Major D. W. Hickey, Jr., from student, C. & G.S. School, to Hawaii, sailing New York, July 16.

Major D. D. Hinman, from member, General Staff Corps, Fort Sam Houston, to office Chief of Coast Artillery, June 30.

Major W. D. Hohenthal, from 62d, Fort Totten, to student, C. & G.S. School.

Major W. W. Irvine, from 6th, Fort Winfield Scott, to instructor, C. & G.S. School, August 1.

Major L. W. Jefferson, from student, C. & G.S. School, to 2d, Fort Monroe.

Major J. T. Lewis, from student, Army War College, to office Chief of Coast Artillery.

Major P. S. Lowe, from U.S.A.M.P. General Absalom Baird, Fort H. G. Wright, to Panama, sailing New York, July 28.

Major Samuel McCullough, from instructor, New Hampshire National Guard, Concord, to student, C. & G.S. School, September 9.

Major J. B. Martin promoted Lieutenant Colonel March 2.

Major E. C. Mead promoted Lieutenant Colonel April 1.

Major C. D. Y. Ostrom, from member, General Staff Corps, Ninth Corps Area, to student, Army War College, September 10.

Major T. R. Parker, from Org. Res. Sixth Corps Area, Chicago, to University of Washington, Seattle.

Major F. L. Topping, from 1st C.A. Dist., Boston, to Hawaii, revoked.

Major J. R. Townsend, from instructor, C.A. School, to student, C. & G.S. School.

Captain W. I. Allen, from student, C. & G.S. School, to instructor, C.A. School, revoked.

Captain W. L. Barker, from student, C. A. School, to Panama, sailing New York, July 28.

Captain L. W. Bartlett, from instructor, C.A. School, to student, C. & G.S. School.

Captain A. H. Bender, from the Philippines to student, C. & G.S. School, September 12.

Captain W. I. Brady, from University of Kansas, Lawrence, to Panama, sailing New York, September 1.

Captain G. R. Burgess, from office, Assistant Secretary of War, to 2d, Fort Monroe.

Captain N. A. Burnell, 2d, from instructor, C. A. School, to student C. & G.S. School.

Captain C. C. Carter, from 9th, C.A. Dist., Presidio of San Francisco, to Hawaii, sailing San Francisco, July 6.

Capt. F. E. Day, from student, C.A. School, to Hawaii, sailing New York, July 16.

Captain M. K. Deichmann, from student, C.A. School, to student, Air Corps Tactical School, Maxwell Field.

Captain C. S. Denny, from 9th, Fort Banks, to Finance Dept., Brooklyn. Previous orders revoked.

Captain J. V. deP. Dillon, from student, Dept. of Justice, to office, Judge Advocate General, Washington, D. C.

Captain R. E. Dingeman, from 51st, Fort Monroe, to student, C. & G.S. School.

Captain E. C. Engelhart, from Submarine Mine Depot, Fort Monroe, to 6th, Fort Winfield Scott.

Captain R. A. Ericson, from Panama, to student, C. & G.S. School, September 12.

Captain B. F. Fellers, from the Philippines, to student, Army War College, Fort Humphreys, September 1.

Captain R. I. Glasgow, from student, C. & G.S. School, to Hawaii, sailing New York, July 16.

Captain S. J. Goodman, from student, C. & G.S. School, to the Philippines, sailing New York, September 9.

Captain E. R. Guild, from student, C.A. School, to Quartermaster Corps, Fort Huachuca. Previous orders revoked.

Captain F. L. Hayden, from Hawaii, to student, C. & G.S. School, September 12.

Captain W. G. Holder, from Hawaii, to 6th, Fort Winfield Scott. Previous orders amended.

Captain, P. C. Howe, retired, April 30.

Captain J. F. Howell, Jr., from 62d, Fort Totten, to student, C. & G.S. School.

Captain P. A. Jaccard, from Hawaii, to 52d, Fort Hancock. Previous orders amended.

Captain R. H. Krueger, from the Philippines to 6th, Fort Winfield Scott.

Captain W. S. Lawton, from 6th, Fort Winfield Scott, to student, C. & G.S. School.

Captain, J. R. Lovell, from student, C.A. School, to student, C. & G.S. School.

Captain M. J. McKinney, from the Philippines, to 6th, Fort Winfield Scott.

Captain W. L. McPherson, from student, C. & G.S. School, to U.S.M.A., West Point. Previous orders revoked.

Captain D. C. Martin, from student, C. & G.S. School, to student, Air Corps Tactical School, Maxwell Field.

Captain H. H. Myrah, from Panama, to 6th, Fort Winfield Scott.

Captain A. B. Nicholson, from the Philippines, to student, Air Corps Tactical School, Maxwell Field.

Captain W. L. Richardson, from 6th, Fort Winfield Scott, to student, C. & G.S. School.

Captain J. H. Rousseau, Jr., from 2d, Fort Monroe, to the Philippines, sailing New York, May 26.

Captain D. J. Rutherford promoted Major March 1.

Captain F. F. Scheffler, from University of Illinois, Champaign, to student, C. & G.S. School.

Captain C. Q. Shelton, from student, C. & G.S. School, to student, Air Corps Tactical School, Maxwell Field.

Captain L. O. Shutt, from student, C. & G.S. School, to Hawaii, sailing New York, July 16.

Captain J. F. Stiley, from University of Washington, Seattle, to Panama, sailing San Francisco, July 30.

Captain G. H. Stubbs, from CCC, 1st Corps Area, Boston, to student, C. & G.S. School, September 9.

Captain E. B. Thompson, from instructor, C.A. School, to student, C. & G.S. School.

Captain H. N. Toftoy, from Panama, to Submarine Mine Depot Fort Monroe.

Captain F. B. Waters, from Georgia School of Technology, to Hawaii, sailing Charleston, July 18.

Captain W. L. Weible, from student, Army War College, to student, Army Industrial College, September 1.

Captain L. A. White, to Hawaii, sailing New York, March 25. Previous orders amended.

Captain T. B. White, from student, C. & G.S. School, to 2d Fort Monroe.

Captain F. J. Woods, from 6th, Fort Winfield Scott, to 52d, Fort Hancock.

Captain V. W. Wortman, from University of Illinois, to Panama, sailing New York, September 1.

Captain W. L. Wright, from student, C.A. School, to student, C. & G.S. School.

First Lieutenant D. S. Alexander, from student, C.A. School, to Hawaii, sailing New York, July 16.

First Lieutenant C. L. Andrews, from student, C.A. School, to 11th, Fort H. G. Wright. Previous orders revoked.

First Lieutenant W. H. Ball, from 6th, Fort Baker, to student, C.A. School, September 9.

First Lieutenant L. K. Beazley, from student, C.A. School, to 52d, Fort Hancock.

First Lieutenant F. A. Bogart, from student, C.A. School, to Panama, sailing New York, July 28.

First Lieutenant W. S. Coit, from student, C.A. School, to Hawaii, sailing New York, July 16.

First Lieutenant N. A. Congdon, from student, C.A. School, August 15. Previous orders amended.

First Lieutenant D. D. Edison, from 14th, Fort Worden, to student, C.A. School, September 9.

First Lieutenant F. H. Fairchild, from student, C.A. School, to 14th, Fort Worden.

First Lieutenant F. T. Folk, from student, C.A. School, to Hawaii, sailing New York, July 16.

First Lieutenant R. T. Frederick, from student, C.A. School, to student, C. & G.S. School.

First Lieutenant O. H. Gilbert, from 52d, Fort Hancock, to 7th, Fort Hancock.

First Lieutenant S. I. Gilman, from student, C.A. School, to 6th, Fort Winfield Scott.

First Lieutenant T. H. Harvey, from student, C.A. School, to the Philippines, sailing New York, September 9.

First Lieutenant W. H. Hennig, from student, C.A. School, to Panama, sailing New York, July 28.

First Lieutenant H. W. Hunter, from student, C.A. School, to Hawaii, sailing New York, July 16.

First Lieutenant M. M. Irvine, from student, Mass. Inst. of Tech., to the Philippines, sailing New York, Sept. 9.

First Lieutenant H. J. Jablonsky, to U.S. M.A., West Point, August 20. Previous orders amended.

First Lieutenant J. J. Lane, from student, C.A. School, to U.S.M.A., West Point.

First Lieutenant F. A. Liwski, from student, C.A. School, to Panama, sailing New York, July 28.

First Lieutenant W. L. McCulla transferred to Ordnance Department, April 7.

First Lieutenant H. G. McFeely, from student, C.A. School, to Panama, sailing New York, July 28.

First Lieutenant R. F. Moore, from student, C.A. School, to the Philippines, sailing New York, September 9.

First Lieutenant F. G. Rothwell, from 10th, Fort Adams, to the Philippines, sailing New York, May 26.

First Lieutenant Andrew Samuels, Jr., from Panama, to 11th, Fort H. G. Wright.

First Lieutenant E. O. Taylor, from 6th, Fort Winfield Scott, to student, C.A. School, September 9.

First Lieutenant H. F. Turner, from Hawaii, to 6th, Fort Winfield Scott.

First Lieutenant W. M. Vestal, from San Francisco, port of embarkation, Fort Mason, to student, C.A. School.

First Lieutenant F. R. Young, transferred to Ordnance Department, April 7.

Second Lieutenant W. W. Bailey, from 6th, Fort Winfield Scott, to Hawaii, sailing San Francisco, September 17.

Second Lieutenant G. W. Croker, from 13th, Fort Barrancas, to the Philippines, sailing Charleston, May 28. Previous orders amended.

Second Lieutenant M. J. Hickok, Jr., from 62d, Fort Totten, to Panama, sailing New York, June 10.

Second Lieutenant J. A. Scott, Jr., from 63d, Fort MacArthur, to Panama, sailing San Francisco, May 14.

THERE ARE THOSE who are so closely shut up within a little round of petty pleasures that they have never dreamed of the fun of reading and conversing and investigating and reflecting. It is essential to awaken the impulses of inquiry, of experiment, of investigation, of reflection, the instinctive cravings of the mind. The principle underlying all our educational procedure is that actions become more successful as they pass from the sphere of feeling to that of understanding.—MEIKELJOHN.

Book Reviews

LOOKING BEHIND THE CENSORSHIPS. By Eugene J. Young. New York: J. B. Lippincott Company, 1938. 353 pages; index; \$3.00.

Across the foreign desk of the *New York Times* flows an unending river of news from the world's capitals. To see to it that the stream is muddied sufficiently to confuse American opinion is the function of the foreign propagandist; to clear the waters is the business of Eugene J. Young, cable editor of the *Times* and one time war editor of the old *New York World*. And the purpose of his book, says Mr. Young, is to help the average American to see world news as he sees it.

Mr. Young's major thesis—that foreign news is doctored and distorted before export—is hardly a fresh viewpoint; but it is heartening to learn that one need not be a career First Secretary of Embassy to understand the implications of the daily handouts from Europe and elsewhere. All one needs is plenty of what a lawyer calls "reasonable doubt."

In simple, readable fashion Mr. Young summarizes the international issues of the past fifteen years or so, and ably tells the facts behind the news that made the headlines. Here are a few of his evaluations: "It is wise to have a healthy skepticism, particularly on the utterances of statesmen, for in most cases they are largely camouflage." "Il Duce may go on playing his part and taking the limelight but the chances are that, when he finally disappears from the scene, the chief benefits of his labors will be garnered by Humbert [Crown Prince] and his son—and the Vatican." In Germany "there has been no real unity under Hitler. Nazism has as yet established no new system, in fact no system at all for Germany to follow or for the world to follow." "In the manipulation of information the British are past masters. . . . The idea is to make mountains out of molehills and molehills out of mountains—depending on whether Britain or some other nation commits an act likely to arouse public protest." "All expert observers know that in almost two decades French foreign policy has never changed in its essentials, no matter what government was in power."

In Soviet Russia "The mask of peaceful intent conceals certain definite maneuvers in diplomacy which will serve the ends of the army when it becomes ready to move." Japan wants "Elimination of the influence of the Western powers by forcing recognition of the theory that Japan is the 'stabilizing power' of the Orient—in other words the policeman of the Far East—with the right to decide all major policies affecting that region."

Interesting too, is the inference that Edward VIII went to his abdication not so much because of *l'affaire* Simpson

but because of his pro-German leanings and the belief of the British inner circle that he would shortly move for friendship with Germany.

Looking Behind the Censorships is a "must" for the bookshelves of all who would call themselves informed on world affairs.

1 1 1

THE LOST BATTALION. By Thomas M. Johnson and Fletcher Pratt. New York: The Bobbs-Merrill Company, 1938. 338 pages; maps; illustrations; index; \$3.00.

In this book, two civilians—an ex-war correspondent and a historian—set out to show that the famous "Lost Battalion" of the 77th Division (New York) was never, in the true sense of the word, "lost." For five days, it was surrounded and besieged but during that entire time it was sitting on its objective, just where it was supposed to have been, and making a splendid and heroic job of the whole matter, too. Furthermore, everybody knew where the battalion was, including GHQ. In American history, this affair is comparable to the "Charge of the Light Brigade"; the difference being that the Lost Battalion never came back—it held where it was until the rest of the army caught up.

Seven hundred and ninety men participated in the initial attack on October 2. One hundred and ninety-four walked out under their own power when relieved on October 7. A large number were decorated, including the last pigeon sent with a message asking the friendly artillery to cease firing on their own troops.

This stirring episode in a great battle is worthy of every American's attention: particularly those who visualize warfare as consisting of mere symbols on a map. They will find this account stark, graphic, and above all, authentic. Its salient points agree with all military records available, as well as with a personal monograph written in 1924 by Captain Nelson M. Holderman, a company commander in the Lost Battalion.

Besides producing a true account of those five days in the Argonne, the co-authors have subtly attempted to find a scapegoat for the affair, to blame army authorities for sending untrained troops into battle, and to defend the military reputation of Major Charles W. Whittlesey, commander of the Lost Battalion. It is a pity that they undertook any such attempt.

As Captain Holderman wrote: "It was no one's fault; only one of those situations which are bound to arise during military operations incident to campaign, and especially in operations as difficult as those in the 'Forest of Argonne'."



Portrait by Gilbert Stuart
Courtesy Mrs. H. G. Allen, New Orleans

Tarnished Warrior

Major General
JAMES WILKINSON

By JAMES RIPLEY JACOBS

AS a brilliant Revolutionary staff officer, a peacetime frontier commander, an aging general in the War of 1812, James Wilkinson occupies an important place in American military history.

As a companion of conspirators, a master of intrigue, a confederate of alien and domestic plotters, he occupies a position so completely opposite as to make his life an amazing paradox, a puzzle never satisfactorily solved.

Few men had a more intimate knowledge of the then-inhabited sections of America, from Montreal to Mexico City, or of the tangled wildernesses between. Few had his initiative, audacity and relentless purpose. The vivid story of his remarkable career is presented here without gloss or restraint.

*Illustrated with many portraits
and maps, \$3.50*

A Macmillan Book

ORDER FROM

The Coast Artillery Journal

1115 17th Street, Washington, D. C.

As for untrained troops entering battle, civilians who are responsible for our entry into conflicts should consider that inevitable necessity before declaring war against a nation with eleven million mobilized soldiers, when our own army consists of only one hundred and twenty thousand.

The defense of Major Whittlesey was least necessary of all. This New York lawyer who, as a battalion commander, carried out his instructions to the letter, left the army as a lieutenant colonel and wearing the Congressional Medal of Honor—the highest decoration for valor awarded by our country. His citation stated that he: "... distinguished himself conspicuously by gallantry and intrepidity at the risk of his life above and beyond the call of duty." No one could write a better epitaph, even in a book.

E. D. C.

THE APACHE INDIANS. By Frank C. Lockwood.
New York: The Macmillan Company, 1938. 344
pages; index; 59 illustrations; \$3.50.

This is a comprehensive account of the Apache Indians from the days of the first Spanish explorers to the present. Dr. Lockwood tells the history of the most warlike of Indian tribes from the period of Spanish dominion to Mexican independence. He also supplies interesting sidelights on the primitive Apache—his endurance, moral code, and his conduct and attitude toward his friends and enemies.

In part, the history of the Apache is a history of a portion of the United States Army. There are chapters on the Apache as a ward of the government, the various efforts to conquer him, and the Apache activities during and after the Civil War. General Crook, of western fame, of course has a major rôle in this part of the story. The savagery and treachery of the Apache is often counter-balanced by a recital of the injustice, vacillation and indifference manifested by the government.

The narrative is thoroughly documented and the author quotes extensively from contemporary reports, manuscripts, and personal interviews. It is worth having, if you like "Western stuff."

FORT SUMTER, 1861-1865. By DuBose Heyward and Herbert Ravenel Sass. New York: Farrar and Rinehart, 1938. 109 pages; \$1.00.

Virtually every one knows that the first gun of the Civil War was fired at Fort Sumter. Yet, strangely enough, historians have neglected an event equally as important that occurred two years later at the same place: the first major attack by a fleet of ironclads against a coast defense.

The fleet that gathered to launch the attack on Sumter was the most formidable ever floated in any country up to that time. It included four ironclads, all of them designed or reconstructed after the famous battle between the *Monitor* and the *Merrimac*. The new monitors in the

fleet were deemed invulnerable: they carried eleven inches of armor and their turrets mounted the largest naval guns yet carried by a warship. Admiral DuPont commanded for the North with instructions to destroy Fort Sumter and capture Charleston.

The crisis of the action came when all guns of the fleet were concentrated on Sumter. Fifteen- and eleven-inch shells pounded the fort which hammered back until one armorclad began to sink and four other ships were disabled. When Admiral DuPont hoisted his signal flags "withdraw from action," the Rebel flag still floated over the fort. The first fight between armored ships and fortifications had ended in a victory so signal for the coast defenses that the news was suppressed in the North by order of the Secretary of the Navy.

The first and second battles of Fort Sumter are told as adaptations from the novels *Peter Ashley* and *Look Back to Glory*. However, the fictional background is bulwarked by historical accuracy and these two accounts of major battles in our history may be taken as truly authentic.

Fort Sumter was not evacuated until the closing days of the war. During one period of 280 days it withstood a bombardment by 46,000 projectiles. Against it were hurled the heaviest shell yet devised by man. The fort and its stout defenders were truly characterized by Gideon Welles, Lincoln's Secretary of the Navy, when he said that the Charleston had been "the most invulnerable city" of the Confederacy.

Fort Sumter has a place on the shelves of every Coast Artilleryman.

CARBINE AND LANCE. By Captain N. S. Nye. Norman: University of Oklahoma Press, 1937. 441 pages; 73 illustrations; two appendixes; glossary; index; bibliography; \$3.00.

In addition to being a most attractive job of printing, this book shows evidence of exhaustive and remarkable research. Delving into the ancient files of the Fort Sill Library, into War Department records, private collections, and the individual memories of patriarchs, Captain Nye has uncovered and skillfully woven together a century of Indian and military history. While principally a story about the founding of old Fort Sill, the narrative also carries a picturesque account of Kiawa, Caddo, Comanche, and Apache Indian tribes—from their first encounter with American soldiers in 1837, to their final capitulation to white civilization and the death of old Sergeant I-see-o (Indian scout) in 1927.

Compared to the conflicts of today, those battles of the plains that once inflamed our juvenile imagination now appear singularly bloodless and prosaic under the analytical pen of a historian. Occasionally, some of the belligerents were killed, it is true; but most of the time the noise and excitement were caused by war whoops and gunpowder being discharged harmlessly into the air. The task of taming the Southwest Indians seems to have been very similar to the disciplining of recalcitrant children. Treated



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(b) Not to exceed two Honorable Mention Prizes—\$100.00 each.

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(3) Time limit.

No essay received after September 30th will be awarded a prize.

(4) Payments.

Payments of prizes will be made immediately after awards are made. All essays submitted become the property of COAST ARTILLERY JOURNAL. Any person receiving a prize for an essay will receive no other compensation. If any essay is published the author of which received no prize, such author will be paid at the usual rates.

d. HOW SUBMITTED:

Essays will be submitted to the Editor of the COAST ARTILLERY JOURNAL in a sealed envelope bearing the notation "Prize Essay Contest." The copy submitted will contain nothing to indicate its authorship, will be signed by a "nom de plume," and will be accompanied by a separate sealed envelope containing the nom de plume and also the name of the writer. This latter envelope will be delivered to the Chief of Coast Artillery when received and will be opened in the presence of the Editor of the COAST ARTILLERY JOURNAL after the relative merits of the essays have been determined.

e. FORM:

(1) Essays should be limited to approximately 8,000 words, but shorter articles will receive consideration.

(2) Three typewritten copies of each essay will be submitted on letter size paper (one original, two carbons) with double-spaced lines. At least one of any illustration will be a drawing, tracing, or photograph, not a blue print or brown print.

indulgently, the braves became first mischievous, then obstreperous, and finally downright dangerous. But once given a taste of the iron hand, the savages returned meekly to the reservations around Fort Sill.

Native Oklahomans should enjoy this book in which they will encounter many a familiar face or ancestral biography. Will others enjoy reading it? Well, it's all right—if you like Indians.

E. D. C.

CHILDREN OF THE RISING SUN. By Willard Price. New York: Reynal & Hitchcock, 1938. 316 pages; index; illustrations; \$3.00.

"The writer is not conscious of being pro- or anti-anybody. He believes himself the fairest person on earth." Thus Mr. Price, in his introduction.

Judged by these standards—the author's own—the book under review is principally significant, not as a serious study of Japan and of present-day conditions in the Orient, for it is hardly that, but rather as a case-history of a well-intentioned person's reaction to the pressure propaganda of a determined totalitarian state. Mr. Price's volume is, in fact, a mixture of unquestioning acceptance of inspired releases and announcements, of hardly-concealed awe and admiration, and of judgments that, to speak mildly, strike the reader as extremely doubtful. The book is really an amazing, and perhaps, a somewhat alarming exhibition of the extent to which an apparently educated person—Mr. Price writes good English—can be carried away by the dictatorial build-up.

The aberration of the author's judgment is the more striking because here and there throughout the book there are passages which show that he has noted the seamy side of modern fascism. For instance:

"A sad minor strain in this pæan of progress [in foreign trade] is the official report that child labor is increasing: the police announce with pride that they have punished factories which were working employees between the ages of twelve and sixteen three hours beyond the eleven-hour daily limit. There seems to be no blush for the eleven-hour daily limit."

And again:

"While more than half of the nation's entire budget goes into arms, conscription agencies and health bureaus report that the physical condition of the people is growing steadily worse for lack of sufficient nourishment."

Or this:

"... no comfort lies ahead for Eastern Asia. Comfort is the last consideration—consolidation of the imperial power is the first. Japan means to use the agrarian eighty per cent of the 122,000,000 people of Korea, Manchukuo and North China to subsidize industry and 'defense.' We may expect to see the suffering of the many become more intense, the wealth of the few greater, the banks stronger, money sounder, roads and railroads better, mines deeper, cities larger, Japanese advisers more numerous, native sons in high posts fewer, mechanical education wider and ~~and~~

genic education narrower, the average life poorer, the state richer."

Notwithstanding the foregoing, Mr. Price is able to conclude that "Japan might be whipped by Britain and America combined, but only at enormous expenditure and with the dubious final advantage. For Japan would not stay whipped (*Vide* Germany.)" Clearly, Mr. Price does not fall into the error of underestimating an adversary. Indeed, he is singularly free from jingoism. He says:

"If we stay behind Hawaii and mind our own business there is no more danger of war with Japan than of war with Canada. But the navy would not stop there. The navy is equipped to fight and it is human nature to want to do what one is equipped to do. The navy hates to miss the big show in the East. So we already see strain between the navy and the State Department and shall probably see more of it."

This is not to suggest that Mr. Price has sold out, or that he is in the pay of foreign powers. People as ardent as he are not bought; it is not necessary to proselyte a believer.

Recommended antidote: Scherer, *Japan Defies the World*.
F. B. W.

THE CAISSONS ROLL. A Military Survey of Europe.

By Hanson W. Baldwin. New York: Alfred A. Knopf, 1938. 323 pp.; map; index. \$2.50.

Good, plain newspaper reporting has its points in this befuddled world and Mr. Baldwin, serene with New York *Times* serenity, walks the embattled nations of Europe with sure tread, a correspondent of the *Times*. His book—a reporter's account of the external evidences of European rearmament—is given a more technical slant than usual by brief, summary descriptions of some of the new weapons now in the field and others still in the fire.

Mr. Baldwin considers Europe nation by nation: the costs, the "general situation," the army, the navy, the air force, the home front. This uniform treatment is used for the major nations, but the minor states are not dismissed too summarily. And in the good manner of his profession, Mr. Baldwin makes statistics interesting, larding the dull places with descriptions of various scenes, real and imagined—an air raid on London, a ride in an Italian motor torpedo boat, German troops in the *Wacht-parade* and, of course, the next war. He reports what he has seen and heard (or gathered from such handy sources as *Jane's Fighting Ships*) about armaments and about defensive preparations. In all he does a fair and conscientious job of reporting. No disputes over mass versus mobility lead him astray, no weighty philosophy deters the smooth reportorial sailing he set out upon.

Like all good men, he can't escape "best's" and "one-of-the-best's," however cautiously he adds the "perhaps." Here are some of them (for Europe only): the new British plane, the French army, French artillery fire, German antitank organization and technique, Italian evacuation plans, the Maginot Line, Italian cruisers (for speed),

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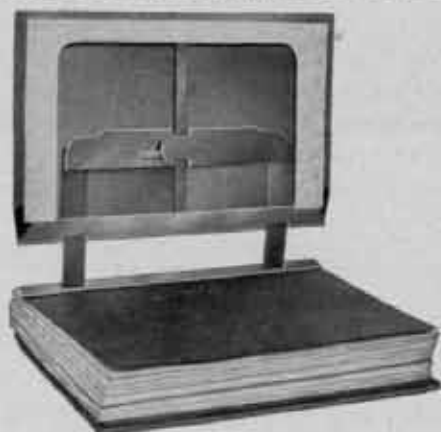
Russian tanks and flying fleet (for quantity), Polish cavalry, Belgian 47-mm. AT guns, the Dutch sailor.

Baldwin does not think the next world war will come sooner than the 1940's; it might be postponed indefinitely, he writes, if the Rome-Berlin axis could be broken down, and especially if England could settle the Mediterranean issue with Italy. Since this settlement seems to be on the way (it was hardly in the air when Baldwin wrote) it may be that the caissons will not have to be unlimbered so soon after all.

W. C. G.

THE NAVY: A HISTORY. By Fletcher Pratt. New York: Doubleday, Doran & Company, Inc., 1938. 411 pages; bibliography; notes; index; illustrated; \$4.00.

Most of us, if the truth were known, remember naval history rather vaguely. We know that the Navy began with privateers in Revolutionary days and in 1812, plus a few ships that owed allegiance to the Government rather than the owners' pocketbooks. We remember that during the Civil War there was a blockade, a *Monitor* and *Merrimac*, a raider named *Alabama*, and that the Navy did something or other along the Mississippi. For the Spanish-American War we recall Santiago and Manila Bay; for the World War, convoy duty and sub-chasing. On occasion we are able to evoke a few names: Farragut, Sims, Dewey, Perry, Hull, and a man named Paul Jones who is now chiefly honored in that a cigarette, a whiskey, and a plug tobacco bear his name.



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If your memory of naval history is dimmed by years of absence from history as it is taught, Mr. Pratt's book will prove welcome. He has done a skillful job of weaving into an integrated whole the story of the Navy's 150 years afloat and ashore. He writes briskly and colorfully, so much so that he is able to give new vigor to the oft told tale of Farragut damming the torpedoes, Dewey's solemn "You may fire when you are ready, Gridley," and the sea epic of the *Constitution*.

Mr. Pratt will be recalled as the author of recent biographical sketches in the JOURNAL: "Sword of the Board" and "Old Pap." His current book is a recommended must for the battery library and the personal bookshelf.

THE CROWNING OF A KING. By Arnold Zweig. New York: The Viking Press, 1938. 458 pages; \$2.50.

This is the story of the German Army's last six months on the Eastern Front. The narrative concerns itself mainly with the General Staff's intrigues and bickerings with respect to the choice of a candidate for the throne of Lithuania. The loss of the war put an end to this, of course, but the events narrated cast their shadow over some of the circumstances now tormenting Europe. Caught in the web of espionage and diplomacy are the young staff Captain Winfried and his sweetheart Nurse Bärbe.

The author will be remembered for his unforgettable *Case of Sergeant Grisha* some years ago. Although his present volume has little value in the realm of tactics or strategies it does tell an absorbing story. Moreover, the account of the functioning of a mammoth headquarters in the field is illuminating and should prove interesting to those who see in "administration" something more than filling out forms and rendering periodic reports.

YOUR WASHINGTON. By Mary Field Parton. New York: Longmans, Green and Co., 1938. 193 pages; illustrations; maps; \$2.00.

Sooner or later, every one comes to Washington. Not only is the visitor confronted by a vast array of governmental buildings, statuary, and exhibits of every sort, but he is also faced with making a choice from a hundred guidebooks. These range from the ponderous (and unexcelled) *Washington: City and Capital* published by the Works Progress Administration, to the ten-cent "handy guides" found on every newsstand.

Miss Parton's book fills the void between these two extremes. Compact and concise, it lists virtually every activity and point of interest that the intelligent visitor will want to see. The illustrations lend point to the text and the maps are especially helpful.

The author makes a point that cannot be over-emphasized: "Plan your trip before you come." To this the reviewer adds, "Get a guidebook before you come." Planning the time to be spent in Washington is much easier at home than when on the trip. *Your Washington* should also prove helpful to those ordered to the city for station.



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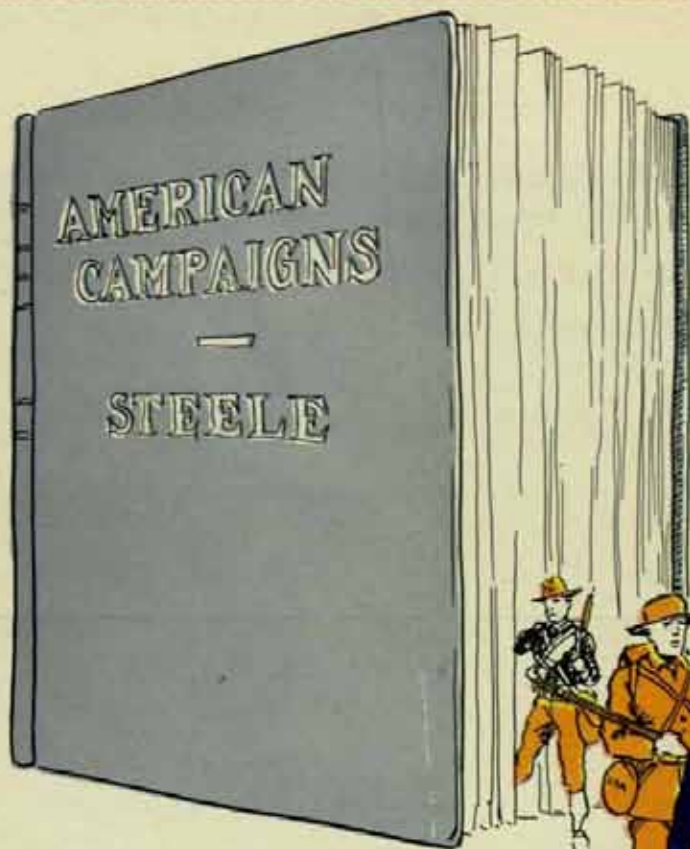
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