

COAST ARTILLERY JOURNAL





Signal Corps

Tec 5 Frank Guy Arrige and Pfc. Clyde I. Bates of the 503d Parachute Regiment raise the American flag over Corregidor for the first time since the surrender of the island.

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Radar Screening for Low-Flying Targets

By Lieutenant Colonel Albert J. Weinnig, Coast Artillery Corps

EDITOR'S NOTE: This article is based on a study made with the radar officers of the 50th and 56th Brigades, Major Victor Raabe and Major Claude I. Parish, respectively. Colonel Weinnig was S-3, 56th AAA Brigade.

Radar officers have long preached the doctrine that the selection of a radar site is of prime importance. Their pleas, unfortunately, were in most instances disregarded. Their clamor for emphasis on radar siting was like the biblical voice crying in the wilderness—heard but unheeded. It was not until tragic failure or only partial success of many missions because of improper radar siting that the doctrine of the radar officer was clearly enunciated and made mandatory, namely, that tactics may govern the general location of a gun battery but the siting of the SCR-584 will determine the exact position. Experience has been such a harsh pedagogue that now every possible technique employed to insure that the radar site selected is the best possible under the existing conditions. These techniques, such as the use of radar equipped helicopters which can hover at varying heights over every possible radar location and obtain camera record of scope pictures, and the use of actual terrain mock-up for line of sight studies, and the analysis of site requirements for the radar determination of hostile mortar positions, are absorbing studies in themselves. This article, however, will relate how American and British radar officers encountered unique problems of radar siting and radar screening in setting up the defenses of Antwerp against the all-out German V-1 (Buzz Bomb) attack on that vital supply installation.

"PIPOLOGY"

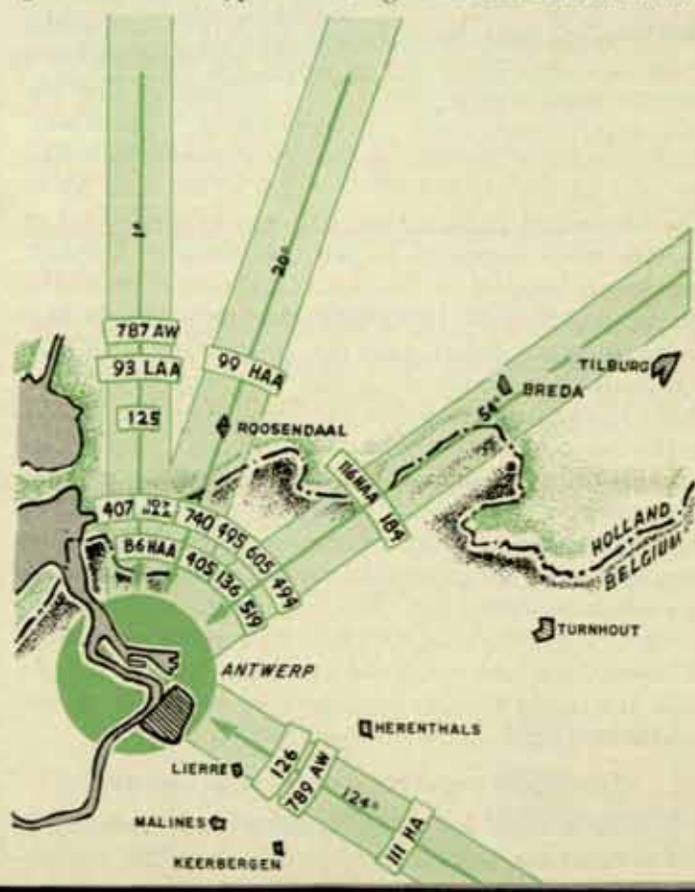
"Pipology is the study and interpretation of radar scope pictures. Ability to interpret 'pips' is both a science and an art. It requires much study and endless hours of practice on the radar. It involves size and shape of 'pip,' bobbing or fluctuation characteristics, and movement in azimuth and range.

The characteristics of the V-1 itself presented a radar problem different in many ways from that required for conventional anti-aircraft gunnery technique. The V-1 is relatively small in size, travels at a relatively high speed (375 mph) and at altitudes that vary normally from 500 to 4,000 feet. The nature of the defense, that is, successive gunbelts across the channelized avenues of attack (see sketch), always presented an unfavorable aspect angle of the V-1 to the radar. The radar always "saw" a head-on view of the target, whereas a side view of the "bird" gives the optimum

radar response. This fact was made all the worse when the Nazi, because of metal or production shortages, began to construct V-1 with plywood wings; however, the increased vulnerability of the plywood bird to gunfire partly compensated for the poor radar response. The V-1 response on the SCR-584 was remarkably clean, slightly weaker in intensity than the "pip" of a fighter, such as the P-47, and was almost entirely free of bobbing characteristics. It was easy to identify—principally because of its unchanging altitude, unvarying azimuth of approach, and constant speed. The radar operators became very proficient in distinguishing the V-1 pip from that of an aircraft—although on a few occasions a low-flying Spitfire or Typhoon made the boys a bit trigger happy as it sped toward an Antwerp airfield on a typical V-1 course.

TERRAIN FEATURES

In order to understand the problem of radar siting in the Antwerp defense one must have a clear picture of the terrain as the radar "sees" it. The important features are ground contour, type of soil, vegetation and sources of fixed



echoes. The terrain is essentially flat. An elevation study of cross sections of the ground along lines through the Antwerp port area to the North, Northeast, East and Southeast shows a general slow rise in the ground of a few yards (0-10 yds.) for a distance of 10,000 to 20,000 yards outward from the port area. From this first slight crest there is an imperceptible downward slope which drops about 10 to 20 yards over a distance of 20,000 to 50,000 yards. Beyond this depression the ground again rises in the Northeast and East to another similar crest and in the Southeast the ground rises to small rolling hills. As tactical doctrine dictated that the gun battery be not less than 10 miles from the so-called vulnerable area (VA) of Antwerp (so that wounded "birds" could not glide into the VA), the radar invariably had a clear view of the valley while searching for a pick-up of the V-1. This was a situation conducive to intense clutter which would prevent detection. In addition, the ground was extremely wet as the water level varied from above ground to a few feet below the surface. Radar could seldom be dug-in and the reflections of radar waves from the damp ground were very strong. The effect of this condition was to intensify the clutter. The presence of the great number of small towns and villages, each with its several chimneys and church steeples, further aggravated the problems of clutter. Fortunately, much of the area was covered with small patches of woods, mostly pine, and these could be used as an effective mask to screen out the fixed echoes. Proper siting of the radar with respect to these patches of trees made many areas usable which otherwise would not have been acceptable as radar sites.

TACTICAL REQUIREMENTS

The tactical requirements of the defenses imposed the most exacting radar demands. The SCR-584 was required to function perfectly both as a gun-laying radar and as a medium-range search radar. Every refinement that the radar experts could devise was employed to "squeeze out" the last ounce of accuracy so that even unseen fire under the most adverse conditions was lethal to the buzz bomb. The fire control problem, however, was relatively easy of solution when compared to the difficulties of detection which were imposed by the tactical necessity of practically pin-pointing batteries 1,000 yards apart on a straight line. Radar siting was thus limited to a position not more than 300 yards from a point designated by a map study. The ability to search and pick-up a low-flying target like the V-1 so that smooth tracking with steady director output data was obtained at a minimum of 12,000 yards range required an exceptional radar site. It was soon discovered that of the fifty-odd gun positions which were pin-pointed on the map, only a half dozen satisfied the minimum requirements of a satisfactory radar site. The next section of this article is a general discussion of our efforts to improve radar siting to insure early pick-up of the low-flying buzz bomb. As such, the results of our experiences are applicable to any gun defense against very low-flying aircraft.

RADAR SCREENING FOR LOW-FLYING TARGETS

The detection of low-flying aircraft with the radar SCR-584 presents two specific problems which are not encoun-

5,000 feet. The first problem is that of ground clutter which appear on the PPI scopes and range scopes when the radar searches at angles below 60 mils. Usually, clutter is experienced at low elevations when the radar has a good view over the surrounding country. This is particularly true in flat terrain in low countries when the towns and villages are built on the higher ground. In such terrain echoes from objects such as houses, factories, water towers, chimneys, and hills produce objectionable clutter on the scopes. The second problem is the possibility of the radar locking down on the ground reflection of the aircraft instead of tracking the echo from the aircraft itself. This is especially true if the terrain is extremely wet in which case the reflected echo of the aircraft is usually strong enough to track. If the presence of strong fixed echoes makes the elevation tracking erratic, this possibility becomes very probable. The elevation of the radar parabola which has erroneously locked upon the reflected echo will continue to decrease as the aircraft approaches until it finally comes against the elevation stops and the aircraft is lost. This can also become a very dangerous situation when commands to fire are a matter of split second judgment, particularly at night when the unseen type of fire control is in effect. It should be emphasized that the above is experienced only when the altitude of the aircraft is comparatively low, and terrain features are as described above.

The obvious method of solving these two problems of clutter and ground reflection is to screen the radar from its source of trouble. The most desirable method of screening would be to place the radar in a saucer-like depression in the ground with a near horizon of ground within about 1,000 yards, the crest of the ground being at an angle of sight of about 20 mils. In such a site, the source of the ground clutter is screened from the radar beam and is thus eliminated from the radar scopes. Obviously this type of screening is rarely available, especially when tactics or high gun density dictate the exact location of the radar and precludes the choice of a site outside a very limited area. Under these conditions, artificial screening or major alteration of the terrain are necessary.

A method of determining where artificial screening is required and some of the details of screen construction are described below:

a. Clutter diagrams are made for the radar with the parabola set to zero degrees elevation. The radar is thoroughly tuned and maintained at its peak performance in order to be certain that all clutter that is present will show up on the radar scope. These clutter diagrams are then studied to determine whether or not an artificial screen is needed, and if so, over which azimuth arcs it should be erected. The tendency of the radar to track the ground reflection of the aircraft can be observed by watching the behavior of the parabola as the radar tracks a low-flying aircraft through its engagement arc. Rarely will there be a tendency to track a reflected echo when there is no ground clutter, as the mask, which screens out the clutter, will also screen out any echo reflected from the ground.

b. The extent of screening will depend on tactics, which will determine through what arc the target shall be engaged. If the aircraft is to be engaged in a limited

screening is erected only to cover that arc with sufficient overlap (about 10° on each side) to guard against spillover.

c. The angle of sight to the top of the screen from the radar will vary from site to site. If the screening is too high, the aircraft itself will be screened and not detected. The maximum angle which can be allowed is governed by the expected altitude of the target and the detection range required. In the defense of Antwerp, the angle of sight from the center of the parabola to the top of the screen should not exceed 20 mils. For this measurement of angle of sight, it is imperative that the radar be leveled and that the telescope mounted on the parabola be collimated with the electrical axis of the parabola. Measurement can be checked with a B.C. telescope mounted on the roof of the radar.

d. The top of the screen must be truly horizontal. The screen is extended downward to ground level and must be completely grounded.

e. The screen is set at an angle between 15 and 30 degrees to the vertical, sloping downward and outward from the radar, i.e., the top of the screen is the nearest point of the screen to the radar. (See sketch.)

f. Provision must be made to enable the height of the screen to be adjusted when first erected. The height is adjusted initially until the clutter has been removed or has been sufficiently reduced to insure that no interference from clutter is experienced while tracking targets over the whole of the engagement arc. The screen is then clamped and fixed in position.

g. The distance of the screen from the radar should be equal over the whole screening arc, i.e., the screen is erected on an arc of a circle with the radar at the center. It has been experienced that the greater the distance the screen is from the radar, the more effective the screening. It was decided to fix this distance at 40 to 50 yards because of practical limitation of height to which screening material can be erected and the amount of screening material that was available. In exceptional circumstances the absolute minimum radius of 30 yards was authorized. If the screen is too close, the radar beam is distorted and power is dissipated into the screen.

The effect of artificial screening thus erected usually clears up a cluttered PPI scope, reduces the effects of fixed echoes upon automatic tracking, and eliminates false tracking of ground reflection. The reduction of clutter to 1/10th amplitude can be taken as the performance to be expected from a single wire screen of the chicken-wire type. Proper adjustment of PPI intensity will cause these echoes to produce only faint intensification of the wire screen, or even to vanish entirely. Very strong echoes will not appear to be affected at all. This is due to the fact that the strong signal, even though reduced 90 per cent, is still strong enough to give a saturation signal. The attenuation caused by the screen in the case of these strong echoes will be evidenced by a reduction in angular height at which these echoes disappear. Screening in the firing sector outside the search sector is practical to reduce the effect of fixed echoes on automatic tracking. In many cases screening out fixed echoes will permit tracking "through" the echo with no noticeable irregularity of tracking. In nearly every case, it will be possible to screen

the echo sufficiently well to prevent the fixed echo from causing loss of target.

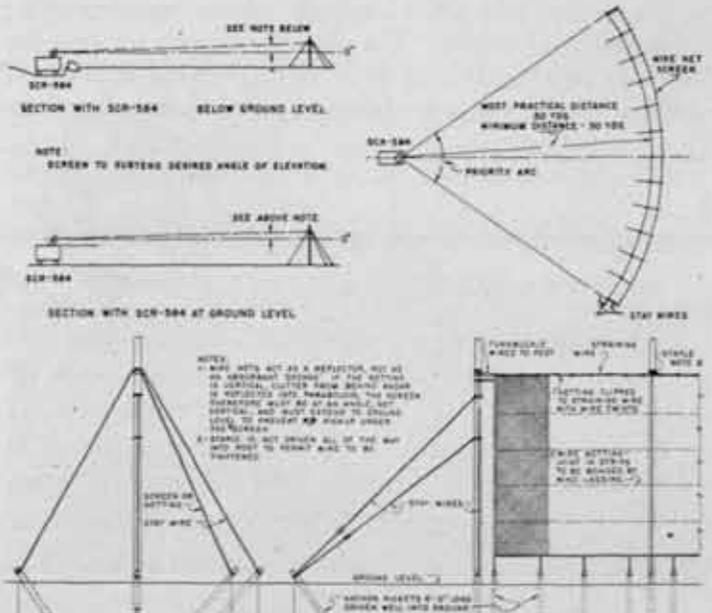
Screening material can be improvised. In our specialized defense against the buzz bomb, the large number of radar sites that required alteration made it practical for the British supply services to design and issue a standard screening set. This set consisted of iron tubing, guy and fastening wire, clamps, turnbuckles, and an ample supply of light wire fencing of 1- and 2-inch mesh. Material for a 60° arc of screening at 50-yard radius could be transported on a 2½-ton truck. At some sites, it is possible to dig in the radar until the roof is level with the ground and then construct an earth mask with a bulldozer. Screens can be made from a thick live foliage, particularly in wet seasons of the year. However, the wire screen is most practical because of its uniformity, ease of transport, construction, and camouflage adaptability.

It is again pointed out that artificial screening is mainly of importance in engagements where the altitude of the target is low (3,000 to 5,000 feet), and the signal strength is relatively weak. For normal targets above 5,000 feet, clutter is seldom serious because searching is performed above 60 mils angle of sight, at which point the narrow beam of the radar sweeps over sources of fixed echoes and clutter is practically nonexistent.

RULES FOR SITING

Every new development or relocation of a gun battery was an exercise in radar siting from which valuable lessons were gleaned. One of our first experiences was to learn to use ground contours to our advantage in siting the radar. As an example, the position given the 494th AAA Gun Battalion was well forward of a crest, so dropping back to a reverse slope was impractical. In an effort to obtain good long-range pick-up this battalion sited their radars with insufficient tree mask. The remedy in this case was found to be resiting the radars behind heavy tree-covered areas giving an angle of elevation measured from the center of the radar antenna to the top of the trees of about 25 mils.

Two sites which were occupied by the 407th Battalion illustrated still another condition. These sites were located



with a perfectly flat, clear, very wet area about 800 yards wide directly in front of the radar. Beyond this area was a low tree mask. Clutter at these sites was present in the range of 0 yards to 20,000 yards but not so thick as to prevent searching, picking up and even locking on the buzz bomb. However, the effect of ground reflections was pronounced. The radars tracked satisfactorily until a ground echo in the radar beam entered the narrow gate and gained sufficient strength to pull down the parabolas. Normally as soon as the narrow gate cuts out the interfering signal a radar goes back to the target. In these sites, the target signal reflected from the damp ground was so strong that it, combined with the fixed echo signal, pulled the parabolas of the radars to an angle of elevation less than zero mils and the radars continued to track the reflected target signal at a negative elevation angle. Since other considerations made it impractical to move the batteries, artificial wire screens were erected and, by eliminating the ground reflections, cured the trouble.

Still another lesson was learned by B Btry, 184th Battalion. This battery was set up to take advantage of natural tree screening. However, isolated high trees stood up above the general level of mask. These trees did not too seriously interfere with pick-up, but whenever a target being tracked automatically passed behind a tree, the radar data became very erratic and unsteady, causing poor firing and frequently loss of target.

The results of site failures led to a set of rules for siting, based upon ability of the radar to make pick-ups of divers in time to allow steady director output data at 12,000 yards ground range. The rules were:

- a. Angle of mask not less than 10 mils or more than 20 mils over firing sector.
- b. Locate on reverse slopes where possible—if not behind trees.
- c. Locate so that tree mask would be within 400 yards of the radar if possible.
- d. Avoid wet ground ahead of the radar if possible.
- e. The PPI tube must show no clutter beyond 15,000 yds. at 25 mils elevation and all clutter must disappear at 75 mils to 100 mils elevation.

These rules were never hard and fast, but merely a guide in the selection of sites. The necessity for pin-pointing the batteries in a small area made their practical application difficult. However, by working toward them, sites were much improved.

One additional siting operation is noteworthy. At one

time it became tactically advisable to site four batteries of the 125th Battalion at the extreme north end of the defense within 3,000 yds. of the enemy. This area represented very bad radar condition—forward sloping ground, extremely damp with pools of standing water, no tree patches usable for screening out clutter, many of their high trees interfering with tracking, and lots of clutter-producing objects—chimneys, windmills, houses, wireless towers, etc.—in the area. The area as it stood was useless. Tactical considerations were judged to outweigh the radar site, so the batteries were sent out to occupy the area. The record of this battalion had previously been excellent but here experienced almost 100% failure to hit. Rather than move the battalion and leave uncovered the buzz bomb alley over their positions, it was decided to make completely artificial sites by using wire screening.

At the beginning of the screening operation all four batteries reported:

- a. Superior pick-up—launching could be observed at 35,000 to 40,000 yards away and 35,000 yards was standard pick-up range for targets of extremely low altitudes.
- b. Targets could be followed normally into the dense clutter area in all sites at about 18,000 to 20,000 yards.
- c. Automatic tracking at long ranges was impossible. Radar almost always tracked ground reflection.
- d. Automatic tracking at short firing ranges produced erratic firing because of fixed echo interference and trees.

The "site repair" job was as follows:

- a. One radar not previously pin-pointed on the ground was moved to take maximum effect of the terrain features. The move was about 50 yards and helped materially.
- b. The interfering thin high trees were cut.
- c. Wire screens were installed to eliminate ground reflections to reduce the effect of fixed echoes on automatic tracking and to thin out the fixed echo patches by reducing the weak echoes below the PPI intensity level.

After crews became accustomed to operational differences between the artificial sites and the sites they had previously occupied, excellent firing results were again obtained.



"The decision to deploy U. S. Antiaircraft Battalions in the Diver defense of Antwerp was based on the demonstrated superiority of the SCR 584—M9 Director—Automatic laying 90mm gun combination against flying bombs."—From an official ETO document.

Notes on German AAA

(The following are extracts of an interrogation of a foremost authority on German antiaircraft artillery.)

PERSONNEL AND TRAINING

Originally, German antiaircraft personnel were specially selected men who were superior in morale, discipline and smartness. Careful mental, physical and "moral" investigations were made of them before they were accepted for the service and thereafter they were given a year's training before they were considered ready for combat. Six months of this was comparable to our basic training and culminated in a target practice. Men were then assigned to units and underwent unit training for the remaining six months of the period. Even more rigid selection was made of officers, with comparably stricter training standards; every officer had to be proficient in any duty which he could order a man to perform.

As the war progressed the initial six months of basic training was cut to three, and the unit training was conducted on operational sites. This reduction in basic training time was deemed a mistake.

Eventually the selectness of the organization was ruined by taking about 75% of the men for duty in other arms. The replacements were anything but up to grade and were "volunteer" Russian PW's, members of the Hitler Jugend, and women and girls. Apparently some German allies were also used, but these were spoken of despairingly. Girls were used only in searchlight units as telephonists and plotters.

Emphasis was placed on the need for selected manpower in antiaircraft artillery, because antiaircraft gunnery was considered a "technical art."

Heavy guns were always manned by AAA units; light guns at specific industries were manned by *Heimat Flak* units composed of factory workers.

Firing ranges were difficult to find because of the density of the population. There were four ranges in the vicinity of Rostock with fields of fire over the Baltic, one near Fecamp on the Channel, and one near Antwerp. Inasmuch as there were over 2,000 batteries to be fired, transportation difficulties made these ranges available to only a limited number of units, and finally it became customary to fire target practices from the gun positions, with warnings to the population to clear out.

Towing planes were invariably too slow. The *Luftwaffe* provided no modern airplanes to tow targets and efforts to get better ones were not very successful; they were too badly needed elsewhere. At long last they secured the services of a few captured airplanes.

MISSION OF AA

The mission of Antiaircraft Artillery was to destroy enemy aircraft and by destruction to defend the objective. During a period after the beginning of the war, it was argued by some that the mission of AA was to defend the objective and that it did not matter whether enemy air-

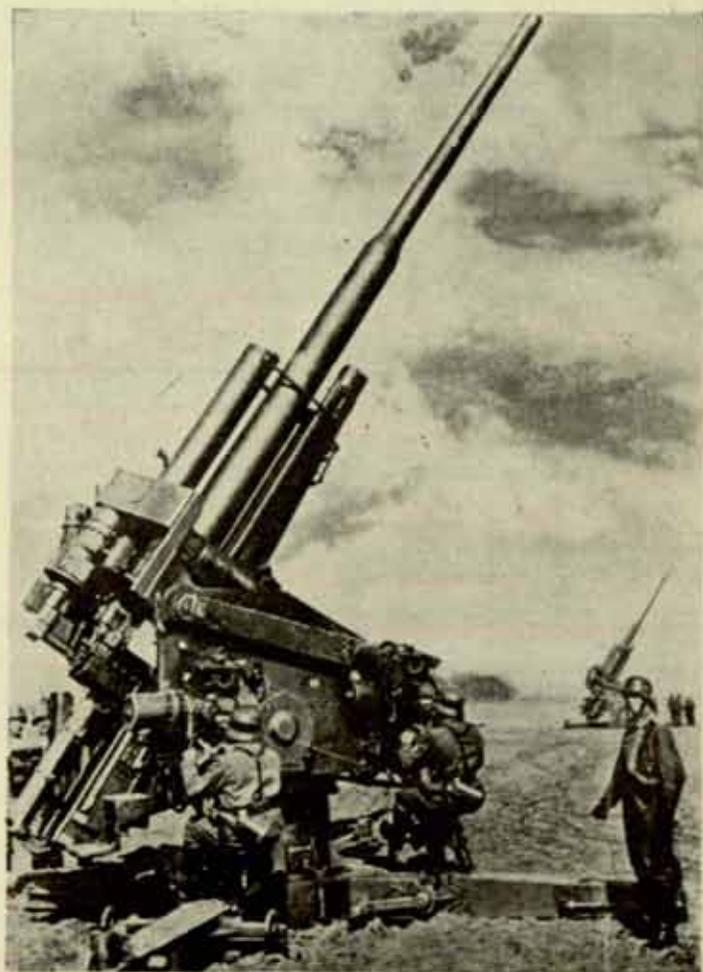
craft were destroyed or turned away. However, this concept again gave way to that of destruction.

EARLY WARNING SERVICE

Originally there were three early warning nets in operation—the *Flukko* (civilian warning service), the Air Corps and the AA—each serving its own organization independently. This often resulted in the existence of three different "pictures" of the air situation so, in the fall of 1943, the system of early warning was changed. The same services continued to be performed by each, but the Air Corps Fighter Command was made responsible for all early warning and the AA and *Flukko* normally received their early warning from the Fighter Operations Room.

The Air Corps initially used ground OP's but these were gradually superseded by Radar from 1942 on. Within the Fighter Command Operations Room all flights, both friendly and hostile, were plotted and the Commanding Officer of the fighter wing was present, in person, for all alerts. The AAA Liaison Officer was normally a Brigadier General or Colonel and he, too, was present for all alerts. There was only one AALO.

The *Flukko* was located in each large city and its area



128mm AAA Gun



88mm AAA Gun

European Photo

was determined primarily by available communications. The *Flukko* plotted hostile and unidentified flights only and its purpose was to warn the appropriate civilian agencies.

Early warning in general was excellent. An early-warning radar was present in all areas defended by AA guns, and Allied aircraft were picked up at distances which ranged from 200-300 km (130 to 200 miles). This permitted AA units to receive about two hours warning of bomber attack. German radio listeners picked up warnings as soon as American planes began to warm up at English bases. (This caused the observation that the *Luftwaffe* should have attacked take-offs. An effort was made to convince both Hitler and Goering, but with scant success, that this would have been effective.)

There were few false alerts, but feint raids caused considerable difficulties. As a result of feints Berlin received some attacks without warning.

AA FIGHTER COORDINATION

Before the fall of 1943, the AAA Commander frequently coordinated the AAA and the fighters and would tell the Fighter Commander when to be airborne, what area to cover, etc. About the time of the Hamburg raid, however,



20mm AAA Gun

night fighters demanded and secured permission to enter flak-defended areas.

With reorganization, coordination of Air Defense was made the responsibility of the Fighter Command and operational control over the AAA was exercised by the Fighter Wing commander through the AAA Liaison officer in the Fighter Operations Room. This control normally took the form of restrictions. For example, AAA could not open fire in daytime above certain ceilings (initially this was 7,000 meters but was made progressively lower until, in some defenses, AAA could not fire at all when fighters were airborne).

German flights in the German zone of communications were reported to a central point prior to take-off. The German AAA received this information of friendly movements of aircraft to include time airborne, course, and altitude. However, when an Allied raid was in progress, the system did not function properly and the AAA did not receive advance warning of friendly flights.

AAA was permitted to fire on unidentified aircraft. This caused "much confusion" because German pilots did not observe the rules for restrictions to flying.

It was believed that no restrictions should be placed on day fighters, as good aircraft recognition training (in their palmy days, flak units had two hours of recognition training daily) will protect fighters during daylight hours. At night, fighters should engage attacking aircraft only on their approach to a flak-defended area, breaking off as the attackers come within gun range. There was a high regard for the effectiveness of *flakartillerie* as compared to that of fighter aircraft.

In each Operations Room, the Commanding Officer, *in person*, conducted all alerts. (If the commanding officer was to be temporarily absent, he designated another officer by name to take his place.) A duty officer remained in each Operations Room. He was required to call the Commanding Officer on the approach of any hostile flight.

AAA ALERTS AND MANNING DETAILS

For heavy AAA, alerts were normally called for two or more aircraft only; and toward the end of the war, be-



37mm AAA Gun

cause of ammunition shortage, AAA was forbidden to engage attacks consisting of one or two aircraft only. Flak commanders alerted the AAA. The Fighter Control Center could not alert the AAA. "That was why we had *Flak* commanders."

In light AAA there were normally no special alert periods in Germany, though this depended on Allied air tactics; in Italy there was a dawn and dusk alert because Allied aircraft usually attacked during these periods. Light AAA always kept at least the No. 1 gunner on each gun. This man could, in an emergency, point the gun and fire the ammunition in the magazine. In addition at least one air guard was on duty in each platoon.

HEAVY AAA

PREPARATORY FIRE

Heavy AAA batteries received met messages from the Fighter Command every three to four hours. When these met messages were being received *no* trial fire was conducted. In the absence of met data, trial fire was conducted several times daily.

Calibration fire was *not* conducted. Trained teams measured the muzzle velocity of each gun in a battery (as required—perhaps every several months) and this was the only calibration correction made.

Muzzle velocity was measured by a chronograph—two wire screens at a set distance apart through which the projectile passed. Near thickly inhabited areas, these screens were placed on scaffolds so that the gun could fire at a safe angle of elevation.

CONDUCT OF FIRE

It was *strictly forbidden* to make any corrections during firing. After firing, errors were checked and corrections placed in preparation for the next course.

Flank spotters were not used. Other batteries would telephone the firing battery after a course and report the average deviations.

Volley fire, where all guns in a battery fired together at a set interval, was not used. (I.O. Volley fire was observed to be used by the Germans in Tunisia; however, this was probably not normal.)

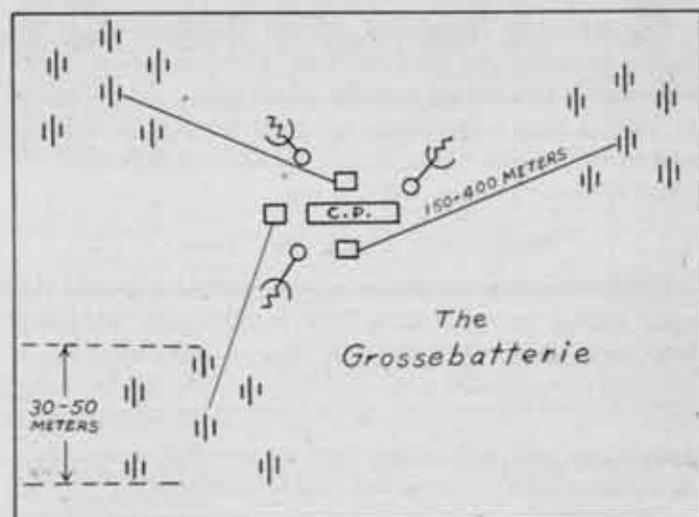
PRIMARY SECTORS AND CONTROL OF FIRE

Each heavy AAA battery had its primary sector for engagement, and sectors were laid out with overlapping sectors so at least two batteries could fire on any target. Batteries were required to fire on enemy planes appearing in their primary sector but the decision as to which of succeeding formations entering that primary sector should be engaged was left to the battery range officer. When there was no target in the primary sector, a battery was permitted to fire in its secondary sector but first it must inform the Operations Room at which time negative fire direction could be exercised.

From ten to twenty seconds were required to change targets, depending on the sector of the new target.

THE GROSSEBATTERIE

Early in the war, planes were structurally light, lightly armored, and slower. One-battery units gave sufficient fire power, but as planes were improved structurally and more heavily armored, more fire power was necessary. Single batteries (four to eight guns) were consolidated to form *Dobblebatterien* (double batteries) and even *Grossebatterien* (great batteries) for more fire power.



The *Grossebatterie* was actually three single batteries side by side. There was no more operational tie between these three batteries than when separated, except that all engaged the same target.

Never during the war were all three directors in a *Grossebatterie* knocked out by air attack. If one director or radar did go out, then that battery received present position data by telephone and calculated data by use of the *Malsi*. There was no way of connecting more than one battery of guns to one director, nor was there an arrangement for sending radar data to other than its own director.

Normally, all three batteries of a *Grossebatterie* engaged the same target. Each battery could engage a single target, though that was seldom done.

TACTICAL EMPLOYMENT OF HEAVY GUNS

An initial bomb release line (IBRL) was computed for each area objective assigned for flak defense. This computation was based on the highest altitude and highest speed at which enemy attack could be expected.

Heavy flak units were distributed all around the objective at as regular intervals as terrain and radar reception allowed. 128mm batteries were placed just inside the IBRL (i.e., toward the objective) so that with their ground range of 10,000-11,000 meters they were able to cover the entire Critical Zone to their front. 105mm batteries seemed to be similarly employed. 88mm batteries were uniformly spaced within the area between the outer edge of the objective and the IBRL and, if the area were large some batteries were placed within it.

Every effort was made to engage aircraft before bombs were released.

The Germans had made only meager plans for defense against retaliatory use of PAC (pilotless aircraft) by the Allies. It was the subject of a memorandum issued by the Reichsmarshal, Goering, but not much was done about it. Barrage balloons, AAA, and jet aircraft in daylight—all were to be used but there were no specific plans for the use of AAA.

Each heavy AA battery was supposed to have alternate positions prepared and camouflaged about 1,500 meters from its regular position but this was seldom complied with.

DEFENSE OF A POINT OBJECTIVE

The minimum defense of a Point Objective would be twelve batteries arranged as four *Grossebatterien*. Batteries would be situated near the bomb release line to cover the critical zone (considered as thirty seconds). Altitude used in calculation of the bomb release line depended on Allied tactics—normally 7,000 meters.

DEFENSE OF LARGE OBJECTIVES

The vital points in the area were picked out and the bomb release line was calculated for the area including these vital points. Outlying objectives of lesser importance

were not normally considered in determining the size of the area to be defended. Metropolitan areas, as such, were not defended. *Grossebatterien* were then placed to cover the critical zone with batteries spaced normally as follows:

88mm: 1,500-3,000 meters

105mm: 2,500-4,000 meters

128mm: 3,500-5,000 meters

Large important objectives were defended by as many as 500 guns though it was believed that absolutely vital objectives, such as synthetic gasoline plants, etc., should have been defended with 1,000 guns placed in three concentric circles.

DEFENSE OF AIRFIELDS

Airfields were not defended by heavy AAA. There simply weren't enough guns for this purpose.

DEFENSE AGAINST RADAR JAMMING

Although radar jamming is very often effective, it can be overcome by training and special equipment. Aircraft carrying electric jammers were the first priority targets. In the presence of window, it was sometimes found possible to engage succeeding formations by flank batteries. It was also possible to track and fire on the lead planes of a raid using window. With the radar jammed, the aircraft were engaged by barrage fire for unseen firing and by use of height finder for seen firing. At night targets were illuminated when friendly fighters were not airborne or were out of AA range.

LOW OR DIVING ATTACKS

Low-level attacks on gun positions were quite unsuccessful; the crews knew they were well protected and stood by their guns. Precut fuzes were kept in gun pits and proved quite effective, as did incendiary pellet ammunition. Too, each heavy AAA battery had a light AAA platoon (20mm or 37mm) assigned to the battery and deployed as a platoon about 200-500 meters from the heavy AAA battery for local defense along the most likely avenue of approach.

GENERAL COMMENTS

Radio is sufficiently secure from jamming to be considered a primary means of communication.

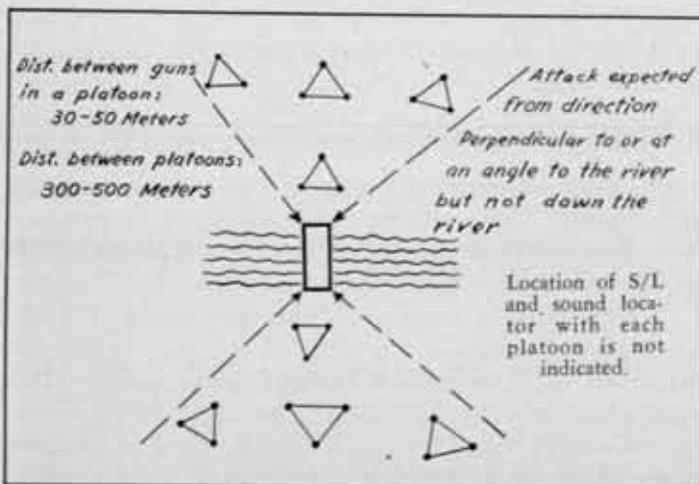
At the beginning of the war it was thought that a heavy flak burst within thirty yards of a B-17 was sufficient to prevent its return to its base. This danger area is now believed to be only five yards.

LIGHT AA

Like the heavy AAA, emphasis in the AW's was on fire power, and the fire unit was considered to be the platoon of three guns—either 20mm or 37mm with ranges as follows:

	Destructive Fire	Harassing Fire
20mm	1,200 meters	up to 2,200 meters
37mm	2,000 meters	up to 3,000 meters

The platoon operated under the central control of the platoon leader and was capable of delivering a murderous volume of fire. Guns within each platoon were sited thirty



AW Defense of a Bridge

fifty meters apart and platoons 300-500 meters apart, for both 20mm and 37mm guns.

Defense of a bridge: Here again, fire power was stressed, and platoons were normally sited to support each other, giving a very effective defense. No bridge strongly defended was destroyed during the course of the war.

Defense of large objectives: There was no AW defense of large areas though AW defenses of point objectives within a large area were established.

Defense of airfields: Throughout the war, the AAA missions never included the defense of aircraft on the airfield.

Early in the war, when air superiority was maintained, airfields were often completely undefended, the AA being used in defense of industry. If the airfield was defended at all, the hangars, workshops, and near-by oil, gasoline and ammunition dumps were protected by light AAA (20mm and MGs only) mounted on top of hangars.

Commencing in 1943, when the Allies began gaining air

superiority, the oil, gasoline and ammunition dumps were moved from the vicinity of the hangars and workshops to near one end of a runway. At least one platoon defended each of these dumps. Then two or more platoons were placed 200-1,000 meters from that end of the runway to protect aircraft about to land. The opposite end of the runway was defended only when planes landed from that direction. Such a defense served as a deterrent to discourage Allied planes from following German planes in.

Defense of routes: AW platoons defended vital points along routes, such as defiles, etc., and the remainder of the road was patrolled by *Flakwaggons*. If sufficient AW were available, the *Flakwaggons* would not be employed.

Barrage fire: Barrage fire with AWs was very seldom used.

Searchlights and radar with AW: Each platoon of AW had a searchlight and a sound locator as a part of the platoon. There was no radar for use of the light AAA though such use had been proposed.



AAA Versus the JP's

By Major William D. Workman, Jr., Coast Artillery Corps

The operational debut of jet propelled aircraft (within which category we include flying bombs) has presented new and challenging problems to the antiaircraft artilleryman—problems which bid fair to wax more and more difficult with the further development and improvement of jet propulsion.

The Germans used jet propelled fighters in fair numbers during the last few spasmodic months of the *Luftwaffe's* existence. So far as the Allied antiaircraft artillery is concerned, however, jet propulsion has been encountered principally thus far in the form of the flying bomb, or "robomb," with which the Germans attacked London and its environs during the summer of 1944.

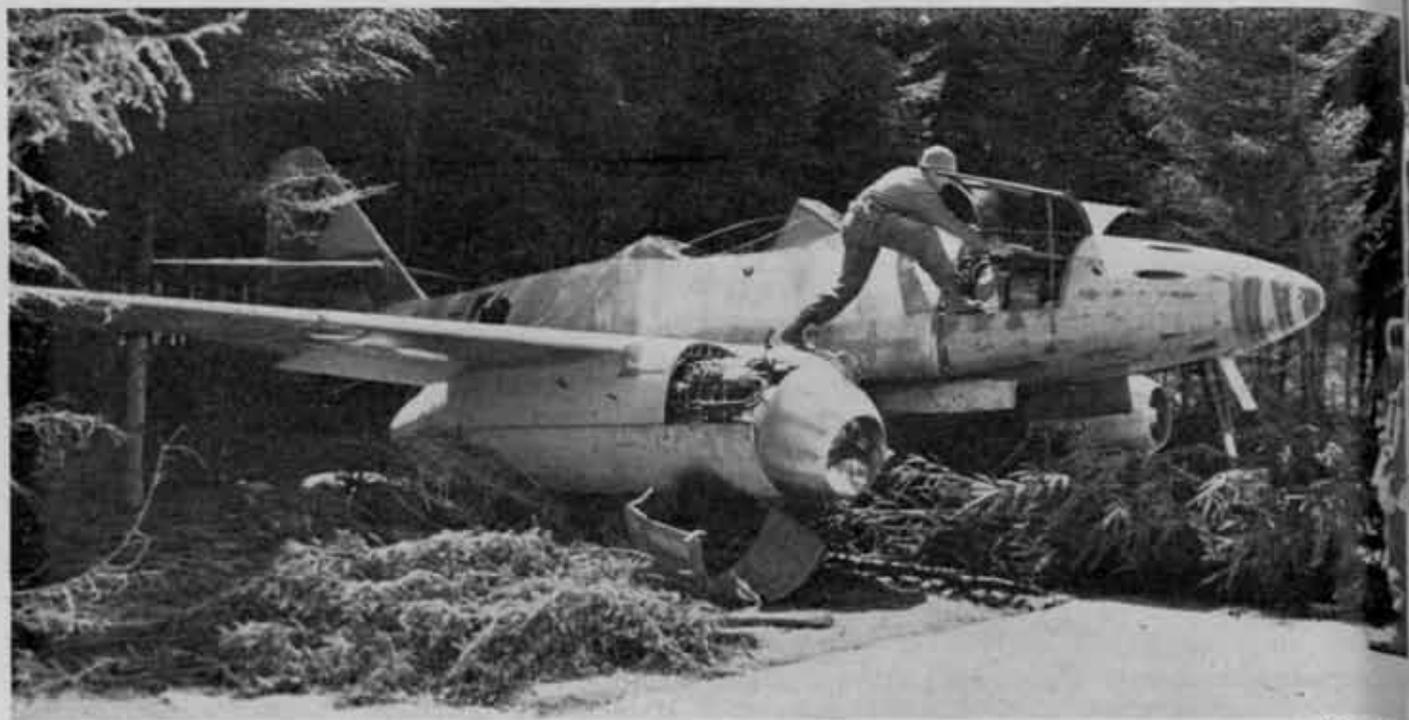
For the most part, piloted "JP's" were employed in the role of interceptors against formations of Allied bombers over Europe, but there were instances of other employment, and it is reasonable to anticipate that the near future will bring considerable development in the use of "JP's" against surface installations.

This business of jet propulsion in and of itself would be of only academic interest to the AA artillerymen were it not for the terrific speeds attained by aircraft using such

motive power. These speeds greatly affect the problem of AAA fire control and introduce difficulties which heretofore have been of a rather theoretical nature. With the increase of target velocity from the 300 miles per hour range to the order of 600 miles per hour, more exacting demands are placed on AAA personnel both as to training and as to matériel.

In view of this, it is perhaps not as callous as would first seem to say that despite the destruction wrought on England by the robombs, their employment may be regarded as helpful in some degree (at least to the AAA student), in that they provided a valuable training aid for the transition from 300 to 600 miles per hour engagements. Furthermore, they provided the basis for test firings which were at least partially controlled, and afforded British and American artillerymen a wealth of statistical data upon which to base future tests and developments.

As AAA targets, the robombs possessed certain characteristics which, though introducing new difficulties, nevertheless had some compensations. The item of speed, for example, was not without some benefit, for it made for less irregularity in flight. This feature, noticeable in the ro-



Signal Corps

A destroyed ME262 jet propelled plane left on the Reich Autobahn near Leipheim, Germany.

bombs with their average speed of approximately 325 miles per hour, is expected to be even more apparent as velocities in the 600 mph range are reached. The proportion of rectilinear flight will be increased because the sheer speed of the aircraft will permit of fewer deviations from straight flight. Apropos of this speed factor, it might be fitting to remark parenthetically that the terrific velocities anticipated will make the enemy air crew's problem of target location, identification and attack extremely difficult at any of the low altitudes.

Another help afforded the AAA gunners by the robombs was the matter of visibility at night, when most of the bombs were launched. The vivid red exhaust flames provided a target indicator which not only was better than having searchlight illumination but which generally afforded a better "bull's-eye" by night than did the craft itself by day.

A third, and perhaps the most gratifying, compensation of the robombs was their unexcelled capability for registering hits. Once effectively struck by AAA fire, the bombs either would explode violently in mid-air or would plunge to the surface and detonate there. There was none of that exasperating business of having a badly hit target aircraft glide or limp away out of sight before crashing or exploding. That single item alone served as an important morale factor, as it made for the placing of credit where credit was due, a matter very dear to the hearts of all AAA gun crews.

In the opening days of the flying bomb assault, the anti-aircraft artillery played an important but not overly effective rôle in a defensive team which included naval craft, interceptor aircraft, AAA guns and automatic weapons, and barrage balloons. At that stage of the battle of the bombs, the anti-aircraft artillery was disposed some distance inland, in which positions the artillery accounted for only 23% of the robombs destroyed in one 30-day period. However, along with considerable improvements in tech-

nique and matériel, the need for several tactical changes became apparent and the guns were redispersed accordingly. They were moved from inland positions to that section of the coast over which the robombs passed en route to London. There they were formed into a belt of guns and automatic weapons covering the entire sector of entry.

As a consequence of improvements in technique and tactics, the rate of bombs destroyed by AAA fire began to rise appreciably. On the basis of actual results, the ratio of robombs credited to AAA rose from the 23% cited above to 55% for the six-week period immediately following the changes. If the destruction caused by the barrage balloons is to be credited to the AAA, the percentage stands at 63%.

The use of balloons against robombs necessitated a few changes in balloon employment, for there were different factors to be considered. For one thing, there was no "psychological effect" on the pilotless aircraft, obviously. Consequently, whereas the mere threat of striking a cable had deterred the Germans from flying into balloon-defended areas below the operational height of the balloons, it now became essential that the balloons be emplaced so as to obtain the greatest practicable number of strikes. Furthermore, it was more difficult to achieve these impacts due to the considerably smaller wing span of the robombs as opposed to German bombers.

However, the balloons were disposed in a screen south-east of London and sited for the maximum cable density consistent with other tactical factors. In this rôle, they served well, accounting for as much as 7% of all destruction in one period. German appreciation of their effectiveness was indicated by the discovery that some of the bombs were being fitted with cable cutters, as had been some of the Ju-88's and He-111's during the Luftwaffe's bombing of Britain.

So far as the anti-aircraft artillery was concerned, the guns did the bulk of the work and deserve the lion's share



German V-1 buzz bomb, Bad Neustadt, Germany.

of the credit. American 90mm and British 3.7-inch guns were used, but the bulk of the radar and other fire control equipment used was American. As one U. S. group commander stated, the particular combination of American matériel used for the robomb-killing job was "the answer to a maiden's prayer." Still further praise was forthcoming from a British general officer, who said that the reason United States antiaircraft artillerymen were on the job instead of British troops alone was that U. S. equipment was "superior to any on earth for this particular type of target." He added that the record was evidence that the U.S. troops knew how to use that equipment.

The success gained in combating the flying bombs spurred AA artillerymen to greater efforts in planning for the engagement of 600 mph targets. Tests were conducted both in this country and in Great Britain with the goal of determining the capabilities of present equipment in dealing with such high speed targets and the requirements for further developments in training, technique, tactics and matériel. While the results of these tests necessarily are classified, it can be said that many factors were brought up for fresh consideration and study, from the angles of both automatic weapons and gunnery.

Gunnery, however, is not the sole matter concerned, for it is obvious that, for one thing, the scope, range and general effectiveness of warning services, visual and radar, must be increased. Not only does this become necessary for guns and searchlights, but for automatic weapons as well. Along with the need for earlier detection goes the need for earlier identification.

Included in matériel considerations is the matter of tracking, for whether the targets be flying at minimum altitudes or great heights, rates for all guns and instruments will be much faster. Furthermore, major changes in altitude will be more sudden, for some of the JP's already in action are estimated to have a rate of climb of approximately 10,000 feet per minute at the higher altitudes.

The greater speeds will have a pronounced effect on performance data currently listed for AAA weapons. For example, TM 4-260 defines "effective ceiling" arbitrarily as "the maximum height at which a directly approaching aircraft flying at a ground speed of 300 mph can be engaged by an AA gun battery for 20 seconds, assuming the first round is fired at maximum fuze, and the last round is fired at 70 degrees quadrant elevation." With this as a basis, the maximum effective ceiling of AAA guns immediately is lowered by several thousand feet when 600 mph targets are contemplated.

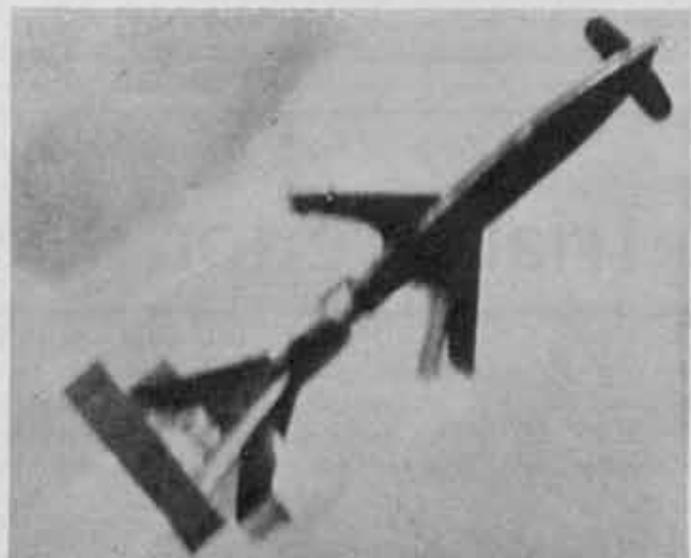
This decrease in the ceiling is not the only effect of the

high speeds, for even though 20 seconds of fire at the lower altitude is possible, rounds fired along the course of the target will have a linear density only one-half of that produced in fire against 300 miles per hour targets. It becomes apparent, therefore, that higher rates of fire and shorter times of flight (i.e., higher muzzle velocities) are needed to restore fire density against high speed targets.

The tactical dispositions of both guns and automatic weapons necessarily will be changed somewhat in the face of attacks by jet-propelled aircraft. It requires no slide rule to realize that the Initial Bomb Release Line for a 600 miles per hour bomber will be removed almost twice as far from the objective as will that for a 300 miles per hour plane. Similarly, the Critical Zone will be doubled in width although unchanged in time length. Consequently, to bring fire to bear in advance of the IBRL, guns must be moved farther from the objective, thereby requiring a greater number of batteries to provide a gun density equal to that against 300 miles per hour targets.

To cite figures which apply to just one set of conditions, consider a 600 mph bomber attacking an objective from an altitude of 25,000 feet with 500-pound SAP bombs. With an allowance of 4,500 yards as the approximate distance of trail for that altitude and speed, the plane would reach the Initial Bomb Release Line at a point 7,200 yards (4.1 miles) from the objective. A bombing run of 60 seconds would create a Critical Zone of 18,000 yards (10.3 miles). The point at which the attacking plane would begin its bombing run, therefore, would be 25,200 yards (14.4 miles) from the objective. If the objective were large, as it likely would be under these conditions, the area to be covered by gun fire would be tremendous.

The high speed of jet propelled aircraft will affect the problem in still another light, for if current time data for the settling of rates, drill time and time of flight are assumed, the target aircraft moving at 600 miles per hour will be almost upon the IBRL by the time the first bursts occur along the flight path of the plane. The true Critical Zone, as a consequence, dwindles to a fraction of its former



Army Air Forces Photo

A radio radio-controlled flak rocket, launched from the ground, was intended for use against our bombers. The Nazis were developing such weapons at war's end.

size, thereby necessitating even more accurate fire control.

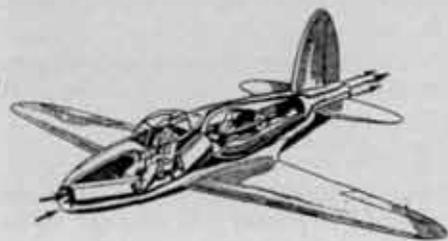
Going back to the set of conditions cited above, if just 10 seconds were allowed for settling of rates and drill time combined, and 30 seconds for time of flight, the resulting 40-second period would permit the 600 miles per hour plane to travel 12,000 yards, or exactly two-thirds the entire distance of the Critical Zone.

Thus it may be seen that the tasks confronting the AAA with the advent of jet-propelled aircraft, while by no means insurmountable, are nevertheless formidable. In the never-ending bout between aircraft and antiaircraft, a new round is coming up, and the fight will go on with new tricks added to the repertoire of each of the opponents and with no holds barred.

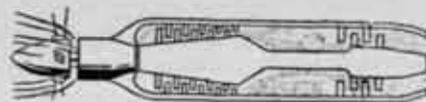
A Layman's Introduction to the Jet-Engined Planes of Tomorrow*

By Hall L. Hibbard

Drawings from Lockheed and Westinghouse.

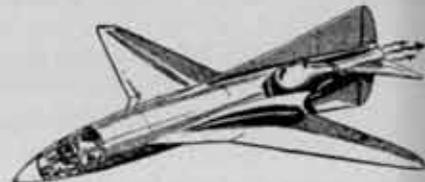


1. **JET PLANE.** Air scooped in at the nose streams to blower, which compresses it in combustion chamber; fuel is injected at high pressure. Resulting mixture is ignited by red-hot glow plug, to give continuous explosion of tremendous force. Escaping rearward, the exhausting gases drive turbine wheel, which in turn, drives the initial compressor blower. Then, blasting out of exhaust nozzle at tail, the explosive force drives entire craft forward. Principle involved: For every action there is an equal and opposite reaction. This engine is called a gas turbine; development of new heat-resistant metals made it possible. Has but one moving part, burns cheap fuels, may largely replace conventional aircraft engines. An air breather, it cannot leave earth's atmosphere. Shooting Star is an example of this type of airplane.



2. **TURBINE-PROPELLER** combination. Here the gas turbine described above is compounded with a standard airplane propeller, an arrangement which retains the advantages of the jet-type engine and yet avoids its low-efficiency factor at speeds under 500 miles an hour. In this application, the propeller does the work, the violent jet blast being largely absorbed by a larger turbine fan and by velocity-reducing devices. Wide use is predicted for this combination: it will power new planes, will replace the complicated reciprocating engines on existing aircraft. Adapted, the gas turbine may also drive locomotives, buses, electrical generators, and perhaps even automobiles.

*From *The Rotarian*, by permission.



3. **ROCKET PLANE.** Purest and simplest form of jet propulsion. Oxygen (usually in liquid form) and fuel (alcohol or gasoline) are piped directly into combustion chamber and ignited. Continuous blast which results sends craft forward. Speed regulated by metering of fuel. Carrying its own oxygen, rocket plane is independent of air; when range-giving fuels are developed, it will ascend to and fly in airless spaces 100 miles above earth. Common fallacy is that jet blast slams against air, driving craft forward. Fact: plane would work as well in vacuum. Principle same as in jet plane above—for every action, an equal and opposite reaction. German V-2 rocket, which shot to 60-mile height at speed of 3,600 m.p.h., was precursor. Given retarding and landing devices, could have carried passenger. Rocket planes still largely in theoretical stage.

Trial Fire for 90mm Gun Batteries

By Captain E. P. Carter, Coast Artillery Corps

EDITOR'S NOTE: As a member of a Gunnery Instruction Team in the ETO, Captain Carter received numerous commendations from battalion, group, and brigade commanders.

GENERAL

The purpose of trial fire is to determine the unknown errors of the gun, ammunition, and meteorological data, and not to shoot out the determinable errors of the fire con-

trol equipment. To obtain accurate corrections to compensate for unknown errors, accurate preparation for trial fire should be made. Level, orientation and synchronization of all equipment and adjustment of SCR 584 and M-9 Director should be carefully checked, and the trial fire problem should be computed by longhand or chart prior to firing.

CONDUCT OF TRIAL FIRE

Trial fire should be conducted: (1) When a new lot of

ammunition is received, (2) When there is reason to believe that the met message is very much in error, or (3) To determine developed muzzle velocity after approximately each 200 rounds fired per gun.

Normally, trial fire should be conducted only for the purpose of determining the developed muzzle velocity. If the conditions listed above should not obtain, one problem should be fired each week by each battery.

The present radiosonde meteorological messages are the most accurate messages it is now possible to obtain. Density is one of the largest ballistic effects, and the present radiosonde densities are accurate within 0.02%. Wind direction and speed are well within the limits of accuracy required for AA fire. Consequently, it very seldom should be necessary to conduct trial fire for the purpose of shooting out meteorological message errors.

ACCURACY IN TRIAL FIRE

In order to determine developed muzzle velocity accurately by means of trial fire, every effort should be made to eliminate errors. Accurate calculation of firing data will eliminate range equipment errors. Selection of a trial shot point at a short range will minimize the effects of exterior ballistics. The guns should be carefully oriented and fuzes should be set exactly to the proper value and checked.

Before each round is fired the levels of the gun should be checked, and after the piece is loaded the gun should be laid in elevation with a gunner's quadrant. With a minus bump, the last motion of the gun should be an increase in elevation. Radar spotting is preferable to spotting from an O₂ station.* For accurate radar spotting in range, the 2,000-yard scope should be carefully calibrated. The spotter must be alert to spot the range at the instant of burst; however, a well trained spotter, using the auxiliary spotting scales that have been provided, should be able to spot bursts within 20 yards of the correct range.

It is suggested that lateral and vertical deviations from O₂ be spotted with a BC scope as well as with the radar spotting scope.

POZIT AMMUNITION

With Pozit, it is still important that accurate developed muzzle velocity be determined, for an inaccurate MV set into the director will affect time of flight which in turn affects all predictions. In order to obtain the maximum accuracy from Pozit ammunition, trial fire should be conducted with deep cavity projectile with booster and time-mechanical fuze.

METHODS OF CALCULATING FIRING DATA FOR TRIAL FIRE

The following method of calculating firing data for trial fire has been suggested by Fire Control and Instruction Teams because of its accuracy and simplicity. Each correction placed in the M-9 Director changes the altitude and horizontal range values, and the Director computes the

*Errors' NOTE: Radar spotting is considered preferable to spotting from an O₂ station because of frequent errors in determination of length and azimuth of base line and errors in orientation of the O₂ instrument.

Spotting from an O₂ station for calibration firing is preferable to spotting from a radar because only the comparison of results obtained from the separate guns is required; errors in base line data and orientation of the O₂ instrument do not affect these results.

firing data for the final altitude and horizontal range after all corrections have been applied. In order to check the computations made by the Director and to fire a trial shot problem, an altitude and horizontal range are chosen, and the corresponding quadrant elevation and fuze are selected from the firing table. The gun is fired with this quadrant elevation and this fuze. Computations are made to determine the location of the TSP with respect to the radar. The trial shot point is located by adding algebraically the separate effects to the altitude and horizontal range chosen. This TSP is the point of aim and the data for this point are set into the Director. The firing data as then read on the Director should correspond with the data initially selected and set on the guns. See sample problem.

Select convenient values of quadrant elevation and fuze from FT 90 AA-B-3 corresponding to even values of H and R. Select a firing azimuth in the field of fire. These values are firing data and are set on the gun and the fuze without change, except that calibration corrections are applied.

List the ballistic effects on altitude, range and azimuth of all non-standard conditions and parallax based on altitude, range and azimuth selected.

Determine the coordinates of the trial shot point from the radar by adding algebraically those ballistic effects to the altitude, range and azimuth selected.

Using the altitude and horizontal range thus determined, solve for angular height and slant range to the TSP with the slide rule, M-1.

Set the slant range to the TSP on the radar, and lay radar on azimuth and angular height to TSP as directed by selsyn indicator at the tracker. Check dial readings at computer in tractor test. The radar is now laid on the TSP and may be used to determine the lateral, vertical and slant range deviations of the burst. When using the radar scope for observing deviations, it must be checked and adjusted so that the line of sight from the scope to a target is parallel to the electrical axis of the radar beam.

Set necessary corrections for non-standard conditions and parallax on the computer. If the problem has been properly computed, any differences between director output data and firing data originally set on the guns will be an indication of range system errors. If error exists beyond the director tolerances, and the director is known to be in good operating condition as a result of check problems, then calculations should be rechecked.

* * *

Calculation of firing data for those batteries using the Director M-9 based on FT 90 AA-B-2 differs only in the method of applying corrections to the Director when checking Director output.

Computation of TSP data are made, using FT 90 AA-3 exactly as outlined above.

Firing table corrections, based on WDTC No. 9, together with a plus 2 mil azimuth spot (drift correction) must be applied to the Director in addition to the normal ballistic effects.

Subtract 0.1 fuze number from Director output. TC No. 9 says subtract 0.1 fuze number from fuze output of M-7 Director. This is due to a flat 0.1 fuze error in the B-2 tables. The same error exists in the M-9 fuze servo but

was omitted since the smallest fuze correction that can be applied to the M-9 Director is 1%.

For fire for effect, the 0.1 fuze correction should be applied to the fuze setter of each gun during synchronization.

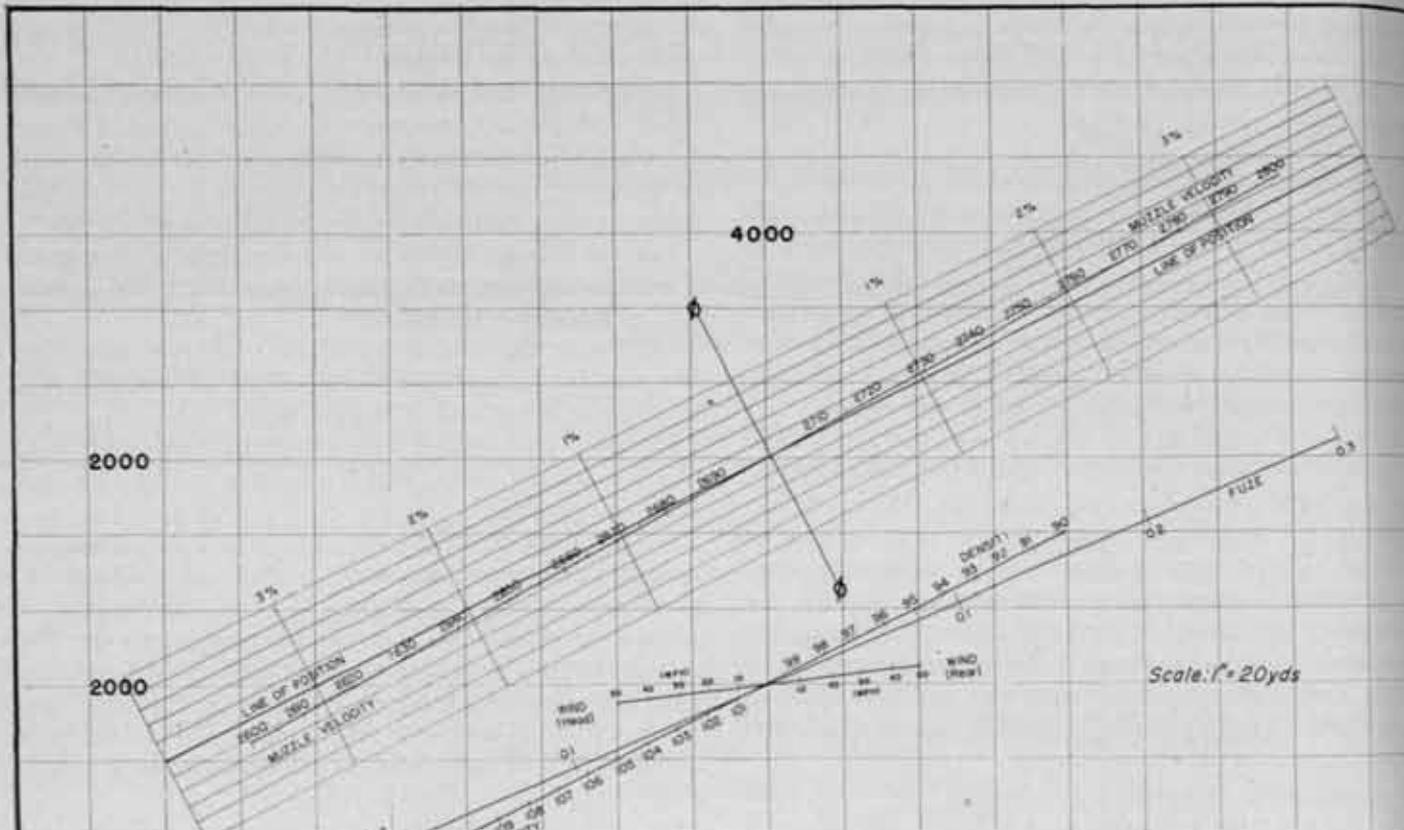
* * *

The above method of calculating firing data lends itself readily to spotting only from O₁. If spotting is from O₁ and O₂, it will be necessary to compute O₁-O₂ data after the coordinates of the TSP have been determined.

The muzzle velocity correction as the result of trial fire may be determined from the chart by using the average vertical and slant range deviations.

It is recommended that trial shot charts for other points be constructed in similar manner.

It is recommended that Battery Commanders keep a detailed record of all trial fire problems computed. This record should remain with the fire unit and be available for future reference.



Scale: 1" = 20yds

PARALLAX DIAGRAM



**TRIAL FIRE RECORD
FIRING DATA AND CALCULATION OF EFFECTS**

Organization: Bn "B" - Coast Artillery
 Date: 12 March 1941
 Time: 1000
 Place: 100000
 Target: 100000
 Assumed SW: 2750
 Gun Range Factor: 1000
 Fuzes: 1000
 Gun No.: 1000
 Remarks: 1000
 Com. No.: 1000

CALCULATED	ACTUAL EFFECTS	
	H	V
Assumed Muzzle Velocity	2750	2750
Corrected Muzzle Velocity	2750	2750
Muzzle Velocity (ft/sec)	2750	2750
Assumed SW	2750	2750
Gun Range Factor	1000	1000
Fuzes	1000	1000
Gun No.	1000	1000
Remarks	1000	1000
Com. No.	1000	1000

0. DATA OF TSP FROM RANGAR
 Assumed = 2750
 Gun No. = 1000
 Fuzes = 1000
 Gun Range = 1000

DIR	IN	OUT	MAX RANGE
1	20	20	20
2	20	20	20
3	20	20	20
4	20	20	20

NOTE: Temperature change effect upon parallax effect
 TSP Conversion from Range
 CONVERSION = 1000
 DEVIATION = 1000

Antiaircraft Artillery Development Trends

By Colonel Wallace H. Brucker, Coast Artillery Corps

EDITOR'S NOTE: Colonel Brucker is Chief of C.A. Branch, Development Section, Hq. A.G.F.

Military history records, on the one hand, the unceasing efforts of one group or another to gain an advantage over the opposition by the introduction of hitherto unknown weapons or tactical concepts. On the other hand, it also records the speedy development of effective countermeasures which have tended to restore the equilibrium between the offense and defense and which have at times tipped the scales in favor of the latter. Thus, the tank has been reduced in effectiveness through the use of mines, traps or barricades, antitank guns, and the bazooka, while the aircraft as an offensive weapon has been greatly reduced in effectiveness by the development of interceptor aircraft and antiaircraft artillery. As technological progress has accelerated, so has the rate of development of offensive measures and defensive countermeasures, with a new and complicating factor now interposed in the form of counter countermeasures.

At the end of World War II, it appeared that the offense was definitely getting out of hand, what with the advent of the atomic bomb and the introduction of bomb-carrying missiles whose speeds were far beyond the capabilities of existing defensive weapons. Whereas, in the past, a defense against attack from the air could be considered successful if it destroyed as much as twenty per cent of the attacking force, because in so doing it exercised a strong deterrent against a repetition of the attack, in the future the criterion of success must be one hundred per cent destruction on the attacker, since an enemy will be able to accept extremely heavy losses in non-piloted missiles in order to place a single atomic bomb on a vital target. For this reason, above all others, the problem of developing an effective defense against attack from the air is perhaps the most perplexing of the many postwar problems which confront our armed forces.

It is fortunate that the war in Europe was brought to a successful conclusion before the enemy could exploit the potentially great advantage offered by his V-2 missile, for now the opportunity is afforded for a deliberate program of countermeasures development, which should be able to keep pace with continued development of the types of offensive missiles against which these countermeasures would be applied.

As the German blitzkrieg of 1939 and 1940 introduced newly improved types of those weapons which were well known in 1918, employed it is true under new tactical concepts, so at the beginning of any future war it is reasonable to assume that the weapons of 1945 will again make their appearance, in an improved form. Thus, it can be expected that aircraft of greatly increased speeds, operating radii,

ceilings, bomb loads, and armor protection will, at the outset, perform substantially the same missions as the 1945 models, supplemented or supplanted wherever possible by ground-to-ground missiles in both the tactical and the strategic roles. In the same manner, Antiaircraft Artillery, by whatever name it may become known, can be expected to employ greatly improved types of existing weapons and other weapons yet to be perfected, in a single, unified ground-to-air effort. Furthermore, the recent war having demonstrated that there is a limit to the manpower resources of even so powerful a nation as the United States, it appears logical that, in the interest of economy of force, ground-to-air weapons will continue, as far as practicable, to have dual purpose ground-to-ground capabilities, so that, as the emphasis shifts from the defensive, these weapons and the troops manning them can be employed increasingly to reinforce the offensive effort. Parenthetically, it can be expected that any aggressor nation will make every effort beforehand to resist an attack from the air by dispersing key industries and by placing all possible vital installations well under ground. Hence it follows that, as in the past, the issue of any future war will probably be settled by ground action.

Unpopular though it may be at this time to speak of future wars, one would be turning his back upon history and lacking in realism if he did not consider the possibility of war, and attempt to devise adequate means for meeting any emergency, however sudden, that might arise. Viewed in this light, the problem of keeping effective weapons continuously in the hands of Antiaircraft Artillery troops may be considered as involving three concurrent developmental aspects:

a. To develop and apply such necessary modifications to existing equipment as will insure that the capabilities of this equipment are exploited to the utmost.

b. By a long-term program of research and development, to produce ultimately greatly improved antiaircraft artillery weapons and associated equipment, similar to existing types, which will be capable of competing successfully with high-speed aircraft of the future.

c. Also, by a long-term program of research and development, to produce some form of guided missile, or other revolutionary device, which will be capable of destroying other missiles while they are in flight.

Although it is not proposed to discuss in this article the details of any of the three programs outlined above, assurance can be given that all possibilities for the development of improved antiaircraft artillery equipment are being carefully considered by the responsible military agencies, and that the talents of eminently qualified scientists and industrial engineers are being devoted to the furtherance of such programs.

Flak versus Heavy Bombers

The Air Forces learned in Europe that flak is a major hazard. The pilot who flew the missions doesn't need statistics but for us who were not so fortunate—or unfortunate—as to get our information the firsthand hard way, let's let the record speak. After all, the record helps to determine future Air Forces tactics and that's the nut we're interested in.

The charts show some interesting figures. Six times as many heavy U. S. bombers were damaged by enemy flak as were damaged by enemy fighters. As to actual heavy bomber losses, the enemy fighters held the edge over flak until May-June 1944 when flak took over the lead.

There was a steady increase in the relative importance of flak until in June, July, and August 1944 flak accounted for about 66% of the 700 bombers lost and 98% of the 13,000 bombers damaged. Flak, always a major cause of loss and damage, had steadily increased in relative importance to become the greatest single combat hazard.

No matter how many or how few bombers attacked, the same approximate percentage returned with flak damage.

For instance, 26.2% of the attacking bombers were hit by flak during the six months ending December 1943;

24.9% were hit during the first six months of 1944, and 23.0% were hit during the three months period ending September 1944. In numbers, this rate was startling: from 3,360 to 4,453 bombers returned with flak damage in each of the six months ending in September 1944—a monthly average just about double the total number damaged by flak in the entire first year of operation. All efforts of the Air Forces to reduce flak damage were apparently offset by the fact that they had to increasingly fly over targets defended by more and more guns and against improved enemy equipment, gunnery and ammunition.

Enemy flak became so effective that in November 1944 General James H. Doolittle, the Commanding General, Eighth Air Force, caused a study to be made of means to lessen the losses. As a result of this study, the following principles of bomber operation were evolved for conditions of the European Theater:

Avoid flying over flak defenses en route to and from the target. Enter and leave the target area on courses which cross over the weakest flak defenses in the shortest possible time, i.e., with allowances for the wind vector.

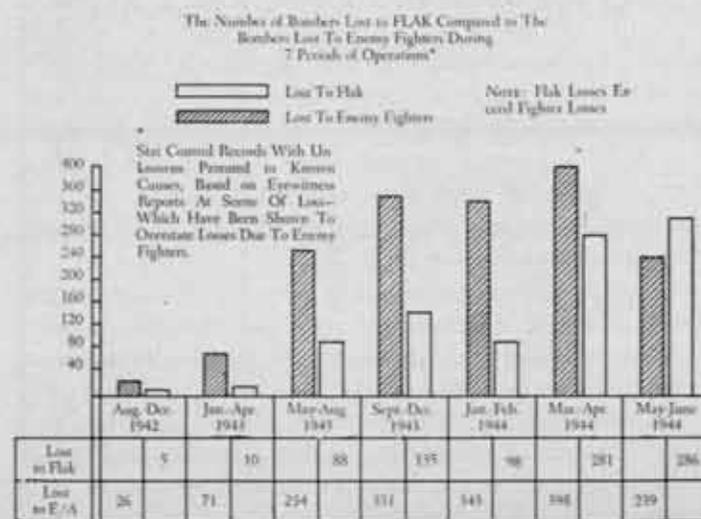
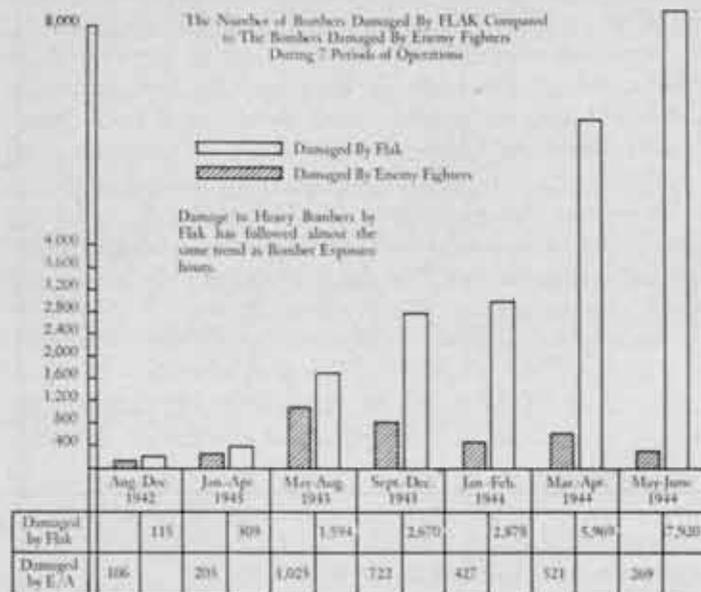
These tactics were applied continuously, and unquestionably prevented a great deal of flak damage and loss. Constant efforts were made to obtain accurate information as to the location of flak defenses, to plan the route in, the route over the target, and the route back to avoid flak, and to improve navigation so as to ensure that the planned routes were flown.

Fly at the highest altitude consistent with other defensive and offensive considerations.

Operations were consistently planned for bombing at the highest altitudes consistent with other offensive and defensive considerations. While there was some general lowering of the average altitude, primarily in the case of tactical targets, there was no appreciable lowering of altitude against heavily defended targets.

Plan the spacing and axis of attack of bombing units to make the fullest use of radio countermeasures.

Starting in October 1943 the Eighth Air Force first employed the radio countermeasure "carpet" and in December 1943 they first employed the radio countermeasure "window." The objective was to jam the enemy's radar so that under "unseen" conditions he would be forced to use the much less efficient barrage fire, and under "seen" conditions he would be forced to use optical range finders with a resultant decrease in accuracy. The greatest effectiveness of radio countermeasures can be obtained only when: (1) enough carpet or window is used to obscure the enemy's radar screen completely (The amount required varies directly in proportion to the number of bombers flying together as a unit) and (2) bombers fly close enough to the source of their protection. Very little protection is afforded to units flying two miles or more from carpet equipped aircraft; the



optimum spacing between two carpet equipped aircraft is about one mile. For window protection against the German type radar in use at the time, bombing units flew within 4,000 feet of the window trail left by preceding aircraft. However, a bombing unit receives no protection from the window it releases and therefore window protection of leading bombing units depends on window released ahead of the bomber force, perhaps by specially equipped bombers or fighter-bombers. Successful execution of this tactic might effectively conceal the entire bombing force under "unseen" conditions.

Minimize the number of bombers flying together as a bombing unit.

If the individual elements of a twelve or eighteen aircraft bombing unit are spread out 1,000 feet in trail, the flak risk is reduced by at least one-half. This formation is very difficult of operation, however, and is considered impractical due primarily to vulnerability to enemy fighter aircraft and difficulty in maintaining formation. Furthermore, if the separate elements of a formation are extended in trail, it requires individual sighting for both range and deflection, and additional blind bombing equipment.

At first the Eighth Air Force tried to bomb by elements of three aircraft but the intensity of enemy fighter opposition quickly forced them to increase the size of the bombing unit to six and then to eighteen aircraft.

In the latter part of 1943 the eighteen-plane formation was reduced to a twelve-plane formation, primarily to eliminate trailing elements, introduce greater maneuverability, reduce flak risks, and present a solid wall of fire against nose and tail attacks.

Increase the spread of the entire formation in altitude and breadth to reduce the risk from barrage fire.

The primary danger is from accurate firing methods and it is seldom possible to predict when the enemy may use or be forced to use the less efficient barrage fire. This makes it impractical to plan a maneuver or a formation to reduce the risk from barrage fire. However, we can appraise our formation or proposed formations from the standpoint of vulnerability to barrage fire—when, if and as used.

Increasing the length in trail did not decrease barrage risks but barrage risks did decrease with an increased vertical or lateral dimension of the entire formation. If the enemy increased the dimensions of his barrage box in proportion to the increased vertical or lateral dimensions of our entire formation, his density of fire in the area through which our bombers flew was decreased and each bomber was thereby subjected to a smaller risk. If the enemy did not increase the dimensions of his barrage box while we increased the vertical or lateral dimensions of the entire formation, the bombers outside of his barrage box got a risk-free ride.

Close up in trail so as to reduce the time between attacks of successive bombing units and thus saturate the enemy flak defenses when they are employing continuously pointed or predicted concentration firing tactics.

Flak guns employing accurate firing methods have definite limitations in their rate and continuity of fire. They get hot and have to cool off, and they must allow a few seconds for the transfer of fire whenever they cease firing at one bombing unit and plan to fire at a succeeding bombing unit.

If we fly successive targets of bombing units in trail three or more minutes behind each other we create an ideal situation for the flak gun. Then, each gun can fire a maximum number of rounds at the first target, change targets, and fire a maximum number of rounds at a succeeding target.

The more bombers we can get within a given interval the greater the reduction in flak risk per bombing unit. For instance, when our bombers fly at 20,000 feet and at 260 MPH ground speed on a course tangent to the dead zone of 88mm flak guns firing one shell every four seconds, two wings flying eleven miles apart instead of four miles apart are exposed to around twice as many shells—and the trailing wing is exposed to about three times as many shells per gun; three bombing units flying two miles apart instead of one mile apart in trail are exposed to about 18% more shells—and the trailing units are exposed to around 60% more shells per gun.

By using two or more bombing units abreast, a substantial reduction will be made in the trail length of the formation. Unfortunately, most targets do not lend themselves to bombing with units abreast and the only means of effectively saturating the enemy's flak defenses is to close up in trail. Properly flown, close formations in trail would also obtain maximum protection from radio countermeasures, would reduce the hazard from enemy fighters and would reduce the area to be guarded by our fighter escort.

Evasive action.

Evasive action offered large possibilities in reducing flak risks. Its object was to prevent the enemy from calculating the future position of our bombers. The possibilities of taking effective evasive action were, however, limited by the size and lack of maneuverability of the formations flown. Evasive action by groups or wings must be planned so as to maintain the desired fighter defensive character of the formation, permit achievement of the briefed bombing altitudes and headings, and be coordinated to enable assembly at the rallying point without loss of time.

Generally, the plans for evasive action by groups included flying groups at different altitudes, starting bombing run at altitude different from that used in crossing coast defenses, changing altitude by at least 1,000 feet (preferably diving) between the I.P. and the bomb run (when selected I.P. is too close to the target, such altitude change was made prior to the I.P.); loss of altitude after "bombs away" and on withdrawal; making turns onto bomb run and after "bombs away" as sharp as is consistent with other flight requirements; minimizing the length of the bomb run; making irregular changes in course of at least 20° every twenty to forty seconds, except on the bomb run; and feinting toward another target when possible.

Headaches of Strategic Bombing

By Lieutenant Colonel Jesse O. Gregory

EDITOR'S NOTE: Colonel Gregory joined the Eighth Air Force July 1943 in England as Assistant Flak Analysis officer and was head of that Section from April 1944 to July 1945.

It is axiomatic that AAA matériel can be most efficiently deployed and controlled only after we know and understand the capabilities and limitations of the enemy air arm we are defending against. The following discussion of strategic bombing is presented with a view to giving the antiaircraftman a basic understanding of those Air Corps problems that reflect in the AAA mission.

So far as strategic bombing is concerned, bombing by formations of planes is desirable because of the increased mutual protection from enemy fighters, the need of a smaller number of experienced and well-trained pilots, navigators and bombardiers, and the simplicity of control. In addition, friendly fighter escort is simplified, larger forces are enabled to be concentrated at single objectives without danger or fear of collision or of bombing one another, radar countermeasures are generally more efficient, and only one aircraft per formation is required to be manned and equipped with the increased weight of personnel and equipment required for non-visual bombing techniques.

Bombardment aircraft are so constructed and loaded that they can carry a light load of bombs over long distances or a heavy load of bombs over short distances. In the first case, the aircraft would carry a full load of fuel and in the latter case the heavier bomb load would be compensated for by a lighter fuel load. In either of the two loadings the cruising range (endurance) can be considerably increased if routes and altitudes can be selected so that the aircraft will be flying with the wind. Conversely, an aircraft which flies against the wind will be slowed down and its range reduced. Before any air operation a staff navigator must compute the speeds, distances, times and fuel consumption for the projected flight path. When the computed fuel consumption exceeds a value which has been determined as excessive it will be necessary to make some compromise on loading or route plan.

At 25,000 feet, and in still air, the B-17 aircraft will fly at a ground speed of about 240 mph; a headwind of 100 mph decreases the ground speed to 140 mph and a tail wind increases the speed to 340 mph. At the slower speed the aircraft becomes a much more desirable target from the antiaircraft gunnery point of view, for two to four times the number of projectiles can be fired than would be possible if the wind were used to increase the ground speed. (It is interesting to note that few, if any, of the many German flak commanders interrogated after V-E Day advocated the shifting of gun defenses toward the prevailing wind.)

In visual bombing, high ground speeds have a tendency to increase the range error of the bomb pattern while slow ground speed tends to decrease this error. Although the advantages of high ground speed usually outweigh the disadvantages

of slower ground speed, there is some indication that, as ground speeds approach 500 mph, the effect on bombing accuracy with current methods will be pronounced.

In practice it is seldom feasible or desirable to make a bomb run directly into or with the wind. The normal condition is when one component of the wind vector blows the aircraft to the right or left and the other component increases or decreases the air speed. The aircraft is then said to "drift" and the drift angle, the difference in direction between the ground track and the longitudinal axis (heading) of the aircraft, must be set into the bomb sight by the bombardier. Modern bomb sights are mechanically constructed to compute drift corrections as high as twenty-five to thirty degrees, but large drift settings usually result in low order of bombing accuracy. The command bombardier prefers that the drift angle not exceed eight to ten degrees. When flying at 25,000 feet altitude and 250 mph true air speed this condition is met with a fifty mph wind not greater than 45° from the rear or 30° from the front of the aircraft.

Targets which are poorly illuminated are difficult to identify and to keep centered in the bomb sight during the sighting operation. Bombardiers prefer to have the target illuminated by a source of light (the Sun) which is behind the bombardier. The direction and altitude of the sun varies with the season of the year, the time of day, and the latitude of the target area. The writer is unaware of any studies conducted to determine the effect of sun direction and altitude on bombing accuracy; however, in at least one air force operating over Germany a lateral angle of 50° or either side of the sun in winter and decreasing to 30° in summer was avoided whenever possible.

Propeller-driven aircraft produce a considerable amount of turbulence in the air which is commonly called "prop wash." This turbulent air results in the inability of a single aircraft to fly straight and level or for a formation to stay together when the interval between successive elements in the same sky volume is less than two minutes. For this reason elements of bombing formations are stacked in altitude within the limitations imposed by the fact that aircraft fly somewhat faster at higher altitudes, and winds are usually stronger at higher altitudes but not always from the same direction. One form of attacking unit which was considered standard was a thirty-six aircraft group composed of four squadrons of nine aircraft each, so stacked in altitude that the whole group formation was approximately 1,000 feet deep. These groups were then flown in column at two-minute intervals. At the target each squadron bombed separately, the maneuver at the initial point being arranged so as to bring the separate squadrons across the target at approximately thirty-second intervals. Exact timing of all operations is extremely difficult and the timings described here were seldom made good in combat, but they were values selected for planning as being within the limits of capabilities.

Enemy fighter aircraft constitute the most serious threat

heavy bombardment operations. The most efficient defense against enemy fighters is the friendly long-range fighter escort which can harass or engage the enemy fighters and prevent their attacking the bombing force. The escort fighter is a much faster and shorter endurance (time) aircraft than the bomber which it protects. For this reason, successive forces of the escort in ETO rendezvoused with the bomber stream at prearranged points along the route and stayed with the bomber force until forced to return to base because of fuel shortage, at which time a fresh escort force would rendezvous with the bomber stream. Thus escort fighters worked in relays along the bomber route. On very deep penetrations the fighter escort capabilities were overtaxed and became less efficient than normal. In order to compensate for the thinning of escort on long missions, the approach and withdrawal were likely to be made so as to require the bombing force to be in enemy controlled skies a minimum length of time.

The development of electronic aids to navigation and bombing has reached a state of perfection sufficient to permit the planning of air attacks on targets which weather forecasts indicate will be totally obscured by clouds. The expected accuracy of this form of attack is far below that of visual bombing techniques but many targets, because of size or the strategic consideration of time, will be subjected to this form of attack. It is beyond the scope of this article to discuss the techniques of the several systems employed except to point out that a third member, the radar navigator, is added to the bombardier-navigator team and that the instruments used often require the aircraft to fly predetermined approaches. Depending on the technique, approaches are limited by the following considerations: location of ground equipment, ease of recognition of route, ease of identifying initial point and ease of target identification. The initial point to target run is considerably longer (eight minutes being a general average) than is necessary when visual bombing is planned and flight is virtually straight and level from initial point to target. Low altitudes will limit the range of some systems of unseen bombing because of limitations imposed by the curvature of the earth's surface.

Under favorable surface weather conditions, and with adequate air warning service, smoke screens become an efficient defense against high level precision bombardment. Visual sighting of bombs requires a maximum of visibility to the bomb sight. In planning air operations, where troublesome smoke is anticipated, it is desirable to have the ground track parallel to and from the same direction as the surface wind. The bombardier will thus be in the best position to observe between plumes created by the smoke generators and will more readily pick out the target or other familiar feature in the target area.

Air Intelligence can provide the air commander with maps which indicate the shape and density of areas defended by antiaircraft guns. One intelligence agency in the European Theater during World War II estimated that it could outline defended areas with a degree of accuracy of better than 90% and could state the gun density within the area to an accuracy only slightly below 90%. Information of this type is used by the planning echelons in determining

routes, selecting the aircraft heading for attack, and determining the bombing altitude.

Routes will usually be selected so that the aircraft are exposed to a minimum of fire from gun defenses other than those at the target. Occasionally, because of considerations previously mentioned and because large formations do not turn easily (a turn in route greater than 70° is usually considered undesirable), flight over known defended areas had to be made. At such times evasive action and radio countermeasures were used to reduce the effectiveness of the AA defenses.

The selection of aircraft heading at the target, from the antiaircraft point of view, is made after careful consideration of the gun disposition around the target and the direction and velocity of the forecast wind. Then it is possible to compute the relative chance of damage for aircraft approaching the target on any of several headings. These computations are made by "Flak Analysts" who are usually especially trained antiaircraft officers on permanent duty with the Intelligence Section in Air Force Headquarters.

The accuracy and effective range of antiaircraft weapons is considerably affected by the altitude of the target aircraft so that the expected efficiency and intensity of the ground defenses is a primary factor in the selection of bombing altitudes. Excessive altitude, on the other hand, introduced certain undesirable factors some of which were: decrease in bombing accuracy; decrease in bomb loadings, range, or both; increased load on engines with a resultant increase in engine failure; increase in the supply of oxygen and warm clothing required for aircrews and a resultant increase in casualties due to anoxia and exposure.

Formation flying becomes difficult because a rarefied atmosphere renders control surfaces less efficient.

WEATHER

Weather is probably the first and most decisive factor in planning air operations. Since flights of ten hours and greater are not uncommon, it is essential that the planning echelons be reasonably certain of the weather conditions over a period of time that will include take-off, assembly, route, target and landing. These conditions can, in most cases, be forecast to a remarkable degree of accuracy and are presented to the air planning staff in their primary subdivisions of weather—clouds, visibility, wind, icing conditions, and frontal conditions.

Clouds interfere with successful air operations when there is no clear area for assembly or no clear layer of sky in the altitude brackets along the courses considered for route approach. Pure instrument bombing is unaffected by cloud cover or visibility but many successful missions are the result of an alert bombardier sighting through a break in the clouds while on an instrument approach. Of course the accuracy of visual bombing decreases when clouds cover the target. Cloud formations normally exist in layers and are reported and forecast in terms of per cent of earth covered, and altitude of the base and top of the cloud layer. Since a four-tenths cloud condition may nullify an entire mission, the bombardier listens carefully to the cloud forecast which, in complete code might read: "Six to eight tenths strato-cumulus, base 1,000 feet, tops 3,000 feet.

Visibility is the measure of the distance along the earth's

surface at which objects are clearly discernible. Air operations become restricted when take-off and landing visibility is less than 500 to 1,000 yards, and returning aircraft are frequently diverted from their home base when visibility falls below these safe limits. Unlike cloud conditions, visibility is a more localized condition and, since it may consist of fog, haze, smoke or dust, is considerably more difficult to forecast accurately. A typical forecast might read: "Five hundred to 1,000 yards at base becoming six to ten miles at continental coast." A visibility of six-plus miles at the target is desirable for successful visual bombing though this figure is often dependent upon altitude, type of bomb, ease of recognition of the target and skill of the navigator-bombardier team.

Wind varies in both direction and velocity at various locations and altitudes but can, in most cases, be forecast within a range of accuracy of about fifteen degrees in direction and ten miles per hour in velocity. The importance of wind effects on aircraft flying at altitudes of about 25,000 feet can be better realized by pointing out the fact that, over targets in Europe, wind velocities were commonly in excess of fifty mph and occasionally exceeded 100 mph. Over Japan, B-29's at the same altitude frequently experienced winds of 100 to 200 mph. Flight characteristics of aircraft are not affected to any great degree by wind, however certain other effects such as endurance, ground speed and bombing accuracy are functions of wind velocity and direction and must be considered.

Ice will form on various surfaces of an aircraft under certain conditions of humidity and temperature. Although many of the lesser annoyances caused by icing conditions can be remedied, the formation of ice on the air foil surface and on propellers is very serious. Ice layers on the air foil surfaces change the aerodynamic characteristics resulting in a loss of both lift and air speed, the additional weight being of little consequence. Ice on the propeller may upset

its aerodynamic efficiency, produce serious dynamic imbalance and damage the air-foil structure when thrown off by centrifugal force. In reporting and forecasting, an icing condition is described in terms of the minimum altitude, severity, type of ice and the type of air mass which will contain the ice. A typical forecast of icing conditions might read: "5,000 feet; light rime in frontal cloud." Rime ice is a granular, whitish and rough deposit; it breaks away easily and is not considered a great hazard to flying. Glaze ice is clear, dense, solid ice which adheres firmly to structures to which it forms. Air operations which would likely encounter severe conditions of glaze ice are not considered feasible.

Frontal conditions occur when a cold air mass and a warm air mass meet, producing a weather phenomenon called a warm or cold front. It is beyond the scope of this article to discuss all of the ramifications of frontal conditions though it is pointed out that turbulent air and clouds at all altitudes, two factors which seriously interfere with air operations, are usually present in a frontal condition. Air attacks may be routed around a frontal condition and occasionally over a weak front, but attack through a front is generally prohibitive.

From the foregoing, it becomes evident that air planning is a very complex process involving the careful consideration of all the factors influencing air operations. Then, after carefully considering all details, the best compromise plan—the one which offers a reasonable chance of success with a minimum exposure of the force to enemy action, is finally evolved.

By careful compilation of facts and a reasonable understanding of the capabilities and limitations of the enemy air arm, an alert and progressive air defense commander should be able to predict the enemy intentions with a reasonable degree of accuracy at all times. Obviously intelligence of this nature would be of inestimable value.



Underwater Spearhead

The job these unsung heroes did was one of the war's most closely guarded secrets

Their job was to blast the way for invasion. Their tools of war consisted only of a knife, as many high explosive charges as they could carry and small rubber boats. They worked under the very muzzles of enemy guns—without foxholes.

These were the underwater demolition teams, made up of courageous and unpublicized men whose work uniform was a pair of swimming trunks. From the Mediterranean to Normandy to the Pacific they successfully spearheaded

D-day operations by removing thousands of mines, posts and a variety of other enemy-placed obstacles designed to impede beachhead landings.

One of their biggest jobs in the Pacific was at Okinawa where they removed more than 3,000 separate obstructions. At Guam they took out nearly a third of that number.

Demolition operations were always hazardous, but the job on Omaha beach in Normandy ranks as one of the most perilous. There three out of every five men became casualties. But in doing their job the teams distinguished

themselves. The Navy Combat Demolition Units of Force O (for Omaha) had the mission of slashing 16 fifty-yard gaps through three principal lines of obstacles. Unable to carry out reconnaissance or advance work, they landed with the first wave of combat troops under devastating machine-gun and sniper fire from the cliffs and Nazi strongholds on the Normandy coast. Yet within two days they had sapped over 85 percent of the German-placed traps on Omaha Beach.

Fortunately, casualties in the Pacific areas were much lighter. Everywhere the sacrifices and work of the demolition teams were a big factor in keeping down casualties among the assault forces which followed them to the beachheads.

Training for underwater demolition work began without publicity early in the summer of 1943. The Navy school at Fort Pierce, Fla., turned out some 2,500 officers and enlisted men. Commander (then Lieutenant Commander) Draper L. Kauffman, USNR, Bethesda, Md., son of Vice Admiral James L. Kauffman, USN, Commander of the Philippine Sea Frontier, headed the school and went through a big share of the Pacific war in the field with his teams.

The school had one of the most rigid physical training programs ever passed in the Navy. Principal physical requirement of the candidates, all volunteers, was that their ear drums be in good condition so that they would be able to dive under water. Swimming had top priority in the training. In actual demolition work the teams went ashore in boats as they placed their explosive charges in position to blow up enemy barriers. But a week or more before the invasions, reconnaissance teams were sent out—and they had to swim in from a thousand yards or more off the beach and spend several hours in the water. Aerial reconnaissance was helpful, but the final beachhead check had to be made by the men who swam in and tested the location of the tetrahedrons, posts and mines.

The trainees developed stamina in swims of two or three miles several times a week. No matter how well a man could swim, he was drilled to use the side-stroke and breast-stroke instead of the crawl for purposes of stealth. On one reconnaissance training mission a swimmer, caught in the current, stayed afloat without a life jacket for eight hours and it is claimed that this feat was excelled by others on actual operational missions.

To withstand prolonged immersion the men got only the standard Navy diet with extra vitamin pills. Grease, favored by Channel swimmers, was found to be of no help. The men on reconnaissance missions wore ordinary swimming trunks, light tennis-type shoes usually fitted with a fin to aid in swimming, and sea dive masks for working underwater. They couldn't be bothered with life jackets. Their tools were relatively few: explosives and fuzes and gear for securing the charges in position.

The underwater demolition teams training for the invasion of Honshu shifted bases from Hawaii to Los Angeles because water off the latter site was more like the cooler water off the Jap mainland.

In the Mediterranean and Normandy invasions, demolition teams were composed of one officer and five men, many of them drawn from the Seabees, who are noted for

their ability to improvise. For the Normandy operation recruits were drawn from the Army, and the teams were joint Army-Navy units. In the Pacific, however, the personnel were exclusively Navy, and the teams consisted of 13 officers and 87 enlisted men, usually divided into four platoons. In the latter stages of the war, some team personnel were being recruited directly from the fleet. Virtually all naval officers on the demolition crews have been reservists.

The Marshalls operations marked the debut of the underwater demolition teams in the Pacific. This was followed by operations in the Marianas, Carolines, Philippines, Volcanos (Iwo), and Ryukyus. In the European-Mediterranean theater it was Sicily, Normandy and southern France. After the initial operations, commanders of amphibious forces were fully aware of the value of these swimming warriors and acted to devise fire-control support that would keep every possible Jap back from the beaches and cut down casualties while the demolition crews were working.

On open daylight jobs, LCI(G)'s (landing crafts, infantry, gunboat) APD's (converted destroyers used for carrying the teams), destroyers, cruisers and even battleships joined with bombing and strafing planes to keep at a minimum the enemy's interference with men working on reefs and on the beaches. The APD's carried LCPR's, smaller landing craft for personnel, which they used for reaching the reefs. From there on in, small rubber boats and swimming were the modes of transportation.

Underwater demolition work had to be rapid and sure. Frequently on exposed reefs where a man was too clearly a target, the demolition crews had to work for short periods when tides partially or fully covered the reefs.

Normally they laid their high explosives around a large group of obstacles to be blown out. These were connected by cords of instantaneous explosive material. When the safety fuze was touched off, the whole area of obstacles went up together. Synchronized watches and radio contact were used among the platoons or groups of men to assure that the explosives were not touched off prematurely. On prearranged signal, all swimmers would hastily retire from the area of danger to their rubber boats, thence to landing craft to escape the deluge of flying coral, concrete, steel and broken timbers.

Demolition teams found that in constructing beachhead obstacles, the Japs favored hardwood posts and logs wedged down into the reefs, along with cribs of logs and netting packed with cement and coral. These were frequently interwoven with barbed wire and sometimes interlaced with mines.

Unsung heroes of the war, the men of the underwater demolition teams carried out a job that was one of the war's most highly guarded secrets, and they performed their missions without receiving extra pay such as is given to Army and Navy flyers, submarine crews and combat infantrymen for extraordinary and hazardous work.

When the marines, who have been through some bitter battles themselves, landed on Guam they found the following notice:

"Welcome to Guam, U. S. Marines! USO two blocks to right. UDT4 (Underwater Demolition Team Four)."

AAA Organization at Regimental Level

By Colonel Calvin L. Partin, Coast Artillery Corps

EDITOR'S NOTE: It is believed that this article represents the views of The General Board, Antiaircraft Artillery Section, European Theater of Operations. Colonel Partin was a member of AAA Section, ETOUSA, until 1 January 1945, at which time he was detailed with The General Board, AAA Section, ETO.

Early in the last war it was realized that the composite antiaircraft regiment with one battalion each of guns, automatic weapons and searchlights was totally unsuited as a combat organization. The weapons were seldom used together in the proportion in which they were organized into the regiment. The battalions were tactical and so could not operate successfully for long periods when detached from the regiment. Every antiaircraft mission differed in size or nature from almost every other one. In short, the fixed regiment lacked the flexibility to meet the wide assortment of antiaircraft requirements.

The present antiaircraft artillery group headquarters and headquarters battery was devised to provide the required flexibility in antiaircraft artillery command at regimental level. In theory it seemed that any degree of flexibility could be attained if a small tactical headquarters were provided to which a number of administratively separate battalions could be attached. Not only the size but the nature of the command had flexibility, because any type of battalion could be attached to any group headquarters as required.

Peculiarly enough, there was considerable criticism of the group during maneuvers in the United States. It was generally complained that the group commander and his staff had very little to do, that the group commander had no administrative authority to make desirable changes in personnel, or worse, that he did not have command of a battalion long enough to learn its working characteristics and capabilities.

Strong adherents to the group idea believed this dissatisfaction stemmed from the artificialities unavoidable under maneuver conditions. They reasoned that in actual combat the group commander and his staff would have all the useful work that they could do. It was also argued that battalions would normally stay with the same group long enough to develop a team spirit, or that such a spirit is not vital in antiaircraft groups since each battalion acts alone so far as its individual tactical problems are concerned. The group would simply coordinate the efforts of a number of independent battalions each of which generally acted separately.

But the average experience in the European Theater of Operations did not vindicate the present group organization. Instead, all the difficulties encountered in maneuvers were aggravated and magnified. In fast-moving situations battalions were so often attached and detached that frequently neither the battalion nor the group commander knew the exact status of attachment. (The average number of attachments to a group in 11 months of combat in European Theater of Operations was 37; the minimum was 7; and the maximum was 67.) Battalions were attached to

Under these conditions the group commander had no time to establish proper controls over attached battalions. If the group commanding officer had not known the battalion commanding officer before, he never gained the personal knowledge of his capabilities, which is so essential to efficient teamwork. If the battalion did not perform up to group standards in a short period of attachment, the group commander was hesitant to lower the efficiency rating of the battalion commanding officer on so brief an observation. Much was to be desired even in the most favorable situations in which battalions were attached to the same group over long periods of time. The group facilities for AAAS were not extensive enough to materially aid the battalions. Since battalions went directly to supply agencies for service, the battalion staff could usually do as much or more for its battalion at higher service levels than the group staff could do. Since battalions were never assigned to groups (though this was authorized by WD in late 1944) the group commander lacked administrative authority to transfer personnel and to enforce discipline according to his standards. The group staff, in many instances, could do little more than observe and suggest. If they lacked the practical experience and talent to aid the battalions by instructing in their specialties they usually justified themselves in their own minds by "inspecting," or they devoted an unreasonable amount of time to the internal affairs of headquarters and headquarters battery. The result was that at the end of the war almost every group and battalion commanding officer in the European Theater of Operations was dissatisfied with the group as now constituted. Reconsideration of organization at group level was clearly indicated by experience in the European Theater.

In the Pacific the experience seems to have been more favorable to the group organization. Many antiaircraft artillery defenses of group size were on islands or otherwise isolated so that they stood alone. In these cases the group commander had no antiaircraft artillery close enough in lateral or higher echelons to require physical coordination. There was very little opportunity to shuffle battalions quickly from one group to another. The group commander took command of the local defense and operated it as a unit without undue complication or interference. It appears that the group organization worked very well; *but the flexibility of the group was little used* since defenses were fixed over appreciable periods of time. Experience in the Pacific did not, however, present any problem which particularly demanded the present group organization. It seems reasonable that a more rigid organization would have served as well.

But the need for flexibility in antiaircraft artillery organization is even more necessary than originally thought. Almost continual redeployment of small antiaircraft artillery units was necessary in the European Theater of Operations. In the Pacific, where units stayed in the same locations for longer periods than in Europe, each defense presented different requirements. Flexibility in organization was nec-

essary to meet these differing requirements. Why, then, did the group with its almost unlimited flexibility fall so short of the performance expected? It must be that the present group organization violates some principles of organization basic to the best solution.

There are two sets of requirements to be met in organization; first, those of the operation for which the organization is designed and, secondly, those of administering that organization itself. Administration falls in that vast category of human effort dubbed "Necessary Overhead." It contributes nothing directly to any operation but it is necessary to every organization, however small, before that organization can bring any effort to bear upon the purpose for which it is designed. Fortunately, the efficiency of administrative effort increases as the size of the unit administered increases, within limits which are well above the largest units in anti-aircraft artillery.

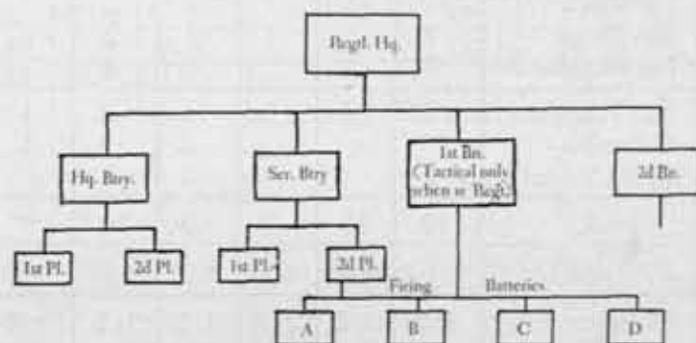
Another requirement to good administration is that all elements in an administrative unit be reasonably accessible. Lastly, the elements within the administrative unit should not be so divergent functionally as to present conflicting administrative requirements. All anti-aircraft artillery troops present substantially the same administrative requirements. It appears, therefore, that from the administrative point of view the basic anti-aircraft artillery organization should include that number of anti-aircraft artillery troops which are normally employed within distances permitting administration from one headquarters. Since an anti-aircraft artillery defense may frequently employ but one type of weapon and since the ratio always varies when they are mixed, it follows that the basic administrative unit in anti-aircraft artillery should be homogeneous as to armament and should contain that number of troops which will be normally employed within distances permitting efficient administration.

From the operational point of view, adequacy of command and control is the prime factor. Unity of command is the first principle of successful operation. The reason for establishing echelons in command between the basic unit and the highest level is to maintain unity and completeness of command at all times. This subdivision is justified only when the whole effort is too large or too complicated to permit efficient management from one central head. The size of the intermediate unit of command should be the largest number of a particular type of troops which can be managed operationally by one headquarters. Anti-aircraft artillery defenses will always be scattered over considerable areas. Whether the principle of "area defense" or of isolated defended points is used, the next command above the basic administrative one defined above will have its activities spread over a considerable area. In the case in which the anti-aircraft artillery supports an army this area will move as the main operation progresses, but it is no less an area. In case of the so-called static or semi-static rear area defense, small units must be moved to meet the changing requirements of defense such as are created by adjustments of our own installations or by changes in enemy tactics. In order to support a moving army it is necessary that small units be moved from the rear to the front of the army area. Lateral adjustments within the army area also are likely to be necessary. If these movements require transfer of basic units from one intermediate command to another an unnecessary

and harmful amount of labor and time are always consumed; sometimes these losses jeopardize the defense for considerable periods. The only other useful services, besides assuming responsibility for a larger area, which the intermediate echelon can perform for the basic units are communications and air warning service. Usually these must extend beyond the limits of the operating unit so that they are not a limiting factor. It seems, then, that the next echelon of command above the basic unit must be large enough to meet normal changes in operations by redeployments within its own area. Any echelon of command between the basic unit and this command decreases efficiency of the over-all defense.

The separate battalion was eminently successful in all theaters in this war because it did not violate basic principles of organization. But the size of this battalion was more or less arbitrarily determined. There was no operational experience upon which to base it. There have always been four batteries in the conventional battalion and so four batteries were used in the new separate battalion. But experience in the war indicates that there normally were six to eight batteries of the same weapon within distances permitting efficient administration. If we accept the principle of administrative organization outlined above it appears, then, that the size of the basic unit should contain six or eight batteries. But if the battalion is enlarged, the probability of having to split it is increased. The evil of detachment is one which can never be cured altogether; its effects can only be lessened, for even in the battery sized unit occasional detachment of a platoon will be necessary. If the basic unit is established under the principles defined above, units will be split only when it is necessary to separate a part of a unit for a special purpose, whereas now it is frequently necessary to divide the separate battalion in order to obtain a normal defense. The evils of detachment can be lessened by so forming the basic unit that when necessary it can be divided into parts of operationally useful size each of which can administer itself.

From the consideration set forth herein it appears that the basic unit of command and administration should be a regiment of six or eight firing batteries of the same weapon. This regiment should be formed in two purely tactical battalions of three or four batteries each. It should have a headquarters battery and a service battery each of two platoons. Normally the battalion staff officers in the battalion headquarters should operate from the regimental headquarters. But when it becomes necessary to detach a part of the regiment a field officer from the regiment would take an appropriate part of the regimental staff, one platoon of



headquarters battery and one platoon of the service battery, including one of the messes, and perform the special mission requiring the detachment. The organization would be:

This regiment would meet the largest number of operational situations without artificial subdivision. When subdivision is unavoidable it permits of efficient subdivision

likely to meet the greatest number of requirements. It lends itself to easy formation of the next higher command unit. (The next echelon of command above this regiment should be a completely autonomous brigade capable of all antiaircraft artillery command, administrative, intelligence and communications within the area which it operates.)



A Tentative National Guard Program

On 14 February 1946, the War Department announced tentative State allotments for a postwar National Guard program for the States and insular possessions to consist of approximately 622,500 officers and enlisted men. It is emphasized that these totals are tentative only and allotments are subject to change as requested by the individual Governors.

The Air Forces strength will be approximately 47,600 with principal units being about 12 wings, 27 groups, 84 squadrons, and 12 control and warning groups.

The Ground Forces strength will be approximately 571,000 with principal units being about 22 infantry divisions, 2 armored divisions, and 18 regimental combat teams.

CAC and AAA will be a component part of the Ground Forces.

Of the Ground Forces total National Guard strength 14,134 officers and men are tentatively assigned to Harbor Defenses and 72,236 officers and men are tentatively assigned to Antiaircraft units.

Under War Department policy, it is normally the responsibility of the States to provide and maintain armories and storage facilities adequate for the housing of personnel and the storage of equipment. Such adequacy will be determined by Federal inspection and approval. The recruiting of personnel is also the responsibility of the States.

RECOMMENDED HARBOR DEFENSES (NGUS)

Harbor Defenses	Batteries						Total Gun and Mine Batteries	Bands	Group Hq. and Hq. Btrys.	Bn. Hq. and Hq. Det.	Bn. Hq. & Hq. Det. Sep. Bn.
	16"	12"	8"	6"	90 MM	Mine					
Portland	1	1		2	2	1	7	1	1	3	
Portsmouth	1			1	2	1	5	1	1	2	
Boston	2	1		3	2	1	9	1	1	3	
New Bedford		1		1	2		4	1	1	2	
Narr Bay	2		1	3	2	1	9	1	1	3	
Long Is. Sound	2			1	2		5	1	1	2	
New York	2	2		1	2	1	8	1	1	3	
Delaware	1	1		3	2	1	8	1	1	3	
Ches. Bay	3			3	2	1	9	1	1	3	
Charleston		1			2		3				1
Key West				1	2		3				1
Pensacola		1			1		2				1
Galveston		1		1	1		3				1
San Diego	1		1	3	2		7	1	1	3	
Los Angeles	1			2	2		5	1	1	2	
San Francisco	2	1			2	1	6	1	1	2	
Columbia				2	2	1	5	1	1	2	
Puget Sound	1			2	2		5	1	1	2	
Total	19	10	2	29	34	9	103	14	14	35	4
T/O and E	4-67	4-67	4-67	4-67	4-77	4-69		20-107	4-62	4-66	4-66
Changes	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2			1	1	1

PROPOSED AAA NATIONAL GUARD ALLOTMENTS

State	Hq. and Hq. Btry. AAA Brig.	Hq. and Hq. Btry. AAA Group	AAA AW Bn. S.M.	AAA AW Bn. S.P.	AAA Gun Bn. Type A	AAA Slt. Bn. Type A	AAA Opn. Det.	Eng. Slt. Maint. Det.	Sig. Radar Maint. Det.	Ord. Maint. Co. AA	RA Antiaircraft Instructors with National Guard (Tentative)				
											Col.	Lt. Col.	Maj. or Capt.	Staff Sgt.	T/3 Clerk
Alabama	0	1	1	1	1	0	0	0	1	0	0	1	3	4	1
Alaska	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arizona	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arkansas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
California	2	4	3	2	4	2	2	2	6	1	2	4	11	17	6
Colorado	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Connecticut	1	2	1	1	1	1	1	1	2	1	1	2	4	7	3
Delaware	0	1	1	0	1	0	0	0	1	0	0	1	2	3	1
Dist. of Columbia	0	1	1	0	1	1	0	1	2	1	0	1	3	4	1
Florida	0	1	1	1	1	0	0	0	1	0	0	1	3	4	1
Georgia	1	1	0	1	1	1	1	1	2	0	1	1	3	5	2
Hawaii	0	1	1	0	1	0	0	0	1	1	0	1	3	4	1
Idaho	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Illinois	1	2	1	1	2	1	1	1	3	1	1	2	5	8	3
Indiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iowa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kansas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Louisiana	0	1	1	0	1	1	0	1	2	1	0	1	3	4	1
Maine	0	1	1	0	1	0	0	0	1	1	0	1	2	3	1
Maryland	0	0	0	0	1	0	0	0	1	0	0	0	1	1	0
Massachusetts	1	2	1	1	2	1	1	1	3	0	1	2	5	8	3
Michigan	1	2	1	2	2	1	1	1	3	1	1	2	6	9	3
Minnesota	0	1	1	1	1	0	0	0	1	1	0	1	3	4	1
Mississippi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Missouri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Hampshire	0	1	1	0	1	0	0	0	1	0	0	1	2	3	1
New Jersey	0	1	1	1	1	1	0	1	2	1	0	1	4	5	1
New Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New York	2	5	5	3	6	2	2	2	6	4	2	5	16	23	7
North Carolina	0	1	1	0	1	1	0	1	1	1	0	1	3	4	1
North Dakota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ohio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oklahoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oregon	0	1	1	1	1	1	0	1	2	0	0	1	4	5	1
Pennsylvania	1	2	2	3	4	2	1	2	6	2	1	2	11	14	3
Puerto Rico	0	1	1	0	1	1	0	1	2	1	0	1	2	3	1
Rhode Island	0	1	1	0	1	0	0	0	2	0	0	1	2	3	1
South Carolina	0	1	1	1	1	0	0	0	1	0	0	1	3	4	1
South Dakota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tennessee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Texas	1	2	1	2	2	1	1	1	3	2	1	2	6	9	3
Utah	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Virginia	1	1	1	1	1	0	1	0	1	0	1	1	3	5	2
Washington	1	2	1	1	2	1	1	1	3	0	1	2	5	8	3
West Virginia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wisconsin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13	40	32	24	43	19	13	19	60	20	13	40	118	171	53
T/O and E:	44-10-1	44-12	44-125	44-75	44-115	44-135	44-7								
Changes:		C1	C1, C2 C3.		C1, C2 C3, C4	C1, C2 C3	C1, C2								

In addition to the AAA Instructors, plans call for the following additional instructors:

Senior State Instructors	35	Brigadier Generals, 17 Colonels
Executive to State Instructors	35	Colonels, 17 Lieutenant Colonels
Asst. to Senior State Instructors	52	Warrant Officers
Asst. to Senior State Instructors in states with less than 6,000 troops	1	Master Sergeant, and 2 Technicians 3d Grade
Asst. to Senior State Instructors in states with more than 6,000 troops	1	Master Sergeant, 2 Technicians 3d Grade plus increments of 1 Staff Sergeant and 1 Technician 3d Grade for each 6,000 additional troops.

Elimination of Branches Within the Army

(Editor's note: Following is a thought-provoking plan for elimination of the branches within the Army. It reflects a trend of thought of personnel within the Service but does not necessarily reflect War Department policy.)

The National Defense Act divides the Army into branches, designates the number of officers and enlisted men in each branch, and gives to each branch a chief. The system is inflexible. With advent of war on a large scale, this inflexibility resulted in the issuance of Executive Order Number 9082 which did away with the branch chiefs and transferred their duties to the Commanding General, Army Ground Forces. Under these broad war powers, the size of the various branches was increased or decreased to meet the changing situations. Officers were shifted between branches, and new branches were created.

With the rapid strides being made in the development of weapons, who can say that any branch, as we now know it, may not be rendered obsolete a few years hence, and as a result the concept of the entire armed forces be changed?

It is believed, therefore, that when legislation is drawn for the new National Security Act, Congress should set the over-all limit on the size of the Army but that the President, by Executive Order, should have the power to organize the Army. Further, that the United States Army should consist of officers, warrant officers, cadets and enlisted personnel organized into (1) a General Staff Corps, (2) the several Administrative and Technical Services, and (3) the "Combat Arms," and the assignment of personnel thereto be as determined and announced by the President. With the exception of officers to be permanently detailed in the Medical Department, the Corps of Chaplains, and Professors, USMA, all officers now in the United States Army, and those who enter subsequently, should be commissioned in the United States Army and then be detailed periodically to the General Staff Corps, one of the Administrative Services, or in the "Combat Arms." It is to be noted that the term "Combat Arms" is an over-all term not to be broken down into branches in the designation of the assignment or the category of an officer. The machinery to enable an individual to go from an Administrative or Technical Service to the Combat Army or vice versa should be easy of operation. Officers of some of the so-called Technical Services, such as Engineers, Signal, Ordnance, Chemical Warfare Service, etc., would be considered as members of the Combat Arms when assigned to certain types of duty. There should be no rigid rules in this regard; in general, those officers of such Technical Service on duty with the Army Ground Forces would be considered as members of the Combat Arms. In such a set-up the opportunities to qualify or to be selected for high command in the Army are avail-

able to any officer except those permanently detailed in the Medical Department, the Corps of Chaplains and the permanent Professors, USMA.

POSTWAR EDUCATIONAL SYSTEM

Since prior duty with troops is a prerequisite of a good staff officer, it is proposed that during the first six years of service, each officer be required to spend at least three years of troop duty with a company or battery, this duty to consist of two tours of 1½ years each with different arms. Further, it is proposed that each officer be required to spend at least one year in command of a unit commensurate with his rank. For example, prior to the promotion of a captain to the grade of major, his record must indicate that he has satisfactorily commanded a company or battery for at least one year during his service. It is realized that with the selection of general officers, especially during a war, exceptions to the general policy will be necessary.

With the organization as proposed above, the Army Ground Forces educational system should be designed to produce an officer who is well-grounded for both command and staff duty.

The trend in this war has been away from employment of a single arm and toward combat team and task force organizations composed of several arms, often supported by other arms. Even the present infantry regiment has its own organic artillery and tanks, and has engineer units and units of other arms and services habitually attached to it when it enters combat. There is no place in the future army for a regular officer, at least of the present promotion list branches, who does not possess a working knowledge of the employment of the several arms. The objective of the system is not to make an officer into a jack-of-all-trades nor especially qualified in any, but rather to produce an officer who can take his place in an integrated team wherein each has special knowledge as to the particular part he is to play, and at the same time has a workable understanding of all the plays of the team as a whole and a working knowledge of the duties and techniques of his teammates.

A school system alone will not suffice. Practical application of the theories taught at the schools, coupled with actual service with different type units, is essential. The system does not lose sight of the fact, however, that a small group of officers will be required who will specialize in the development of tactical doctrine, methods of training, and new equipment necessary for each of the several arms. The value of this small group of officers will be in direct proportion to their knowledge of how their specialty fits into the team play so necessary in a task force type organization. These officers will be developed from those having aptitudes for the particular fields by successive detail in these same fields. That is practically what occurs under the present branch system.

In the past, branch consciousness and branch prejudice

have hindered the progressive development of real team play by all components of the combined army fighting team. Elimination of this narrow type of thinking can be done only by doing away with the existing concept of individual arms and substituting therefor a doctrine of combined arms wherein the component parts are trained to think, act and function as a team. In other words, an officer should be assigned to the United States Army and not to a specific part of that force.

During 1946 thousands of officers may be brought into the Ground Forces of the Regular Army. Before these officers are commissioned in the Regular Army, the system to be used for their education and development should be firmly established. A possible system is proposed in the following chart form. The full value of this system will not be realized if these officers are required to choose and be commissioned in branches upon entry into the Regular establishment.

NORMAL FLOW OF RA, AGF OFFICERS THRU AGF AND OTHER SCHOOLS STARTING WITH CLASS OF 1946

AGE	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
YEARS OF COMMISSIONED SERVICE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
RANK (PRESENT LAW)	← 2d LT. →			← 1st LT. →						← CAPT. →						← MAJOR →						
APPROX. PERIOD IN CAREER OF SCHOOL ATTENDANCE	BRANCH IMMATERIAL AGF 9 Mos. REQUIRED			GENERAL STAFF War Dept. 4 Mos. REQUIRED						COMBINED ARMS AGF (Sch. of Divisions) 5 Mos. REQUIRED			COMMAND War Dept. (Corps & higher) 4 Mos. SELECTIVE			OTHER HIGH COMMAND SCHOOL War Dept. SELECTIVE						
	SPECIAL COURSES Civilian universities, signal communications, motor vehicles; special and technical artillery subjects; survey, radar, and electronics; parachute and airborne subjects; winter, mountain and amphibious branch technique schools; etc. REQUIRED: 1 branch technique course. ELECTIVE: Any others.																					



"We will never have universal peace until the strongest army and the strongest navy are in the hands of the most powerful nation."—C. H. VANTYNE, late head of the Department of History, University of Michigan.

Critique After Battle

By Colonel S. L. A. Marshall, Infantry

(Editor's note: One of the most complete stories of the war was that presented by Colonel S. L. A. Marshall and published in the Infantry Journal under the title One Day On Kwajalein.

That story was not published in the Coast Artillery Journal because of its extreme length and subject matter but we believe that Critique After Battle, the introduction to that story, is of interest and value to the Coast Artilleryman.)

* * *

The one way to try for the truth of battle was to muster the witnesses and see for once whether the small tactical fogs of war were as impenetrable as we had always imagined they were. We could only find out more about the fight by asking those who had done the fighting.

So we began with the gun crews, talking this first time to each crew separately in the presence of their company officers and the battalion staff. For four days we went over that one night of battle, reconstituting it minute by minute from the memory of every officer and enlisted man who had taken an active part.

By the end of four days, working several hours a day, we had discovered to our amazement that every fact of the fight was procurable—that the facts lay dormant in men's minds waiting to be developed. It was like fitting together a jigsaw puzzle, a puzzle with no missing pieces but with so many curious twists and turns that only with care and patience could we make it into a single picture of combat.

We discovered other things as we went along. We found that the memory of the average soldier is unusually vivid as to what he has personally heard, seen, felt and done in the battle. We found that he recognizes the dignity of an official inquiry where the one purpose is to find the truth of battle, and that he is not prone to exaggerate or to be unduly modest. We discovered also that he will respond best when his fellows are present, that the greater the number of witnesses present at the inquiry the more complete and accurate becomes the record since the recollection of all present is a check on the memory of any one witness.

* * *

As we went ahead with the company critiques on Kwajalein in the 7th Division, we became more certain of the most important discovery of all—the immediate tactical value gained by seeking the full detailed history of an action. The companies themselves were the most direct beneficiaries of all that was learned. They had fought together on the same field and yet they did not understand what they had done. To the man in the ranks no real significance was attached to his personal rôle in the battle, simply because he had not related it to anything else. The average company officer knew only as much of what had

happened to his men in battle as what he had seen them himself, or what had required some official attention from him at the time.

We should have known all along that this was the case. Soldiers have never in the past sat down and straightforwardly rebuilt the various parts of their collective experience, even after they have been in sudden death action as members of the same squad. Inertia, and often reluctance, stops them from any private inquiry and they are not under any military requirement to do it. Thus the most valuable part of the lessons which can be learned only in bloodshed become lost to an army. Each personal experience is sharply etched against a vague and faulty conception of how things went with the group as a whole. Men do not know the nature of the mistakes which they made together. And not knowing, they are deprived of the sure safeguard against making the same mistake next time they are in battle.

Consider what happened to Company B, 184th Infantry. Until the critique was held, the platoons did not know that they had attacked simultaneously from different sides of the same Jap-filled shelter. Or again, in Company F of the 32d, the men thought on the last day of Kwajalein, and continued to think until the critique, that they had been fired into by their own mortar section. Yet all the time the facts were right there in the companies which, put carefully together again, would have shown them that they had received Jap fire and not American.

Direct dividends of this type came out of every critique. One company officer after another said, as the critique went on: "I am dumbfounded to learn that these things happened to my men." And these were first-class officers. They had commanded bravely and well in battle, though they had not known of a way to glean in full the tactical and moral combat lessons of their own fighting experiences. Said the commander of Company C, 17th Infantry: "In two days of this briefing I learned more about the character of my men and where the real force lies in my company than I had known in all the time I fought and trained with them." That ought to be worth any amount of painstaking effort to take advantage of the "critique after combat."

Actually the critique requires comparatively little effort. The men like to do it. No other form of military education will sustain their interest for so long a period. To reconstruct one day of vigorous battle will usually require about two days of briefing (about five hours each day), provided the men are given the opportunity to do most of the talking. They will always be keener and will participate more freely on the second day, and if a third day is required the response will again rise.

The thing is done the most direct way. Battle is never a maelstrom but a series of whirlpools and eddies. It starts with an incident somewhere along the line and is carried



Signal Corps

men and equipment of the 7th Infantry Division approaching the shores of Enubuj Island, Kwajalein Atoll in assault boats and alligators, 1 February 1944.

in other incidents. It is never true that all men of an outfit fight at one time. And even in a sustained engagement hours long, a number will not be in the fighting at all.

It is best to find the starting point before briefing begins in earnest. Let one man get on his feet to tell what happened as he remembers it. The reconstruction of the story will then take a natural course, provided only that the discussion leader uses a little judgment and imagination in keeping to the thread of the narrative and introducing all pertinent lines of inquiry—clearing up each point fully.

As the first man mentions the names of other participants, they are called on to tell what they know about the action at the point reached. They in turn will bring other men into the story. The order of the witnesses should depend upon the time sequence of the combat story and never upon the rank of those who are telling it. All are equal in the informal court. All are only looking for the truth for the good of the outfit. The critique is not the time for officers to make pretensions to superior knowledge of the common experience—a few are disposed to try it. The success of the inquiry comes of their good judgment and good faith.

Let us illustrate the method a little more concretely by telling how we got started with Company B of the 184th. We had studied the ground minutely and we had also acquired much more knowledge of how regimental and division headquarters and other units had reacted to Company B's performance than was known to the company officers. In a ten-minute conference before the company was assembled, Lieutenants Klatt and Kaplan told us about the relationship of the two platoons they had led and how they happened to become separated. They identified Sergeant Hartl as one of the key figures.

Captain White, the company commander who was recovering from a wound, was able to come out of the hospital to attend the critique. When the session started we asked him: "What could you see of our own artillery fire when you jumped off?" He did not remember. We then asked the whole outfit if anyone remembered and after a

few opinions had been expressed they agreed as a group on the distance the shells were kicking up ahead of them when the attack began. We asked Captain White: "Were the tanks with you?" He answered: "No, they didn't get up and we jumped off on time without them. I don't know why they failed us." That was put down as a question on which we would check with Battalion and the tanks.

It was absolutely necessary in these critiques to use a blackboard, or lacking it, some kind of surface on which events could be roughly pictured. We asked one sergeant from each platoon to come up and sketch in Company B's ground with relation to the rest of the island. Sergeants Hartl and Eyerdam came forward. We then asked Lieutenant Klatt to describe the ground over which he advanced and we called on his platoon as a whole to supplement his description with any of the details which they remembered. This was repeated with the other platoon.

Then we came to the question: "Who was the first man to fire at an enemy during the advance?" Several named the same man and we asked him to get up and tell his story, which he did.

We asked the group as a whole: "How much fire was coming against you at this time?" Some ten or twelve men spoke on the point. We got into the real meat of the problem when Lieutenant Butler made a general statement about how the two platoons split because of the difficulties of the ground. Then Lieutenants Klatt and Kaplan separately told of their local situations and the state of their information with respect to each other's platoon. But we had to take it up with the men to learn just what had happened. Commanders of units do not and cannot see the whole action.

Almost invariably the clearest statements came from the privates. We asked them not only what they did in the fight, but what they said and how they felt. They were usually quite sure of their recollection of their emotional reactions. But they rarely remembered just what they said in the midst of action. It was the man who heard another man speak who was most likely to remember the words, and not the man who said them.

The critique went on in this way for three days—for several hours on the first two days and a briefer time on the third. As any new point came up, the questioning was halted briefly and the facts set down. The record was dictated sentence by sentence to a typist in the presence of the whole company. The content and continuity of the narrative were accepted by all who had been in the battle. We seldom worked more than five hours a day. The response is better if the men are not worked too long.

Now none of this calls for an expert, or for special training in conducting such critiques. Any company officer who has the respect of his men and a reasonable amount of horse sense can do it. If he is fitted to lead them in battle, he is fitted to lead them in re-living the battle experience. Frequently, after less than ten minutes of coaching, we placed a company commander in front of his men and let him carry on for the next three days with only a minimum of help from the sidelines. We found that invariably when a commander had such control over his men that he could hold their interest during the time required to reconstruct the story, the company had made a splendid score in battle. There is no better measure of leadership. The commander who has not attained this degree of leadership will need more help by those in general supervision of the critiques.

Where the action of separate platoons was not definitely joined, we found it out early in the critique, and then we sometimes took the platoons separately. The number of lieutenants and sergeants who were able to lead the discussion at different times was truly surprising. They caught on readily.

They enjoyed doing it, just as the men enjoyed the chance to let their fellows know their own share in the battle. For every unit it was a morale-building experience. Once the initial reserve was broken down and the men came to understand that the inquiry wasn't just a stunt or a strict official inquiry, they gave everything they had to it. We could always be sure when we had achieved the proper atmosphere of confidence and candor, for any erroneous statement would then get a protest from the

outfit. Men would speak up and say: "No, it didn't happen that way." Or maybe: "He's wrong in his timing; that came along later." And they would enter the objection just as quickly if the witness happened to be an officer. Where facts were disputed, we could almost always find some other line of inquiry—perhaps through checking with another unit—which would clear things up.

It was always a convincing argument with the men that if they came clean with their mistakes, the whole army might be able to profit and other men's lives would be saved. And so they held nothing back. They acted as if they wanted the whole story to come out, and they did.

After the first few hours of briefing any unit, the Division Commander, the Chief of Staff, and others of the 7th Division staff were able to drop in on these discussions without embarrassment to the men. It was always advantageous to have the battalion commander and his S-2 and S-3 present, and usually the regimental commander was there some part of the time. In the course of the critiques we found tactical gaps that could be closed up immediately by instituting new training techniques. We found a few moral lessons that are not to be discovered in any training manual. We also found many courageous men who had been overlooked in the distribution of awards, with the result that the appropriate steps were taken.

The following are a few of the elementary rules which need to be respected by the discussion leader in company critiques after combat.

(1) Officers and men are on the same footing in seeking for the truth of battle. Corrections may be made by anyone present.

(2) Everything said by any witness must be heard in full—repeated whenever necessary.

(3) No matter what facts are disclosed, the leader strives to uphold the dignity of all witnesses.

(4) No morals are to be pointed out or tactical lessons drawn during the critique. It must be a straight inquiry into facts.

(5) Every man present is free to supplement the statement of any witness, ask questions which will clear up the situation, or point out to the briefing officer that he is missing an important line of inquiry.

(6) It is helpful as the critique progresses to relate the actions of the company to events elsewhere in the higher command.

(7) No witness should ever be cut short, or else all will become non-coöperative. When a witness gets away from the continuity of the action, he should be stopped tactfully and told that the rest of his statement will be considered later where it fits into the whole story.

(8) Where the witness has taken a praiseworthy part in the action he should be commended in front of his fellows.

(9) There must be no arbitrary interpretation of facts. Disagreement is a sign that corroborative evidence should be sought from some new angle. All should hear and agree to each sentence of the notes taken by the typist dictated by the discussion supervisor.

(10) Open argument is to be encouraged, for only so can the confusions of battle be explained and eliminated.



Signal Corps

Leaving blazing Jap installations behind them, American troops advance inland on Kwajalein Atoll, 31 January 1944.

The 40mm in Direct Support of Infantry

By Lieutenant Colonel Lee J. Davis, Coast Artillery Corps

The Americal Division landed on the beach near Talisay, Cebu, Philippine Islands, on E-Day, 26 March 1945, and the Infantry advanced rapidly to secure Cebu City on E plus 2 but from here on the going got tough. In the hills to the west and northwest of Cebu City the Nips had previously prepared fortified positions and to these positions they retreated. The fortifications had been under construction for many months and were not only elaborately prepared but were stocked with a six months' supply of ammunition and food. There were hundreds of well-constructed pillboxes, fire trenches and tunnels, both for storage and for protection of personnel. In most instances—and particularly the positions in the main line of resistance which was along the top of Babag Ridge, Hill 25—the tunnels had several entrances and exits, with openings provided on both sides of the ridge for a distance of several miles and all had only one route of approach which was the Lahug Road, a very narrow coral road cut out of the precipitous slopes of the hills.

The enemy armament consisted of 150mm Naval guns (sited so that fire could be brought to bear on any target in Cebu City, the excellent Cebu harbor, or Mactan Island, the location of our operational strip), 75mm guns, 3-inch Naval guns, 40mm, 25mm and 20mm guns, .50 caliber machine guns, light machine guns, and mortars. Most of the mortars were heavy (90mm). An interesting sidelight on the Japanese ammunition employed during this opera-

tion was the use of .50 caliber HE. Since this ammunition was used largely against personnel, a high percentage of serious casualties resulted. A surgeon of the 58th Evacuation Hospital told us that wounds received in this operation were the worst he had encountered.

After the rapid fire advance of the Infantry in the first few days the attack slowed down due to the heavy casualties suffered in attempting to take the fortified positions. A conference was called by the Americal Division Commander to determine the means of taking the hills, and it was at this meeting that the use of 40mm guns was recommended.

Enemy air attack had been light and four gun sections which were scheduled for the defense of Lahug Strip (not yet operational) were available. While waiting, these guns had been employed to give a defense, in depth, of the harbor and dump areas. The guns which had provided this defense in depth were used for terrestrial fire and did not affect the primary mission.

Air and artillery support had been given but neither the bombing nor the artillery had the property of being able to fire directly into the caves and tunnels. Added factors in favor of the 40mm were the higher rate of fire, the greater mobility, and the fact that plenty of 40mm ammunition was available.

On the morning of 8 April 1945 two gun sections, less M51s, were moved under cover of darkness to a position west of the Capitol buildings on a hill overlooking a draw in a position to bring fire on a series of hills immediately to the front, with an average range of 1,500 yards. Hasty fortifications were thrown up to give the crews some protection against return fire. These sections were placed approximately fifty yards apart, which is too close for safety from enemy artillery or mortar fire, but that knoll was the only place the guns could be emplaced to bring effective fire on the objectives.

The gun site was accessible by truck and the fire control equipment was taken along. A part of the firing was done by Case III pointing and this method proved to be accurate and effective but was abandoned as the M7A1 sight produced the same results and at the same time made much smaller crews possible. The M7A1 sight was used to bring effective fire on pin-point targets at ranges up to 2,500 yards, using a speed setting of 0 MPH and by pointing the arrow directly toward the target.

This fire proved to be so effective that the 182d Regimental Combat Team was able to take the first eight objectives with only one casualty, and that same afternoon two guns were called on to be placed on the south flank to support the advance of the 82d Division, Philippine Army, under command of Lieutenant Colonel J. Cushing.

From 8 April 1945 to 26 April 1945 missions were scheduled daily and the results were uniformly satisfactory.

It was neither necessary nor desirable to send out our own forward observers. In most cases the corrections were made from the gun position using the scopes for spotting when Case III pointing was used and either field glasses or a bor-

HEADQUARTERS

AMERICAL DIVISION

COMMENDATION

FOR OUTSTANDING SERVICES

To the OFFICERS and ENLISTED MEN of the 478TH AAA AUTOMATIC WEAPONS BATTALION (less Batteries "C" and "D"). For meritorious service in connection with military operations against the enemy at Cebu, Philippine Islands, from 8 April to 7 June 1945.

During the above period this antiaircraft battalion contributed in a most outstanding manner to the vanquishment of the Japanese Forces encountered during the V-2 Operation. The crews of these automatic weapons displayed outstanding ability and aggressiveness. The brave actions and complete and utter disregard for their own safety were in keeping with the highest standards and traditions of the United States Army.

From 8 April to 28 April, this organization used its 40mm guns in conjunction with the United States Army 182d Infantry and the 82d Division, Philippine Army. These weapons were employed in locations where neither cover nor concealment were available. The fine marksmanship of these men contributed much to the morale of our forces.

From 7 May to 7 June 1945, the battalion maintained a perimeter, roadblocks and other strong points along the two main roads of Northern Cebu. During this time daily offensive patrols were scheduled from all positions.

I take great pride in personally noting your fine achievements and conspicuous combat record. These actions reflect highest credit upon your organization and your arm of service.

Lee J. Davis

MAJOR GENERAL
UNITED STATES ARMY

rowed twenty-power scope when on-carriage sights were employed.

Forward observations were furnished by the Infantry when communication facilities were available and some very good firing was done based on this information. At times, corrections were given in increments as small as five yards at 2,000 yards (2½ miles) which is a fine adjustment in any artilleryman's book. In one phase of the advance on Hill 8 the Infantry called for harassing fire to be placed fifty yards in front of their lines which speaks well for the accuracy of the fire.

The mobility of the 40mm gun was a dominating factor, for the guns were sited where access to the hilltops at first seemed to be impossible. The engineers, in many cases, built roads and pulled the guns into position with D7 tractors. In one position the gradient of the slope reached 44°; the answer to the question of mobility is that the gun can be put anywhere a foothold can be found.

No battle, however, can be entirely one-sided and we had our share of casualties as the attack progressed. However, some lessons were learned: at all times use a minimum crew when engaged in this type of firing; in conducting any type of fire that has not been seen before, onlookers are bound to congregate and this will draw enemy fire and increase the chances of casualties; afford both cover and concealment for the crew with some overhead cover if at all possible—one of the sections was decimated by a 90mm mortar that burst in a tree and sprayed shrapnel downward. In this instance the men were all in foxholes but the downward burst caught them. Fortunately only one death resulted and that from fragments striking his head (his helmet had fallen off when he jumped in the foxhole). Earlier, this same section had been working so close to the Jap front lines that a sniper picked off one member of the crew while a tube was being changed.

The following day a push was scheduled on a certain hill and 40mm fire was ordered. The crew began to work over the enemy emplacements which consisted of pillboxes

and rock wall parapets. Captain Frank A. Good, the Battery Commander, called for two volunteers to help him man the gun. First Sergeant Leon A. Davis and Staff Sergeant Aldo H. Farneti volunteered and, working as a three-man crew, they fired 168 rounds of ammunition into the hill positions and materially aided the advance. During the time they manned the gun, ten rounds of enemy 90mm mortar fell near the gun position. The three men were awarded the Bronze Star for this action.

The conduct of all the men under fire was exemplary and those missions were a real morale factor for the men knew they were doing something which contributed directly to the war effort.

The ranges fired were from 500 to 4,500 yards and some effective fire was obtained even at 4,500. One afternoon while firing a covering mission from the wheels, an enemy ammunition dump was hit at a range of 4,000 yards; it was a pleasure to hear the explosion and see the smoke which continued to rise for over an hour. When firing from the wheels on a hit-and-run mission, some stability is necessary. This was obtained by using the outrigger jack pads on whatever was available, i.e., sandbags, wooden 40mm ammunition boxes, etc. On some of these missions the gun was fired while coupled to the prime mover and moved away before the enemy could range in on it.

During the course of firing only one malfunction occurred; a broken outer cocking lever. This was replaced at the position and occurred after the gun had fired 3,650 rounds.

The men of Battery B, commanded by Captain Constantine Vardaš, brought in a prisoner of war taken near one of the gun positions and, in the words of the prisoner "Guns that go boom boom have killed many Japs."

Since only four guns were used at any one time on these missions, the crews were alternated every two days to give all of the men experience. It wasn't long until the men were "battle wise" and this task materially aided in bringing about that condition. For two weeks sections of Battery B held both flanks of the beach area unaided.

The following is a box score covering these operations from 8 April to 22 April 1945:

Enemy killed	425	Dugouts reduced	17
Tunnels blocked	7	Pillboxes reduced	77
CP's destroyed	1	Trench systems reduced	7
OP's destroyed	3	Huts demolished	10
Supply dumps destroyed	4	Machine guns silenced	27
Mortars knocked out	3	Nambu guns silenced	2
		Auto rifles knocked out	2

Rounds fired:

HE 11,695
AP 625

12,320

Guns fired (40mm) 4

Average range 1,800 yards



Japanese officers, representing Lieutenant General Kataoka, Commander of Japanese 35th Army bottled up in northern Cebu Island, arrive in Cebu City to discuss surrender of their forces with Major General William H. Arnold, CG, Americal Division. 19 August 1945.

These figures were taken from reports of the 82d Division, Philippine Army, and the 182d Regimental Combat Team and are not complete since, in many cases, the objectives were not immediately taken and the Japs were able to bury many of their dead and evacuate the wounded.

Jap Prisoner of War Diet Adequate?

By Colonel Robert C. Gaskill, Medical Corps

EDITOR'S NOTE: Prior to Pearl Harbor, Colonel Gaskill was Surgeon of the North Luzon Force under General King. He continued this duty under Generals Wainwright and Jones after the unit was redesignated the 1st Philippine Corps of USAFFE. In short, Colonel Gaskill never left Bataan—until the march to O'Donnell.

Colonel Gaskill was a prisoner of the Japanese from 9 April 1942 until V-J Day and was held at various times in prison camps at O'Donnell, Cabanatuan, Bilibid, Lipa (all Philippine Islands), Shirakawa (Formosa) and Hosokura (Honshu). He remained in the latter camp until 12 September 1945.

Recent testimony of certain Japanese, appearing before the War Crimes Court, to the effect that the American prisoners of war were treated well and fed adequately brings to mind that there were many unusual things eaten by these self-same prisoners in the Philippines, Formosa, Japan, Manchukuo and Korea.

After the fall of Bataan and during the march to O'Donnell some of us who attempted to give medical aid to the weak, ill, and dying, spent as much as ten days on the road, often being put at hard labor in spite of our Red Cross brassards; during this period we had to forage among the corpses that littered the sides of the road for what we ate. It was not until eight days had passed that we were served cooked rice by the Japanese, and this, as was true of the entire period as prisoners of war, in terribly inadequate amounts. The food that we could forage along the road under constant threat of bayonet and gun was naturally small in amount, and consisted of such things as leaves of plants, banana stalks, an occasional cincomas (a turnip-like root), and occasionally a handful of uncooked, often unhusked, rice which we would boil in a can obtained from a dump.

In the Philippines there is a wild plant that is well-nigh ubiquitous, seen growing in ditches and at the sides of canals and known as "kang-kong," often used as a laxative by the natives. This became our standard greenstuff and was popularly known as "whistle weed" because of its hollow fibrous stems. One could always count on a soup made by boiling this plant in water to go along with the rice, even when there would be nothing else.

The next item added by the Japanese to our dietary was camotes, always half rotten and wormy. It was impossible to remove all the taint before cooking, and this foul dish succeeded in giving everyone a most intense burning pain in his stomach.

The day that a four-hundred pound cow was brought in to be butchered for the ten thousand Americans then at O'Donnell was marked down in red letters.

The pangs of hunger became more severe as our slow starvation progressed; individuals began foraging the camp for additional things to eat, and many and varied were the exotic items eaten.

The first gardens grown by individuals were at Cabanatuan. The Japanese camp commander thought these little

garden patches were an excellent idea, and they were when one had the time to cultivate them and the strength to wait the three or four months for a harvest. One could not always wait that long, or maybe the plot was entirely inadequate in its yield. A new dish made its appearance—stewed okra leaves, followed by bean leaves, and awful stewed camote leaves. Pussley, popularly known as "pig weed" grew wild and was ravenously eaten raw or stewed. It was a distinct favorite because of its tartness.

Some men discovered that earthworms when sliced open and washed could be fried and enjoyed. Traps were constructed and snares laid and woe to the unwary dog, cat, rat, or banana cat that had the misfortune to become entrapped. Most people scorned rats, but one man felt that he must eat at least one rat a day and usually he was successful. Dogs and cats were considered a real delicacy.

The few snakes encountered on the camp farm were usually skinned and roasted; there are many who can tell you what roasted cobra is like. Sometimes during the dry season a man was fortunate enough to encounter a lung fish buried in the earth; he was fortunate indeed. Small Philippine frogs, about two inches long, helped stave off the pangs of hunger, as did the native lizard known by the name iguana.



An American prisoner, holding his mess tin of watery stew, wanders aimlessly back from the field kitchen in background. (A Jap photograph.)

International News

One staff officer who was fortunate enough to acquire a few hen's eggs encountered one which was partially decomposed. It was too precious to discard so he ate it, much to his sorrow, for he had acute ptomaine poisoning for several days following. The same fate befell three men who were given a piece of horse liver by a Japanese guard.

When the Japanese began raising ducks to have eggs for their own mess they used rice bran in their mash. This bran began appearing among the Americans, and though it had practically no food value, was ravenously eaten. Corn cobs and corn stalks were likewise eaten. Corn cobs unfortunately produced fecal impactions in most of those who ate them and required surgical intervention as a life-saving measure.

All animals butchered at Cabanatuan were utilized to the fullest extent, or so we thought at the time. The blood was saved and usually found its way into the hospital soup pot. The tripe was used, but the lower intestines were disposed of as offal. Later in Japan we were to discover that if we wanted occasional meat one must forego any aesthetic ideas he might have about food, for horse and pig intestines and lungs constituted our main issue of meat.

In the Philippines the quality of rice issued to the American prisoner of war camps was third or fourth grade. Often as not it represented the sweepings from the mill floor and might contain nearly half its weight in rocks and earth; consequently not one prisoner escaped damage to his teeth from these rocks. Approximately half of the time the rice would be black with weevils. The only first grade rice that I remember in the Philippines was some intended for the Japanese which had been accidentally contaminated by kerosene.

On some working parties where men were working in orchards or coconut groves they were not allowed to have this produce even though it was falling from the trees and rotting on the ground. Under such circumstances as these men ate the grass of the field, even as Nebuchadnezzar.

Occasionally small dried fish weighing about half an ounce apiece and consisting of at least three-fourths bone

were supplied. These were roasted and ground into a powder which could then be sprinkled over the rice. Often as not they would be chewed and swallowed, head, bones, and all. There were also rare occasions when pickled fish, slimy and odorous, would be issued, an evident example of feeding the prisoners what would have normally been dumped as spoiled. All of these were by far better than the fish bones issued as meat. This happened both in the Philippines and in Japan. They could be thrown into the soup and boiled. Some men ate parts of these bones.

In Formosa the meat ration came once a week. There were civilian butchers who took the skin and head of the one pig. The Japanese garrison took the flesh; the six hundred British, American and Dutch prisoners got what was left. When rendered as fat to go into the soup there would usually be about eighteen pounds of lard.

In Japan we would go weeks on end with no meat at all. Then we would receive a small quantity, never over an ounce, of horse intestine, hog intestine, or even a nauseous fish intestine. On two occasions our meat ration consisted of the skin and subcutaneous tissue of the tunny, which boiled up into the most nauseous mess imaginable.

Sometimes men working in the blacksmith shops in Japan would fill their canteens with the mixture in which tool steel was tempered. It smelled like fish but appeared somewhat gelatinous rather than oily. They would pour this over rice. Its taste cannot be described.

During the spring of 1945 we were over a month without fresh greenstuff, having barely subsisted on seaweed kaffir corn, barley and rice, always in inadequate quantities. The Japanese camp commander took the whole camp to the hills and valleys in the adjacent countryside where we collected leaves and grasses. He was good enough to issue this to our kitchen in the amounts laid down by Japanese Army regulations only.

We had almost forgotten that there was such a thing as manna when lo and behold, on 28 August 1945, a B-29 very effectively bombed our camp with standard army field rations, medicines and clothes.



Supplies Air-Dropped to Allied Prisoners

On 28 August 1945 a mercy fleet of 125 superfortresses, in their second "relief bombing" of the week, dropped more than 875,000 pounds of food, clothing, and medical supplies—including canned beer—into sixty Allied prisoner-of-war camps on Honshu and Kyushu. The B-29's parachuted 50-gallon oil drums into eleven camps in the Tokyo area, twelve near Fukuoka, nine in the Kobe-Osaka area, eight near Sendai, and six near Hiroshima. The oil drums contained soup, cocoa, C and K rations, fruit, candy, vitamin tablets, shoelaces, sewing kits, uniforms, soap, toothpaste, razor blades, and other toilet articles. Each superfortress carried 7,000 pounds of supplies. In some cases only half a load was required for the prison camp. Each drop, however, included enough medical supplies to last twelve hundred men thirty days.

Some Notes on Road Building

By Lieutenant Colonel Burgo D. Gill, Coast Artillery Corps

There are literally thousands of miles of roads and trails which must be built by the using troops themselves, to get water and rations. These are the short and small service roads—the seemingly unimportant roads that the regular road builders of an army cannot always construct on short notice because they have more important assignments, or simply because they are not in the vicinity.

No sooner had I entered the Army than road construction problems began to hit me forcibly. I soon realized that all soldiers and officers must know something about road and trail construction work, and, more important, they must know how to do the job with the T/E equipment they have on hand, such as their trucks, axes, and shovels. Of course, efforts are always made to borrow dump trucks, tractors, and earth movers, but usually without success. It is a frustrating feeling to see a lot of road equipment in use nearby on a vital project, and to realize that we cannot borrow it.

When it is realized that roads and trails must be constructed, the problems presented fall into three general classes. These are (1) the location of the camp, (2) the nature of the terrain over which a road must be built, and (3) the road materials at hand.

The problem of roads on campsites or semi-permanent bivouac areas might seem a little off the subject, but let me cite three examples that give camp commanders trouble when road construction and maintenance are to be considered.

A battalion camp was to be constructed on a high, flat knoll. This camp was in a northern locality, and was a beautiful campsite in summer. However, when winter came, the two steep approach roads first became icy toboggan slides, then were snowbound, and finally turned into extremely slick drainage courses when the thaws set in. That camp could have been located at the foot of this hill, or the roads should have had a more gradual slope, and a better drainage system.

A beautiful shady woodland glade was chosen for a two weeks' bivouac area. This small forest was about two feet below the rest of the surrounding territory and the road net, and no sooner was the camp set up than the rains came. The place was soon under a foot of water and soupy with mud.

In another section a camp was started on sloping ground in desert territory. The commanding general had served in this area previously, and surprised everyone by moving this campsite away from the chosen spot, a fold in the ground on a long gradual slope. Subsequently, "unusual weather" descended on us, and a cloudburst hit that night. It was fortunate that we had been moved or the campsite would have been at the bottom of a stream, a foot deep and a hundred yards wide. Extreme care in the selection of campsites, semi-permanent field camps and installations will save much work and trouble later on.

The second problem is the type of ground over which roads and trails must be built. The nature of their work

often brings soldiers into bad terrain. The worst possible types of ground over which roads and trails must be built are mud, tundra, soft sand, steep rocky stretches, and lava beds.

Sometimes, the soldier road builder will have quite a bit of choice in selecting his routes, and may connect his site with any near-by supply road. If a large section of a main supply route goes out, the Army engineers may have no choice but to repair this section which has been destroyed or damaged.

An occasional commanding officer will overlook the importance of immediate road construction. At a northern base, one battery was located on the end of a two-mile peninsula. The battalion commander had instructed the BC to build a road the length of the little peninsula to the main road, so supplies could be hauled in by truck. The rough water season was approaching; the small boat used for supply was in bad shape. Yet, that battery commander procrastinated because of the lack of trucks, men, blasting powder, steam shovels, and road material, and it seemed that this two-mile stretch of road would never get built. To expedite road construction, the battalion commander declared the supply boat "inoperative." The S-4 then dumped the supplies at the end of the roadless peninsula. That battery had to pack in its rations and gasoline on foot, with the result that the road trail was open and in operation



Road building through rugged Guadalupe hills for a radar position.

Signal Corps



Signal Corps

An AA truck bogged in deep mud while trying to set up a gun near Steffeshausen, Belgium.

in two days! True, it was not a perfect highway, but it could be used by supply trucks!

When it comes to the type of terrain over which a road must be built, it appears at first glance that the local road builder has no choice. However, except for cases of military necessity such as defilade, or running across an installation, or proposed excavation, there always will be a choice.

One should consider the possible water holes, drainage courses, dry lake beds, and the like, which may be encountered. This may seem almost too obvious to mention yet, in one improvised battalion of five batteries, I saw two batteries that suffered greatly from this lack of foresight.

One battery started a four-mile trail, and it worked well

in dry weather. Unfortunately, it crossed a wide, dry, depression in the ground. When the fall rains started, that depression still *looked* dry, but the sand and dust became saturated with surface water and the bottom "went out." This same battery started a second road off at right angles to this one, to hit another main road. Part of this also had to be abandoned because it followed a natural, winding decline. This stretch also became waterlogged. What seemed the toughest section over which to build the road—a section of high, rolling terrain—proved finally to be the best. A jeep ride over it made one think of a roller coaster, but it was high and dry.

Do not disturb the surface; leave the surface mat! We all know cases where military personnel in Alaska and Iceland first scraped smooth the large bumps of either dry or frozen sod. This proved disastrous for their roads soon disappeared into bottomless pits. Also, I have seen some road builders start to move a great many rocks and rounded stones before making their road. Too often, this will disturb the surface mat of earth and permit it to be churned up. The original surface should always be left in place if it is tactically feasible.

Naturally, rock and gravel, when they are available, make the best temporary roads. Troops must use the material at hand, and do not have access to oil, asphalt, crushed rock, cement, or even steel or rope mats.

In effect, there is always material at hand for temporary construction, unless the outfit concerned with road building is in a sea of mud with no small brush, trees, hay stacks, or anything else in the vicinity.

In Florida in years gone by pine needles have been used successfully to build temporary detours alongside highway projects. A foot-thick mat of pine needles, palm fronds, or hay forms a fine surface for deep sand. Of course, it does not last forever, and drivers should be cautioned to use low speed, to start and stop slowly, and to keep away from the edges. (I have also seen coral, shells, and even coal used for this purpose.)



Signal Corps

Construction of a corduroy road through Hürzen Forest near Zweifall, Germany.

We all know how corduroy roads have been built in muddy, wooded terrain. If possible, the logs and heavy planks should be bonded together by wire, or thin steel bands if available.

The best road material is a rock fill, with gravel on top. However, even when one has these materials at hand there may be a scarcity of trucks to haul them, and no power shovel to load the trucks. Even when a steam shovel is located nearby, it is usually there to accomplish a particular rush job, and cannot be spared for even a few truck loads.

The diplomatic weekly use of Coca-Cola and beer ration can work wonders; and the value of personal contacts with other agencies can be measured in yards of finished road!

No matter what type of road one builds, or over what type of terrain, the most important item is the shoulder. Naturally, this does not have to be considered with cement roads; but when building over tundra or sand, by all means build shoulders or side walls, particularly over any ground that might be muddy in rainy weather. These need be only about one foot high for a rock and gravel road over tundra (the Icelandic variety). The "channels" thus formed are then filled with road material. This is of vital importance, since it keeps the truck drivers (most of the time) from running on the edges and thus gradually spreading and cutting the road. I have seen careless driving ruin a road to the point where it was but a few inches wide in the

center with deep, muddy ruts on both sides. Of course, if this side-wall scheme is carried to an extreme, a road may not drain properly, and will leave standing water holes that are ruinous to the surface. Turn-outs must be constructed at intervals if the road is narrow.

If one does not have any material to build culverts, this can be accomplished in two ways. Either build a "dip" in the road, or else fill a big ditch across the road with large boulders to permit seepage.

Perhaps the toughest road to build is one across a jagged lava bed. There certainly is no lack of road material there, but explosive charges are needed to blast material loose.

As so many jungle fighters know, it is easy to build a camouflaged road or trail through dense growth, because it is possible to cut virtual tunnels through the vegetation. These jungle trails have to be kept open by machete parties. Our battery was quite proud of the rock and sand paths we built to some defensive works. We did not visit them for a couple of weeks, however; and one day, a high-ranking inspector visited us, and wished to check our roads. The rock and sand trails were still there, but the wet vines and grass almost blocked our passage.

In conclusion, there is one last thought: As soon as a road is completed, start repairing it. It takes only a couple of men with an occasional load of material to keep up a stretch a mile or so long in constant repair. If you wait too long to start this repair job, you may find the entire road has to be made over as a full-time project.



Gun Data Computers

By Colonel Donald H. Smith, Coast Artillery Corps

Gun data computers for seacoast artillery have been in various stages of development for the past twenty-six years. Some officers have wondered why this method of accurate fire control was not developed years ago, and others have expressed the belief that the computer was an outgrowth of recent development spurred by the advent of war. This article is an attempt to trace briefly the major milestones in the development of the gun data computer.

Development is generally guided and channeled by policy. Policies of the type that controlled the development of computers seldom find their way into print. It is evident from articles published in the *Journal of the United States Artillery* (see article titled "Fire Control" by Major W. P. Wilson, CAC, in Volume 53, No. 2, August 1920) that twenty-six years ago the policy of the Office of the Chief of Coast Artillery encouraged the development of computers and data transmission systems. The correspondence and *Journal* articles of the early 1920's are remarkable in their somewhat detailed analysis of requirements which have been realized in the past four years.

In 1920 the War Department offered a reward of \$25,000

for the development of a mechanical computing apparatus in accordance with certain specifications. A "target computer" and a "battery computer and range keeper" were developed and built by the Ford Instrument Company of New York. Mr. Ford's idea was to make a complete machine so that the artillery might select whatever features they cared to embody in a computing device. In connection with the present standard instruments, it is interesting to note some of the comparable characteristics of this early instrument. The following items are taken from reports made in 1921-22. This early computer provided:

- Continuous electrical transmission of input data.
- Azimuth and range indicated on dials or counters.
- Direction of travel and speed of target indicated by an automatic diagram.
- Any two points within 25,000 yards of the directing point could be used as observation stations (visual stations, radio receiving stations, or subaqueous stations). Provision was made also to use vertical base or self-contained base systems.
- The instrument operated through 360 degrees in



Left: The position generator and triangle solver.



Right: The gun data computer.

THE M8N INSTALLED IN THE TRAILER.

azimuth and up to 50,000 yards in range.

f. The initial triangle was completely solved and the instrument then solved for the range and azimuth of a third point (directing point). In addition, it could be used to determine the range and azimuth from a third station.

g. In case the input data were "ragged," the instrument averaged the data and indicated range and azimuth on a smooth curve.

The specifications for this device were approved 14 November 1919, and the instrument was tested in Panama in 1922 and 1923. A board of officers was appointed to conduct the test; their report was unfavorable to adoption, and the Chief of Coast Artillery recommended that no action be taken to continue the development by the Ford Instrument Company. In 1924, the device was tested by the Coast Artillery Board. Their recommendations were generally concurred in by the Chief of Coast Artillery and were in effect that the instruments be reconditioned and modified and returned to Fort Story for test in connection with the test of the data transmission system purchased from the Ford Instrument Company.

The Gun Data Computer T1 was the Ford target computer modified by the addition of a predicting mechanism, but without ballistic networks. Ballistic and arbitrary corrections were determined by standard methods and applied to the computed data which were then transmitted to the guns by means of direct current self-synchronous data transmitters. The report of this test appears in Coast Artillery Board Project No. 618, which recommended the development of an improved computer which should include means for computing and applying ballistic corrections. The Chief of Coast Artillery approved these recommendations. Specifications for an automatic data com-

puter were prepared and, through an Ordnance Department contract, the Sperry Gyroscope Company developed and built the Gun Data Computer T3, the Long Distance Transmission System T6 and the Continuous Data Transmission System T7. This equipment was installed at Fort Hancock, New Jersey, and tests were conducted in 1932 and 1933. The results of this test indicated that the equipment had certain very desirable characteristics, but not in sufficient number or degree to enable attaining more hits per gun per minute than the then standard method of fire control. In proposing and following up this development, the Chief of Coast Artillery did not entertain the idea that the result would be a group of devices satisfactory in every respect. The development was considered fundamentally successful in that it was definitely shown that the mechanical solution of the fire control problem for seacoast guns was practicable. It had been recognized from the outset that the devices would be too cumbersome, too complicated, and too expensive for standardization and procurement. However, many material simplifications were suggested as a result of the tests, and it was recommended that further development of the T3 computer be delayed pending the result of other developments then under way.

As a result of previous tests and investigations, the Coast Artillery Board proposed the construction of a computer and transmission system along lines suggested by Major General John T. Lewis (then Captain, CAC), and Colonel Gervais W. Trichel, Ordnance Department (then 1st Lieutenant, CAC). Development funds were made available and an experimental model was constructed at Fort Monroe, Virginia, and tested in 1932. This instrument was based on an entirely new principle, was simple in construction when compared with other computers, and was

adapted to rapid procurement at an estimated cost far less than that for any other computer then known. The success attained with the first experimental model warranted the construction of a second experimental model. This was accomplished with the assistance of the Ordnance Department. This computer, known as the L-T Seacoast Artillery Director, was thoroughly tested during June 1933 with very satisfactory results. Development funds were allotted to the Ordnance Department for a pilot model for extended service tests, and as a result the Gun Data Computer T5 was designed and manufactured at Frankford Arsenal. Design, development, and manufacture with the limited funds available was a slow process; and it was not until September 1937 that the Data Computer T5 and the Data Transmission System T15 were shipped to Fort Monroe for test. This computer was unsuitable, principally due to lack of accuracy and reliability of operation of the present position mechanism, and to the excessive time required for orienting or reorienting. The computer was modified and returned for further tests in the fall of 1938. The Chief of Coast Artillery approved the recommendation that the T5 computer not be adopted and suggested that the successes and failures of the development be given careful consideration in connection with the design of the Sperry-Maxson computer.

Subsequent to the test of the T5 computer, an instrument employing mathematical solutions generally similar to the T5, but utilizing differing mechanisms thought capable of improved accuracy, was proposed by the Maxson Corporation. A pilot model of the Maxson computer was procured with a view to the development of a device suitable for long-range batteries, and also to determine the adaptability of components of the design to a computer for intermediate caliber guns. The Maxson-Sperry design and development was carried on through 1937-38 and 1939. The pilot model was designated the Gun Data Computer T7; it was completed and tested in the spring of 1940. This instrument, with minor modifications, was standardized as the Gun Data Computer M1, which is now the standard computer for 16-inch batteries. Another outgrowth of the development of the mechanical type computer was the procurement of the T8. This computer was proposed for use with medium caliber armament. It utilized the components of the T7 omitting all ballistic correction and gun displacement features in order to reduce the weight, bulk and cost. The T8 was manufactured by the Sperry Gyroscope Company and was completed in the fall of 1942. This instrument was not standardized because it provided data for one gun position only, did not include ballistic units, and was inferior to the Gun Data Computer T12.

With the possibility of hostilities, funds for the development and production of pilot models were made available in increasing amounts. Scientifically trained personnel and additional facilities were available to assist in the development of equipment for the armed forces. The National Defense Research Committee, under the Office of Scientific Research and Development, was requested to undertake the development of an improved antiaircraft director early in 1940. Electrical mechanisms for the solution of fire control data were employed first in the Antiaircraft Director T10,

now the Director M9, developed and designed by the Bell Telephone Laboratories under National Defense Research Committee contract. Action toward the development of an electrical seacoast gun data computer was initiated in April 1941 based on progress reports on the Director T10. Tests of the director indicated the practicability and desirability of the use of electrical mechanisms in gun data computers. Military characteristics for intermediate and major caliber seacoast computers were approved by the Chief of Coast Artillery in January 1942, and Ordnance Department action on the initiation of a development program and approval of the military characteristics was taken the same month. The Gun Data Computer T12 was designed and built by the Bell Telephone Laboratories. It was tested in 1943, was standardized as the Gun Data Computer M8, and was in production at the end of the war.

The M8 gun data computer will be used with intermediate caliber batteries. It is very accurate and is considered superior to the Gun Data Computer M1 and to plotting board fire control equipment. Data transmission systems have been standardized for use in receiving basic data as to target position and to transmit firing data to the guns. The method of treating ballistics in the electric type gun data computer is unique in that it embodies the first approach to a theoretically correct solution of the ballistic problem. Firing tables list differential effects as a function of range. The assumption of such a relationship is necessary for the operation of present plotting boards and associated equipment, and the Gun Data Computer M1, which require that ballistic corrections for various nonstandard conditions be applied independently of each other. Each correction is determined as a function of a given range and all corrections are added to obtain the total ballistic correction. It has long been recognized that this procedure is not correct, but since the solution had to be obtained arithmetically, and in a matter of seconds, no other solution was practicable. Differential effects due to nonstandard ballistic conditions are primarily a function of quadrant elevation (without height of site correction), and for some conditions, of the firing azimuth also. The determination of several ballistic corrections as a function of the firing elevation and azimuth by arithmetical means requires a series of successive approximations. The electric computer is capable of obtaining successive approximations readily with electrical networks which are simple in comparison with their mechanical counterparts. It has been recognized also that errors in firing data will be obtained when the second order differences due to interaction effects of the various nonstandard conditions are ignored. For example, it is known that muzzle velocities affect time of flight in a certain manner and that the muzzle velocity also affects the correction which should be applied for density. Wherever these interaction effects are appreciable, provision can be made in electrical networks to solve the necessary equations to determine the correct solution. It is evident that the electric gun data computer provides improved methods of computing ballistic corrections.

Nearly twenty-five years of continuous development, culminating in great advances in the past four years, has resulted in the standardization of superior equipment for the services.

What You Need When

By Colonel Arthur Symons, Coast Artillery Corps

"The combat boot never was meant to be cold-weather footwear."

"C Rations were never meant to be eaten more than two or three days at a time."

"The saving of \$1,500,000 per month in the procurement of one type of sock, brought about by finding a shrink-resistant process, was more than paying for current Quartermaster research costs at the time the war ended."

"We entered this war with poorer equipment than we had in 1918."

A few casually tossed-off statements like these, substantiated by facts, indicate that the Research and Development program of the Quartermaster Corps bears looking into. There is a lot the men in the field didn't know about the Quartermaster Corps, but there is little the QM didn't know about the men in the field.

The Research and Development (R and D) people have a story to tell.* Instead of sitting back and pouting because their work has been misunderstood by the very people they helped the most, they go ahead with their job, developing the items the people in the field need most—and saving the taxpayer large helpings of money.

By the end of the last war, in 1918, the army had fairly efficient QM material for the job, which was trench warfare. Some of it didn't look pretty and in the light of present-day knowledge it could have been improved, but it wasn't too bad. It wasn't very practical for dress parades at Monroe or Benning though, so modifications were made to fit the material for "garrison warfare," as one long-suffering QM major expressed it.

There was no research program from 1918 to 1938. Some development was done—much of it of the retrogressive type that resulted in the close-fitting service coat and the un-packable peaked cap. In 1938 an attempt was made to get some people with industrial experience in footwear to design some types for the army. Starved for funds and poorly coordinated, these people performed near-miracles under the conditions.

By 1941 there was a slightly larger and more effective program in operation, with one man to a field; for instance, one man handled textiles, another plastics. It was not until April of 1942, with the war more than a year old, that Research and Development was organized into an effective unit with proper personnel, funds, and authority.

Up to that time the Standardization Branch had handled what research and development there was. As just one example of the rocks strewn in the path of development, not so much as a nutmeg grater could be standardized without the approval of the Chiefs of the technical services and of the sections of the General Staff. Getting separate opinions, and later separate concurrences, of all concerned took endless time and patience.

What R & D has done since April of 1942 is hard to be-

lieve. There are 80,000-odd items in the QMC catalogue, and most of these 80,000 have been studied or tested and improved in that short time. Many of the items have been redesigned several times as new conditions have presented themselves. Climatic conditions in projected areas of operations; availability of raw materials, machines, and manufacturing capacity; and problems of distribution are just a few of the complications that dictate design and development.

The system used now is logical, and effective. The Research and Development Branch sends its own officers out to the field, and gets reports from other officers in the field, to find out what is needed. With one eye on materials scarcities, production possibilities, and cost, different designs are tried until several seem to fill the bill. Several designs may be built and tested in the laboratories. If they pass the laboratory test, they get a field test, either under conditions created artificially or under the actual conditions the items are to face. By the time all the bugs are ironed out, production facilities have been arranged and production on the necessary scale can begin.

But that isn't the end of the story. After the items get to the using troops there is a continuous flow of information back to R & D; some of it praise, some of it criticism. The criticisms are taken seriously, and where the trouble can be corrected it is done—and fast. R & D sends its own officers to the field to encourage the using troops to tell their troubles with the equipment, and the officers themselves, with their more specialized knowledge of what to look for, can often find flaws that the using services never thought of.

No. 1—Tent, Sectional, Hospital—This tent replaces the hospital ward tent. It has a floor plan 18' wide by 54' long which will accommodate 24 cots. Detachable blackout vestibules can be attached to both ends allowing entrance or exit of litter bearers without emitting light. The side walls of the tent are 6' high, permitting personnel to work in any section of the tent without hitting the roof. Detachable screening side walls are provided for protection against insects and a liner suspended from the roof of the tent serves as insulation for both heat and cold. The tent is sectionalized, permitting erection in any desired length. Each section is equipped with combination stovepipe outlet and ventilator permitting the tent to be heated with standard tent stoves.

This tent incorporates a new principle of construction in that it has a framework of webbing which carries the entire strain of the tent. This relieves the canvas from carrying the strain and prolongs the life of the tent.

No. 2—Goggle, Variable, Density—The goggle is designed to permit the tracking and spotting of aircraft into, or in the vicinity of, the sun. A hinged red visor attachment is provided for tracer ammunition observation which can be flipped into or out of the line of sight by means of slight pressure from the finger. The goggle consists of a rubber face contracting cup, the front of which is covered by a rigid plastic frame for holding the lenses. There are two neutral color polarizing lenses in each eye-piece which are rotated by means of a knurled knob through an arc of 60 degrees. In full open position the goggle transmits about 10% of the visible light rays and in the closed position only 0.1%. The density can be varied between these two limits.

No. 3—Boots, Service Combat, Tropical—A 12" high combat boot with the toe and heel made of leather and the remainder of the boot being made of nylon. The nylon portion of the boot permits quick drying and resists mildewing normally encountered in tropical areas. A rubber cleated sole affords excellent grippage in muddy and grassy terrain as well as rocky mountainous areas. The cuff eliminates the need of leggings and the buckle closure affords ease and speed in putting on and taking off the boot.

*This article was written in February, 1946. This program has been curtailed since then.

ou Need It



The QMC has cold chambers and wet chambers and combinations of the two; testing tracks complete with flinty rocks and clayey swamps; laboratories that make some college labs look like a child's chemistry set; and it uses areas in the Far North and in the steaming jungles. If it is possible to find a way to subject a field jacket or a tent stove to tests many times more severe than the items would receive in normal use, somebody in R & D has found it, or will find it.

The result of all these tests, both by the QMC and by the using services, is better clothing and equipment—equipment that will serve its purpose better, last longer, and cost less.

Let's stop right here and get something settled.

You didn't like C Rations or K Rations day after day. You knew that it would have been more sensible to cut out the fruit drink and give you more coffee. The combat boots were too ϵ "/S% cold when the weather dropped below 45° F. You once had to set up a tent, hospital, wall, and your military reputation was almost ruined. That extra flap on the field jacket was a blankety-blanked nuisance, and added nothing to warmth or rainproofing. Jungle shoes didn't protect you against blood-flukes. And so on, *ad infinitum*. The QMC is a bunch of dopes, and why did you have to wait until the campaign was over before you ever heard of shoepacs?

The people in Research and Development aren't perfect, but they have the answers to these problems and many others. Even forgetting that there was no research worthy of the name before 1942, R & D still has plenty of answers—and they're not excuses.

About the C and K Rations. They were designed to be emergency rations, and should have been used as such. It was never contemplated that they were to be used day after day, during the life of an entire campaign. The three meat components of the early ones were all that was thought necessary because the plan was to use them for three days at a time, at most. What happened? Somewhere along the line the program of feeding men B rations at short distances behind the front lines broke down. The war moved too fast; G-4s and S-4s found it was much easier to supply alphabet rations than hot food.

But it didn't take R & D long to learn about what was happening. If operating procedure required C rations for long periods, then C Rations would be given variety. There is more variety in all these rations now, including 10 kinds of meat components in the C Ration; and the 10-in-one has had more favorable comment than chicken every Sunday.

As for the fruit-drink-hot-coffee argument, the ETO wanted more coffee and the Pacific wanted more fruit drinks. There has to be a certain amount of standardization or the problem of getting the right package to the right place would get out of all proportion. And imagine the howls from the Pacific if they got nothing but coffee, or from the ETO if they got nothing but fruit drink. A compromise was reached, and the "customers" were satisfied part of the time.

Now, about footgear, R & D had developed the shoepac long before the trench-foot tales began filtering back. The pac had been used at Chilkoot Barracks for years; miners were quite familiar with them in Pennsylvania and West Virginia and Colorado. R & D found nothing wrong with the basic idea; but they improved upon it by adding a heel, a built-in arch support, a ridge around the heel to which

snowshoe straps could be attached, and by improving the tread. More important, a new last was designed which could be worn over a felt insole and two pairs of thick ski socks.

The pac was designed, ready to go. But the QMC can force nothing on the Theater troops who must requisition the items in time to assure production. In some areas no requisitions came through for the pac. Instead, from these areas requisitions did come for the combat boot and the requisitions were filled. The combat boot is a fine warm-weather foot-covering; in fact, it is hard to find one better. But trench foot will occur under wet cold conditions even at temperatures higher than 40° F. if uncovered leather boots are worn. The QMC took the brickbats because basic fundamentals were not understood by combat commanders and the warm-weather shoe was used for cold-weather operations.

As for tents, hospital, wall, and the other behemoths that have staggered second lieutenants for the past many years, when R & D was organized and got going, a sectional tent was designed that the Beaver Patrol with its patrol leader missing could set up to house a sick battalion. And stoves to heat this miniature Grand Central Terminal are being tested right now—tested heartlessly to find the best.

The extra flap on some of the clothing was put there to protect you against something it turned out you didn't need, protection against—and you should be thankful. It was part of the plan to make you gas-tight, if gas had been used. The flap might have been a nuisance, but you would have been happy to have it there if the enemy had used gas. And who knew, until V-J Day, that gas would not be used?

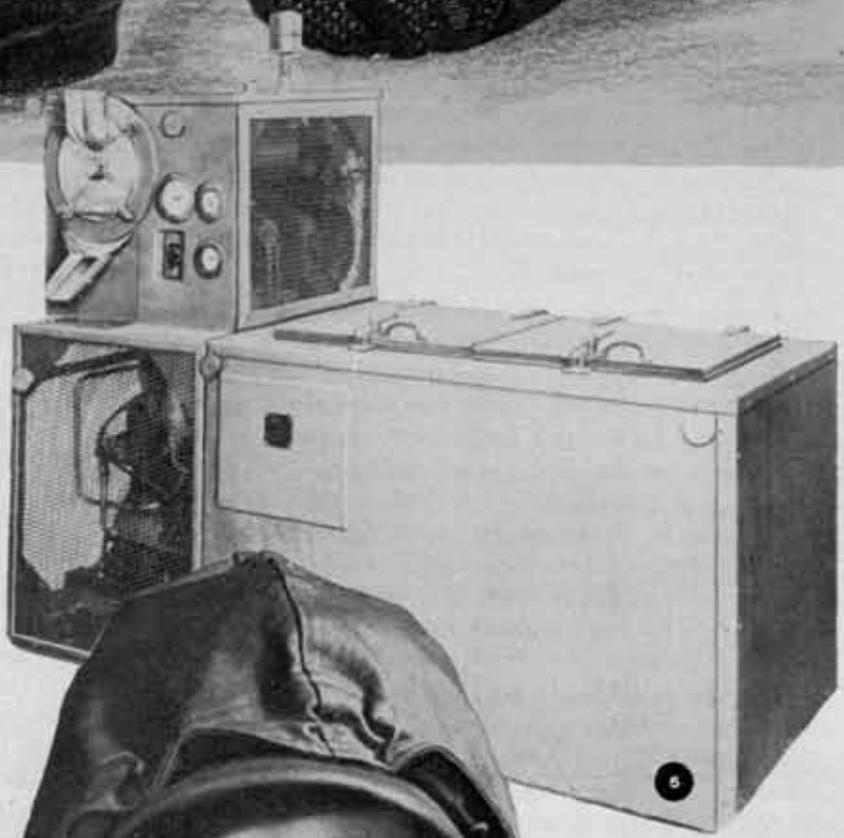
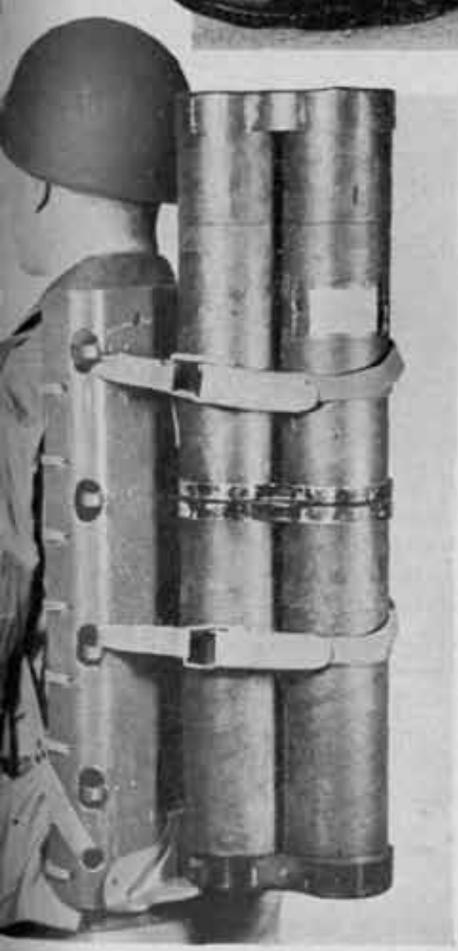
Now, about jungle shoes and blood-flukes. There were many places where the jungle shoes were just what the terrain ordered, and commanders loved them like they loved payday. Nobody told the QMC that the island you were on was next to be occupied—but if they had, it's a dollar against a pair of spiral putties that the QMC would have known about the flukes, and recommended against the jungle shoe. And if you don't believe this, you should see their files of information on climate and resources of more areas of this sad-sack globe than you ever, before 1942, knew existed.

No. 4—Shoepacs, M-1944—Shoepacs are boots with rubber feet and leather tops. They are particularly useful in wet terrain or snow, and are excellent for use with snowshoes. They are waterproof boots and are not intended for protection against extreme cold. Since the feet of the boot are made of rubber, perspiration cannot escape easily, and frost will form inside in cold weather, making the boots stiff and cold. They are adequate for active men in temperatures down to about zero degrees, and for inactive men in temperatures down to about 15 degrees, provided their socks and insoles are dry.

No. 5—Ice Cream Plant, Portable, 2½-40 Gallon—A complete 1,300-pound compact unit which will supply 640 half-servings per day. It is furnished with gasoline-engine power unit and 3 h.p., 220-volt, 60-cycle, 3-phase electric motor or with electric-motor drive only. It is of rugged aluminum construction with sanitary freezing units. 2½-gallon freezing capacity—40-gallon storage capacity.

No. 6—Packboard, Plywood—The packboard is designed to carry equipment and supplies of considerable weight. Because the weight is distributed over the back and shoulders, 50 pounds can be carried with comparative ease and loads well over 100 pounds are by no means impossible. The open space between the body and the load protects the back from hard and irregular objects, and facilitates evaporation of perspiration. Picture illustrates the packboard being utilized to carry two clover leaves of sixty millimeter mortar ammunition.

No. 7—Hood, Jacket, Field, M-1943—A windproof, water-repellent, detachable hood designed to give complete head and face protection. Picture shows hood closed to give maximum protection.



The QMC had the answer to the blood-flukes in his catalogue; you can't, with any justice, blame him for not ramming it down the Theater people's throats when you consider that it takes a while to manufacture things, and that the QMC probably had little more knowledge than you that the Island of Drooly-Drooly was to be taken on 14 July 1944. For that matter, it's a fair wager that the Theater G-4 didn't know it either. That's one of the tough things about fighting a war—Ouija Boards don't put out much dependable information about the future.

If the proper people would only know what is going to happen in the future, and would go to R & D to find out what the QMC has already done and can do in the future, many of these snafus would be obviated. R & D knows the difference between dry cold and wet cold; they know that skiers take different footwear than mountain-climbers; that paratroopers have weight limitations; and that cotton outer clothes, backed up by many layers of woolen inner garments, can do a much better job of keeping men warm than wool alone. If you're scientifically-minded, R & D will tell you about thermocouples and weight ratios and different kinds of perspiration and calories and vitamins and proteins and immersion tests and a thousand other things you never think about because all you're interested in is getting equipment to do the job. That's what R & D is interested in, too, but they *know* what they're doing.

Research and Development knows, for instance, that the Army overcoat is a most impractical garment for field operations. It is heavy; when it soaks up water it is even heavier than before, and it is really not particularly warm. Less weight, in the form of layered woolen garments (such as shirt, sweater, wool jacket) covered by a cotton shell like the field jacket, is warmer, lighter, and provides more freedom of movement. But overcoats we may always have with us because they look better in garrison parades, and look better on Saturday nights in town. But we can't throw overboard what we have learned about the layering principle because we have garrison life; armies are still designed for fighting wars. The result is that we must have both the field jacket and a dress coat; it will be Research and Development's job to insure that the field jacket (or the 1950-plus development that will replace it) is not shelved in favor of the overcoat.

Which brings us to another sore spot, as seen by the using troops. Most QMC items are a final compromise, for obvious reasons. Slightly different characteristics might be required for instance for rations used in Korea or in the Philippines. In cold areas troops need more calories than they do in warm areas. They want meat and jam, cocoa and coffee. But this is not true where warm weather saps the energy and appetites are never enough to devour a ration that would seem normal on a cold wintry day. So the soldier in the warm country growls, "Why do they put all this meat in the rations?" "Why don't we have more cigarettes, fruit drinks or beer?" And the joker in the winter cold gripes loudly, "When are we going to get more coffee?" It is manifestly impossible to design any one item to please everybody everywhere; it is just as impossible to distribute proper quantities of slightly different items to a large number of different areas or different units. It is bad enough to be required to ship mukluks to Alaska and sand-shields to Africa, without breaking the thing down to send brown mukluks to Point

Barrow and white mukluks to White Horse, metal sand-shields to Tebourba and plastic ones to Tebessa.

Along this line, the QMC has developed a combat boot with a nylon top for jungle wear, to replace the leather top used elsewhere. The island commander who finds he needs a nylon top colored pink for his particular spot in the Pacific, not realizing that there are problems of distribution and manufacture, will pound his desk and damn the QMC. But the QMC has to "take it."

That's the story, at least an infinitesimal part of it. What Research and Development has been doing during the war. Now, what about the future?

The story of the \$1,500,000 monthly savings of one type of socks should convince us that R & D pays its own way, a matter of matching dollars. The actual financial savings alone makes it a reasonable setup.

But R & D does much more than that. It saves lives, helps win battles, raises morale, and keeps the sick list low, by doing what it can to get the right equipment to the right place at the right time. There is little argument, in Army circles at least, that R & D should have the funds and personnel to keep at its chore of designing better clothing and equipment for use in any part of the world.

But R & D needs more than funds. It needs the confidence of the Army as a whole; confidence that R & D will provide the best material possible to do the job. R & D cannot find out what the troops need unless its representatives can circulate among the troops in every Theater and Army area; to live with them, listen to them, and help them. R & D cannot provide the items it develops unless the people who need the items cooperate to the extent of telling R & D the type of operations planned, when, and how many troops of what kinds will take part in the operations. Accurate information, completely up-to-date, is necessary if the Quartermaster is to provide what is needed to do the job.

Under Brigadier General Georges F. Doriot, a civilian soldier with broad industrial experience, and a staff of other civilian soldiers and civilian technical experts, Research and Development Branch of the Office of the Quartermaster General has produced thousands of miracles, working against time and obstacles, in the past few years. Arctic explorers and plastic experts and textile technicians and hundreds of others with specialized knowledge now make up the Branch—some commissioned, some working as civilians. Under a peacetime Army organization, although the experts will not be in uniform, it should be possible to arrange with industry to continue this type of research. Industry will supply our next wartime army, and has as much stake in the success of the program as has the Army.

If history is any sort of a teacher, it would appear that we must have Research and Development (under another name, but still performing the same functions) if for no other reasons than to prevent us from sliding back to where we were in 1939. It is quite conceivable that the demands of garrison warfare will dictate design between now and the next war unless we have continuous research to find better products, suited to all the varied conditions of global warfare, and suited to new weapons and new tactics. The saving in money will be tremendous; the saving in delay in casualties, and in inefficiency will be astronomical. There is no point in losing the ground we have gained.

In Retrospect^{*} Extracts of an address by the Honorable Robert P. Patterson, Secretary of War

It is of interest to look back over the last four years and examine some of the developments that engaged our attention, examine them in the light of what we learned later.

Early in the war we heard a great deal about the Japanese Zero. The common report was that it surpassed any of our fighters. The truth was that while the Zero was superior in maneuverability, all our fighters outclassed it in speed, in fire power and in all-around effectiveness. As soon as we managed to get a fairly strong force to the Southwest Pacific, the weakness of the Zero became apparent. The final blow to the Zero myth came in March of 1943 when the Fifth Air Force knocked down eighty-three Zeros in the battle of the Bismarck Sea with a loss of six of our planes.

At the same time there was a tendency to give the Japanese soldier a great reputation as a jungle fighter. There was some foundation for it. The Japanese infantryman was tough, he could travel a long distance on very little, he would not quit. But his tactics were always the same; no matter what the particular situation—holing in, night-prowling and the final Banzai charge at dawn—and our men quickly proved to be better fighters, jungle or no jungle. Guadalcanal, Buna and New Georgia gave us an edge that was never lost.

The Corps of Engineers developed a new weapon to deal with the Japanese habit of penetrating our lines in the dark, a carbine equipped with a telescopic sight and with invisible light, enabling the outposts to scan the terrain in front and pick up the targets without being seen or revealing their own presence. I should add that the German development in the use of invisible light was abreast, if not ahead, of our own.

Some of our new weapons seemed to come in the nick of time, right when the necessity was most pressing. It put me in mind of appearance of the *Monitor*, when the *Merrimac* had had a field day with the wooden ships the day before and it looked as if nothing could stop the *Merrimac*.

We stood in need of a light weapon that would give the infantry soldier confidence in his ability to stop a German tank. The Bazooka, a rocket-launcher that weighed no more than sixteen pounds, was tried out in the summer of 1942. The slow velocity of the rocket enabled us to make use of the hollow-charge shape of explosive, which was most effective in opening a hole through armor. The Bazooka was put into production without delay and was first used in the North African landing in November, 1942. In fact, it was issued to some of the assault units while they were crossing the Atlantic. It proved to be a stand-by of the infantryman all through the war, against tanks, against pillboxes and against buildings.

The amphibious truck—the well-known “Duck”—was another example of equipment turning up in time to fill an urgent need. It was characteristic of this war that landings had to be made on beaches. It was the German plan that if

they held the ports firmly, we might land on beaches but we could not supply and support a large-scale operation over the beaches. The Ducks were first used in Sicily in the summer of 1943. They proved invaluable then, as they did later in Italy, in France, and in all parts of the Pacific, in picking up supplies at shipside and taking them over the beaches to points well beyond the shore line. The Ducks did their part in frustrating the plan to hold the ports.

Our most successful development in ammunition of the standard type was the V-T fuse, for antiaircraft shells and field artillery shells. That fuse greatly reduced the effectiveness of the German V-1 bomb attack on London, and it was of great worth in beating back the German counteroffensive in the Ardennes a year ago. It had been kept under close control for secrecy, due to the danger that the enemy might get the use of it, and the fuse was first released for use by ground troops against ground targets on December 18th, two days after the launching of the German attack. Because of that fuse alone, artillery fire was credited with annihilating an entire German Division. General Patton reported that this product of American ingenuity was the chief factor in our crushing defeat of the German winter counteroffensive.

Against one German device—the V-2 long-range rocket—we did not perfect a defense. We were able to track the missile by radar, and by backtracking the radar and by mathematical calculations we could locate the launching sites. But by that time the launchers had been moved. The terrific speed of the V-2 rocket, 3,600 miles an hour, was the baffling element. The power of a weapon involves the factors of speed, range, accuracy and explosive power, but of the four speed offers the greatest difficulty in successful interception of the missile. As the speed goes up, the chance of an effective defense goes down. Despite this I have no doubt that a countermeasure against the long-range guided rocket will be developed.

I have not discussed the atomic bomb, the most revolutionary weapon since the invention of gunpowder. I have followed that project from the start, and last month I observed the effects of the first bomb at Hiroshima. The omission of it tonight is due to the fact that I am certain you are already well aware of its tremendous significance and that you already know everything that can be made public at this time.

The debt of the nation to its scientific and engineering talent is measured by the difference between victory and defeat in the war that has been fought. We could not have won with the arms we had in 1940, and this does not detract in any way from the matchless courage of our fighting men or the strategic skill of our leaders on the field of battle.

There is no security in high depots of surplus weapons left over after a war. Many of them are already obsolete. Until the time when international organization for peace will put a finish to wars as the means of settling disputes among nations—and I trust that that time is not far distant—the strongest bulwark of our security rests in the genius and skill of our scientists and engineers who are still searching out to the endless frontier.

^{*}Address delivered before the Engineering Society of Detroit 6 February 1946.

A Report on Japanese Free Balloons

A total of one hundred and ninety-four paper balloons and three rubberized-silk balloons, all of Japanese origin, were found in the United States, Canada, Alaska, Mexico and the Pacific Ocean area during the period from November, 1944, to February, 1946. In addition there were eighty-nine recoveries of small fragments of paper or other balloon parts too incomplete to be classed as a balloon. Of these two hundred and eighty-three separate recoveries of balloon material, the findings ranged from small pieces of paper to a few almost intact balloons. Also, thirty-two bombs (or bomb fragments) which had been dropped by balloons on the North American continent were found, and four hundred and seven reports of the sighting of one or more balloons in the air were received.

In early December, 1944, following the recovery of a rubberized-silk balloon from the ocean near the coast of California on November 4, the recovery of a paper balloon from the water near Hawaii on November 14, the report of a mysterious bomb explosion in Wyoming on 6 December, and the finding of a second paper balloon in Montana on 11 December, officials of the U. S. Army and Navy and the Federal Bureau of Investigation began an investigation of the source and purpose of the free balloons.

The FBI assisted the military in the collection of information and field investigations until the latter part of April, 1945.

The following is a summary of the balloon activity and is based on information obtained before the surrender of Japan and information obtained by investigators in Japan after cessation of hostilities.

PURPOSES

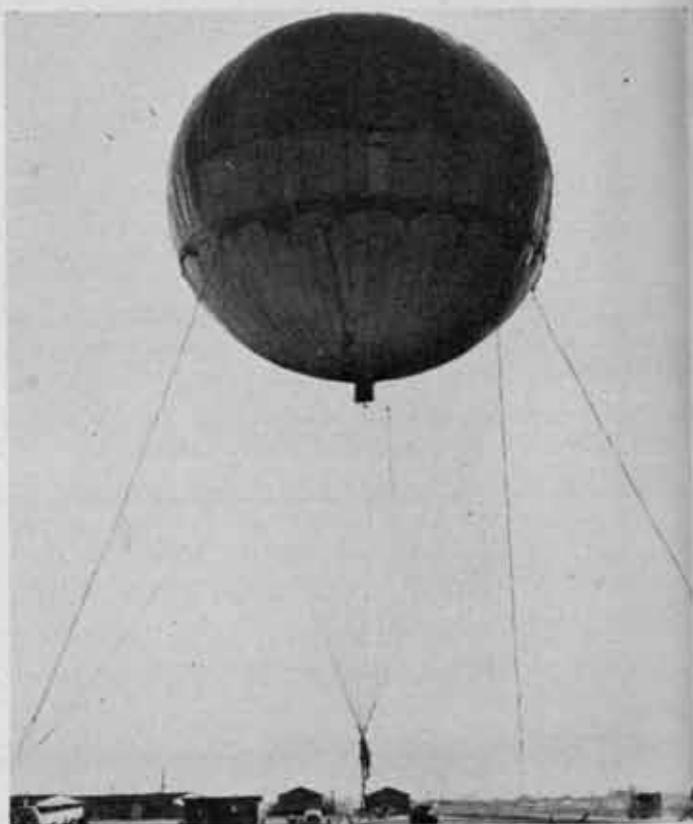
One of the first questions that had to be considered before an effective defense organization could be formed was the purpose or intention of the Japanese in regard to the balloons. It was decided that the most likely uses of the balloons were: transportation of high-explosive antipersonnel bombs and incendiaries, ranging shots (i.e., the study of wind currents, possibly for use in future activities), transportation of biological warfare agents, and propaganda to aid in the bolstering of Japanese morale.

No evidence was obtained from the recovered paper balloons of any purpose other than the transportation of bombs and incendiaries although the many unusual radio signals heard from the Pacific area indicated that ranging might be the primary purpose. Interrogation of high-ranking Japanese Army officers after the surrender indicated that the balloons were released solely in retaliation for the bombing attacks on Japan by U. S. aircraft and that the project was initiated as a result of the Doolittle attack on 18 April 1942. No loads other than incendiaries and bombs were ever used or proposed and that there was no intention to use the balloons to transport biological warfare weapons.

HISTORY

According to information obtained from Japanese officers, paper balloons were under development in Japan between 1932 and 1935 for use in meteorological investigations. Successful paper balloons were constructed with an inflated diameter of approximately thirteen feet and capable of rising to an altitude of about three and one-half miles.

When the first bombing attack on Japan occurred in 1942, the effect on Japanese morale was such that all-out efforts were made to devise retaliatory measures. The Japanese General Staff considered the use of airplanes, submarines, and free balloons, and as a result, development of a paper bombing-balloon was initiated. It was first intended to develop a type of balloon capable of traveling a distance of about 1,800 miles to be released by submarines or warships off the west coast of the United States. To attain this



Completed Japanese balloon is inflated for laboratory tests. The balloon itself at maximum altitude is a true sphere, 100 feet in circumference. It is made of five layers of mulberry paper, each about as thick as cigarette paper, but strong and water-repellent when cemented together. It is filled with hydrogen. Suspended like a chandelier below the envelope by 19 shroud lines, each 45 feet long, is a device for automatic control of altitude. The bomb load is attached to this "chandelier" with an automatic release mechanism. The balloon is further equipped with automatic demolition blocks which are supposed to destroy it in the air.

objective, the weather balloon was increased in diameter from thirteen feet to about twenty feet, and then to twenty-six feet. By the summer of 1943 it was believed that a balloon capable of traversing the required distance had been developed.

By this time, however, it was found that the Japanese Navy was depleted to the point where the ships and submarines necessary to carry on such an attack were no longer available and therefore further investigations were undertaken in an effort to evolve a balloon capable of traversing the wide expanse of ocean between Japan and North America. Much experimental work was necessary but in December 1943 and the first quarter of 1944 approximately two hundred test balloons, loaded mainly with sand, were built and released.

MANUFACTURE

Although the Japanese admit that they knew little or nothing concerning the course and distance traversed by the test balloons, nevertheless they then began large-scale mass production of paper balloons having an inflated diameter of approximately thirty-three feet. On the basis of a few reports of fires and explosions occurring in "unexpected areas" recorded by Japanese monitors from United States broadcasts, they believed that some success had been achieved.

The production goal had been set at a total of twenty thousand balloons but only nine thousand were finished, all of which were released. The first specimens of the mass production were available in July, 1944, but none was released until about 3 November 1944. The balloons were handmade and were constructed in a number of small factories; a shipping tag found with the balloon recovered on 13 March 1945, in the State of Washington, indicated that it was made by the Sagami Arsenal, located about fifteen miles northwest of Yokohama.

The Army organization responsible for the production of the balloons had close liaison with the Ninth Military Laboratory. The Japanese claim that there was no intention to use chemical warfare weapons (other than incendiaries) or biological warfare weapons, and that this laboratory was concerned only with general, difficult scientific problems.

The paper balloons cost originally about 10,000 yen, roughly \$2,300 at the prewar rate of exchange, but this cost was reduced somewhat as production increased.

LAUNCHING

According to recent reports received from Japan, balloons were released from the Island of Honshu. Large-scale launching began in November, 1944, and the last balloons were released on 20 April 1945. However, radio signals from balloon-borne transmitters were heard as late as 11 August 1945, indicating that the Japanese were still studying the meteorological conditions over the Pacific.

Accurate meteorological data relative to high-altitude wind conditions over the Pacific were not available and local weather conditions had much to do with the determination of when balloons were to be launched. If surface winds exceeded approximately ten miles per hour, or if rain were falling, no launchings were attempted. Although complete meteorological data was lacking, the studies conducted by the Japanese indicated that the winter months

were most favorable for launching free balloons which were to be carried to North America. More specifically, the most favorable time was believed to be the period from the latter part of December to the middle of February. However, even though weather conditions were not considered optimum by the Japanese, three thousand balloons, the most released in any one month, were launched in March, 1945. Of this number, two returned to Japan on March 13 after thirty-four hours, but fell in snow and caused no damage.

The balloons were launched in the early morning or early evening, when surface winds were low, by one of two methods. When the wind velocity was two miles per hour or less, the inflated and loaded balloon was held with double ropes passed through the loops in the catenary rope at the equator of the envelope. One end of each holding rope was released simultaneously, permitting the balloon to rise free. When the wind velocity was greater, up to ten miles per hour, a different method was used. First, the ballast-dropping apparatus and load were placed on a stand several feet off the ground. The envelope was then filled upwind from the stand and loaded equatorially with sand ballast in special containers designed to open when pulled from below. The balloon was then "walked" into position and attached to the ballast-dropping mechanism. The ballast release ropes then were pulled and the balloon allowed to rise. It is presumed that this method was used to minimize the shock and oscillation which would have occurred if the balloon had been released abruptly. Launching normally required a crew of thirty men and could be done in thirty minutes, and on several days having favorable weather conditions as many as one hundred and fifty were released.

It is estimated that ten per cent of the balloons released reached the United States, and that twenty to thirty per cent of failures were due to shortcomings of the launching crews. Ten per cent of the total launchings of nine thousand is considerably greater than the total of two hundred and eighty-three balloons and fragments recovered but since some balloons were equipped for self-destruction, and because of the great area of the target, it is possible that close to nine hundred balloons actually did arrive over North America. There are many areas in western United States, Canada and Alaska where man seldom goes, and it is likely that several hundred balloons fell in such spots or were destroyed before landing.

TECHNICAL

Two main types of balloons were used, one the bomb-carrying paper balloon with a diameter of thirty-three feet, and the other the more carefully constructed and more expensive rubberized-silk balloon of slightly smaller size. Nine thousand of the former were built, but only three hundred of the rubberized-silk type were constructed because of a shortage of materials. The Japanese state that thirty of the rubberized-silk balloons were released between June and October, 1944, carrying radiosonde equipment for meteorological data.

During the developmental work, balloons with diameters of five feet to thirty-three feet were used, most of which were equipped with radiosonde apparatus capable of the transmission of information on altitude, pressure differential, temperature, and light intensity. By triangulation of bear-

ings obtained by two or more radio direction-finding stations, the location also could be determined. Some of the balloons were tracked for as long as eighty hours in the summer when the winds were light and variable. In the winter, the balloons normally would be out of range in thirty hours.

When release of large quantities of paper balloons began, about ten per cent of those released were equipped with radiosonde apparatus which furnished information on the altitude of the balloon. Radio direction-finding stations on the island of Honshu obtained bearings on the radiosonde transmissions, which by triangulation indicated the location of the balloon. They were normally tracked up to a distance of approximately one thousand two hundred miles, which distance would often be covered in eight to twelve hours, an average speed of one hundred to one hundred and fifty miles per hour. The wind velocity at an altitude of approximately thirty-three thousand feet, which is believed to have been the average operating altitude of the paper balloons, varied cyclically from one hundred to one hundred and fifty miles per hour, with a period of about eight days. The balloon "track" showed that normally in November the course was south of east, in December directly east, and in February to the north of east.

The Japanese claim that the balloons usually were loaded

with one-third high-explosive bombs and two-thirds incendiaries. However, from recoveries of balloons in this country it is known that such loading was not always used. In some cases, incendiaries only were carried, with the thirty-three-pound high-explosive bomb replaced by a twenty-six-pound incendiary. According to one Japanese source, the balloon load varied from a minimum of about twenty-five pounds to a maximum of about sixty-five pounds, with the average about fifty pounds. Such variation in loading was indicated by the recovered balloons, some of which had been more heavily loaded than others.

RADIO SIGNALS

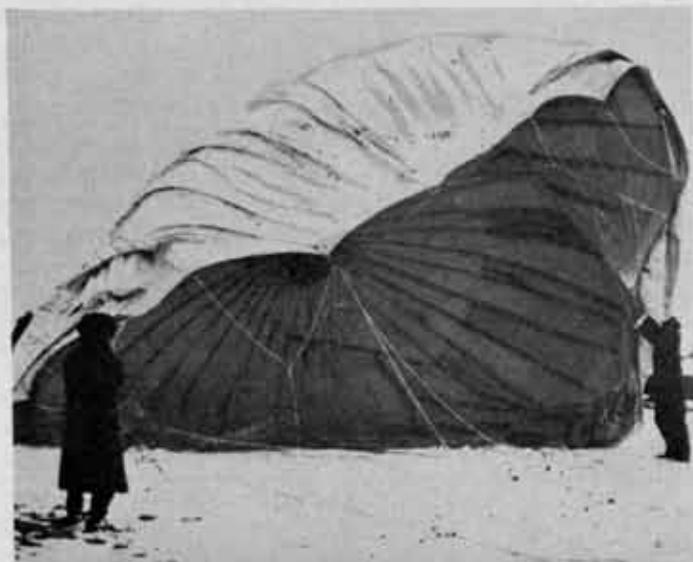
A considerable number of signals transmitted by balloon-borne radio equipment were tracked by one or more radio direction-finding stations in the United States and its possessions between early December, 1944 and August, 1945. It is interesting to note that over forty per cent of the signals were detected after April 20, 1945, the date when the Japanese state that the last balloons were released. These signals, all of the same general character, furnished the Japanese with a means of tracking the balloons after release as well as information as to the behavior of the automatic height-maintaining apparatus.

PROPAGANDA AND CENSORSHIP

The Japanese expected that information on damage caused by the balloons would be available from normal press channels and radio broadcasts. However, after the first mention of the original balloons found, the press and radio of the United States and Canada maintained a very complete voluntary censorship at the request of the Army and Navy through the Office of Censorship and thus denied the Japanese information as to the numbers of balloons arriving and the landing points.

CONCLUSION

The Japanese did not expect that the balloons would be an effective weapon, which estimate proved to be accurate. Casualties resulting from the balloon bombs were six people killed in Oregon as a result of the explosion of an antipersonnel bomb. These casualties were caused by a bomb that presumably had been on the ground for a month or more and were the tragic result of the handling of the bomb by inexperienced persons. Negligible damage was caused by the incendiaries; the only fires resulting being one or two small grass fires.



Army Air Forces

Finding of a Japanese balloon with bombs attached, 23 February 1945.



"The surest guarantee that no nation will dare again to attack us is to remain strong in the only kind of strength an aggressor understands—military power. . . . I recommend that we depend for our security upon comparatively small professional armed forces, reinforced by a well-trained and effectively organized citizen reserve. The backbone of our military force should be the trained citizen."—HARRY S. TRUMAN, Message to Congress, 23 October 1945.



The Current Military Situation



By Colonel Conrad H. Lanza, (Retired)

Introduction. The subjects discussed below are short military studies of areas in which the United States holds interest. The studies are intended to be factual as to what has occurred and impartial as to current conditions, and are based on information available to the author. They do not necessarily imply War Department indorsement of factual accuracy or opinion.

RUSSIA

THE INTERNAL SITUATION

During the war, the destruction of lives and property throughout Russia was appalling. The total casualties have not been officially reported, but have been estimated by various observers as between ten and twenty millions. According to a Moscow dispatch on 10 January 1946, 1,700 towns and 17,000 villages had been destroyed. Great damage had been caused to farms by the removal of farm animals and farm tools, and by the destruction of about 40% of the mechanical farm machines. Additionally, mines and industries, power stations and depots were ruined. Russia existed during the war only by aid of industries established in the Ural Mountains and to the east thereof, and by Lend-Lease supplies and food. This latter aid stopped abruptly at the end of the war and, since that date, Russia has been on her own.

Prior to the organization of the Soviet Union, Russia was primarily an agricultural country employing hand labor but the present government organized great industries through a series of Five-Year Plans. To obtain about ten million needed workers for industry, it was necessary that farms be confiscated by the state. These farms were then reorganized into large collective farms, were supplied with mechanical farm machines and, after some ten years, it was possible to man the industries and still raise sufficient food for the country.

The war has made a change. With a loss of farm implements it is no longer possible to cultivate former acreages because hand tools to replace them do not exist. Besides, necessary labor can be obtained only by reducing the number assigned to industry. Russia had decided not to do this, and it has adopted a new Five-Year Plan, as the first of three, to be started immediately. The object of this first

plan is to vastly increase industrial production with the primary view of making Russia a greater military power than ever. To accomplish this mission, there will be no improvement in the standard of life for the present except that the prewar standard will be sought. There is a great dearth of food, supplies and labor in Russia and, if no outside aid is received, the food situation cannot be entirely satisfactory before 1947. The industrial situation will take all of the three contemplated Five-Year Plans.

Several millions of Russian troops are stationed in occupied areas. They do have a political weight and military possibilities but the important fact is that these occupied areas feed the troops. It should be kept in mind in evaluating military intentions that these troop stations may be more for logistical than for tactical or strategical reasons. It is not always possible to determine which reason is predominant.

Russia is strenuously working to re-establish her industries. At the beginning of 1946, 40% of the coal mines in the Don area were reported working with production said to approximate 50% of prewar standards. About the same rate of progress seems to have been made in other regions and industries.

Labor is perhaps the greatest problem.

On account of the Russian black-out of news there is no dependable account of morale in homes, but with the end of the war there was a marked deterioration in the morale of the Russian army. Millions of Russian soldiers had come in contact with western civilization and with western armies and could see for themselves that the standards of life, in even the poorest of the occupied areas, were equal or superior to the best in Russia. It is claimed that, as a consequence, desertions have been large—one report noted 60,000 desertions in Austria alone. The opposition of displaced Russians to returning home after having seen western civilization is apparently marked.

To meet this situation, the Russian government has initiated strong measures for improving morale, and reports indicate that discipline among Russian units in contact with American and British observers has recently shown some improvement.

Unconfirmed reports are that about ten million Russians, opposed or supposed to be opposed to Communist Russia,

are in concentration camps. It is certain that the number in such camps is very large. These persons do work but it is not always the most suitable, nor as efficient, as that obtainable from free men.

Forced German labor is reportedly being used to relieve the labor situation. No official report exists as to their number but estimates vary between three and five millions. Importation of free labor from the Balkans would be possible but if this were done, it would be necessary to pay this labor sums sufficient to enable them to remit to their families, and to provide for occasional visits to their own homes. As Russian citizens have no such privileges, this idea has been rejected.

It seems that there will continue to be a deficiency in production of both food and supplies in Russia for a number of years.

RUSSIA'S INTENTIONS

Indications are that the Russian government is opportunistic. Like all other nations, neither the people nor the government are all of the same opinion. At present Russia is unusually active politically, and in numerous directions. Major activities are in Manchuria, Iran and the Balkans with political opposition to British interests in Greece and Southeast Asia. The sole direct opposition to American interests is press reports objecting to an American base in Iceland and press objections on 3 February against the Anglo-American Palestine commission as being completely unauthorized and invalid.

Definite pronouncements have been made by the High Command in Russia, which give an idea of what it has in mind. On 6 November 1945, Foreign Commissar Molotov, in a broadcast stated: "The history of blocs and groups of the western powers indicates that they do not tend to bridle aggressors, but on the contrary to encourage aggression, particularly on the part of Germany. Hence there must be no relaxation in the vigilance of the Soviet Union and other peaceful states on this score."

And the same Commissar on 6 February 1946, states: "The Soviet Union will solve all the tasks that it has set itself if the pack of aggressor hounds is kept chained. That is why the Soviet people are watchful. . . ."

On 9 February Marshal Stalin broadcast: "It would be incorrect to think that the war (World War II) rose accidentally or as the result of the fault of some of the statesmen. Although these faults did exist, the war arose in reality as the inevitable result of the development of the world economic and political forces on the basis of monopoly capitalism.

"Our Marxists declare that the Capitalist system . . . leads in time to sharp disturbances in their relations to groups of countries, which consider themselves inadequately provided with raw materials and export markets (and who), try usually to change this situation and to change it in their favor by armed force."

This latter speech was lengthy and reviewed the war and the Proposed Five-Year Plans. It claimed that Russia's success was due to Russian pre-vision in providing industries for her war needs. The Allies were not mentioned and no credit was given for either the military or Lend-Lease aid furnished. This fact, and the animadversions to

western Powers and to monopoly capitalism, has been generally construed as indicating suspicions of the British Empire and the United States.

RUSSIA'S MILITARY SITUATION IN CENTRAL EUROPE

For Russian dispositions in Manchuria and Iran, see sections on China and the Levant.

FINLAND AND NORWAY

Swedish reports are that the frontier between Sweden and Finland is being fortified under Russian directions and that important air and naval bases are under construction along the Aland Islands and the north side of the Gulf of Finland. Excepting one air and naval base at the entrance of the Gulf of Finland, Russia has denied engaging in fortifications along the west coast and boundary of Finland.

No recent report has been noted regarding Russian occupation of the northern province of Norway. It is therefore assumed that it still is held by Russian troops.

Reports from Finnish ships taking reparation cargoes to Leningrad are that great disorders exist at that port and that cargoes which have been exposed to the weather ever since the expiration of the war are partly ruined. Labor is difficult to obtain and unloading of ships might take weeks; orders and papers and a maze of red tape are required for simplest operations.

In general, there is no information indicating any possible Russian offensive in the north. The climate and terrain are such that an attack on Russia through Finland is improbable and nothing beyond defensive measures is required in this sector.

THE BALTIC STATES

Russian naval and air bases are under construction near Paldiski, Estonia. The islands of Dagoe and Oesel, which close the Gulf of Riga, are being fortified with labor being performed by Estonian labor battalions composed mostly of men over fifty years old believed to be hostile to Russia.

According to reports from Finland, the three Baltic States—Estonia, Latvia and Lithuania—are bitterly anti-Russian. There is an extensive Underground.

As of 1 February, the Baltic States were disorganized and impoverished and it is reported that the Underground operates in sabotage against Russia. At the end of the war, a German Army Group held parts of Latvia and Lithuania. It is believed that a part of this force took to the woods, and are now aided by native Balts and Russian deserters in a general guerrilla warfare. The Russians have removed large numbers of citizens.

The disorganization resulting from these conditions has reduced the population of Latvia from about two millions to an estimated 750,000 with comparable losses in the other two states.

EAST PRUSSIA AND POLAND

There is a strong Underground, a successor to that operating during the German occupation. It is now anti-Russian and engages in raiding post offices, banks, railroad stations and similar critical points. This is an old Polish acquirement which operated with considerable success in 1906 in an attempt to overthrow the then Russian rule. The official

Polish government is pro-Russian and is opposed by the Underground. The 18th Polish (pro-Russian) Division was known to be in line against Underground forces near Bialystock at the close of February.

In an effort to obtain the support of the peasants, Russian occupation in Poland and in East Prussia resulted in confiscating the large landed estates and dividing them into standard farms of five hectares (about 12½ acres). Due to the climate and soil, American agricultural experts consider that the smallest farm economically justified is 100 acres and anything substantially less is sure to lead to depressed areas. Numerous dwarf farms cannot support the population. Immediate difficulties have been intensified by the impossibility of finding enough tools for the multiplicity of new farms. As a result of these measures famine is appearing.

The Poles are raising an army—strength unknown—to support Russia. Assuming that the present population is about 70% of what it was before the war, it should be practicable to raise thirty divisions. A very large Russian force is in Poland but is kept away from main cities and consequently its strength and composition are unknown. Lowest and highest estimates from observers who have been in Poland place the strength between one million and two and a half millions.

BORNHOLM

This island, belonging to Denmark, is garrisoned by about 6,000 Russians. They have treated the inhabitants fairly and have not interfered with communications with Denmark. Denmark has made no objection. There are some 5,000 British troops at Copenhagen. If objection is made to the Russians in Bornholm, consistency would require objection to British in Copenhagen. For good and sufficient reasons Denmark wants the British to remain, and consequently the Russians remain in Bornholm. This was a former German air base and is excellent for that purpose.

RUSSIAN-OCCUPIED GERMANY

This is being Sovietized as rapidly as possible and many Germans are joining the Communist Party. However, the majority of Germans do not like the Russians, and should there be an election today, there is no doubt that it would be heavily anti-Russian and anti-Communist.

Reports indicate a withdrawal of Russian troops from Germany. In February the Russian troops in Poland and Occupied Germany were regrouped by corps and armies and some observers considered this as a preparation for a military campaign.

Russia has in reserve a large body of German officers, including about fifty generals, headed by Generals von Paulus and von Seydlitz. These two individuals have been conducting certain schools and some German officers have left the British sector to attend them. This movement is contrary to the normal one which is to escape from Russia. All that has been ascertained about the schools is that the courses given are partly military and partly political (Communist) which is, of course, standard practice in Russia. To date there has been no report of German-raised troops in Russian employment.

CZECHOSLOVAKIA

The Russian army's strength here is not known, but there is no information to indicate that it is abnormal. According to various reports, the Czech Government has made repeated strong protests to Moscow alleging Russian looting, etc. This condition, if true, is probably due to loss of morale in the Russian Army, which its High Command is doing the best it can to restore.

A Russian detachment is working an uranium mine near Jachymov. That village is near to the German boundary. A British observer reported that in January he noted sixty-eight Russian scientists as in charge, and over two hundred workmen at this mine. The uranium product was shipped to Dresden but what happened to it thereafter has not been ascertained.

The Czechoslovakian Government is raising an army under Russian direction.

AUSTRIA

There is a large Russian force present, estimated at about 500,000 men. Some 125,000 of these are first-class attack troops, partially supplied from Russia, and fully equipped. The balance are second-class troops whose discipline is reported as leaving much to be desired. These latter live off Austria and use animal-drawn transportation.

SLOVAKIA

As of January 1946, the largest reported organized resistance to Russian occupation is in Slovakia. In the mountains in the south part are one Slovak and one Russian (anti-Communist) division. These are reported as complete with artillery and armor. They are controlled by a Corps Headquarters, the commander of which is a Russian (anti-Communist) general. Liaison exists with the Polish Underground. No Russian operations against this hostile corps have been reported, but it is possible they may be undertaken after the snow has disappeared from the high areas held.

Numerous Germans are stated to be with the Slovak Corps. Due to desertions from the Russian ranks, the TO strength of the anti-Communist division is being maintained.

HUNGARY

The Russians have forced a division of the great landed estates, which have been allotted to tenants in dwarf farms of five or eight hectares (12½ or 20 acres) and it has been found impracticable to find farm tools for the sudden multiplicity of these dwarf farms. The acreage recommended for Hungarian soil and climate is around 300 acres as the lowest justifiable economically. Farmers are discouraged and claim the Russians are seizing most everything they can lay their hands on. Because of these circumstances, the farm production at present is estimated as only 25% of what it was under German domination.

There is a very large Russian army in Hungary. At the commencement of the year, reports estimated this force as 1,200,000 men. The main body, which is particularly strong in artillery and armor, is on the high ground some thirty to forty miles west and northwest from Budapest. A strong advance guard holds the east bank of the Raba River and connects on its right with the Russian Army in-

Austria, and on its left with a Yugo-Slav army, which form natural wings to the main force, in Hungary.

The Danube crossings are held by strong detached forces. Between the Danube and the Tisza rivers is a strong force, presumably the GHQ reserve. Services and technical troops, which include amphibious and naval units, are east of the Tisza.

The disposition of what appears to be the main Russian mass of maneuver is such that it would be possible to advance westward on either or both banks of the Danube, advance into north Italy, or move south toward Greece or Istanbul. As noted previously, the strategical possibilities of the Russian deployment may have been subordinated to the logistical desire to transfer the supply of the troops to occupied areas, yet the strategical possibilities cannot, however, be overlooked.

YUGOSLAVIA

The left of the foregoing mentioned Russian army in Hungary is covered by a Russian directed Yugoslav army. According to reports of American correspondents and British observers, seventeen divisions have been identified, amounting to 250,000 men. These hold a prolongation of the Russian line east of the Raba River and face northwest.

In the rear of this Yugoslav army, which is under the orders of Marshal Tito, is an Underground which is active in sabotage and in attacks on critical points. The head of the Underground is General Mihailovitch. This general was formerly recognized by the Allies, and was equipped by them during the war with arms and munitions. He is faithful to King Peter and has a considerable following. Since the war the Allies have recognized Marshal Tito and their aid to Mihailovitch ceased.

The Underground has one division operating in Montenegro, and another in east Bosnia, but these divisions are believed to have not over 6,000 men each present for duty. Under the circumstances, the military position of Mihailovitch would appear to be hopeless with the end of winter. However, recent reports indicate he is gaining strength from elements of the population which are anti-Tito.

ROMANIA

A large Russian army is present. Its strength has been reported as anywhere from one to two and a half millions but none of these reports come from competent observers. It is probable that there are at least a half million Russians in Romania, and there may be many more.

BULGARIA

No large Russian force is reported in this country. The Bulgar army of twelve to fourteen divisions is under Russian control. Reports from Turkey claim that the majority of these divisions are opposite her frontier. The Russian army in Romania is in position to promptly support the Bulgars if necessary.

SPAIN

Spain is a new center of trouble. It could conceivably become an area of military operations.

Spain has just about twice the area of Great Britain and

about half as much population. Excluding overseas territory the area is 194,800 square miles, and the population prior to recent wars was over 21 millions.

The present political government of Spain arose from events which commenced in 1936. On 16 February of that year an election was held for the Cortes, or national parliament, which gave the Left parties 256 members as against 205 for all other parties. The popular vote gave the left 4,356,599 votes out of 9,408,550 ballots. The Left, although composed of Republicans, Socialists, Communists and Anarchists, united in a single ticket. The Right, composed of Monarchists, Conservatives, Agrarians, etc., had separate tickets for each party. The Left, although wanting a popular majority, won easily.

The Left ousted the President of Spain on the following 6 April by vote of the Cortes, and a new Left President was elected. Each side charged the other with preparing a revolution. The Left, being in possession of the government, undertook to make radical changes. Many of these were just, such as division of landed estates, revision of taxes, etc., but obtaining these aims by legal methods was considered too slow. Murder of proprietors of estates and seizures of the land by tenants followed, but though the government officially deplored these excesses, it failed to prosecute the offenders. With immunity a practical promise, the disorders increased and spread to the murder of prominent leaders of the Right merely because they were leaders.

This led to the revolution of July, 1936, of the Right parties on the ground that if its leaders did nothing they would be killed anyway, and they might as well take a chance and fight it out. As nearly as can now be determined, the Right and Left were nearly evenly balanced as to popular votes at that time. Each had slightly under 50% of the ballots.

The Army in Spain has regularly taken part in politics as standard practice. The corps of officers, who are well educated, have always taken part in political movements. As in most armies, their tendency was to be conservative and they therefore sympathized with the Right parties. They readily agreed under the circumstances to meet violence with violence and to start a revolution.

General Francisco Franco was then the Commanding General in the Canary Islands and the second ranking General of the Army. When the revolution broke out on 18 July he flew to Morocco and assumed command. Shortly thereafter his superior was killed in an air accident, and Franco succeeded to the position of Commander in Chief. The title Commander in Chief soon included that of Chief of State. General Franco still holds both posts.

The revolution started in July, 1936 and lasted until January, 1939. It was bloody, and caused extraordinary damage to property. In the seven years which have passed since, Spain has avoided wars and has attempted to restore life to normal but only partial progress has been made. In general, law and order prevail but economic conditions are poor.

During World War II Spain's preference was for the Axis. This has been charged by the Allies as due to General Franco but it is not certain that his actions did not represent the views of the majority of his people. There is a Com-

ist Party in Spain, but it is a minority. The excesses of the civil war, justly or unjustly, have been charged against the Communists, and the country is strongly anti-Communist and anti-Russia, as representing Communism. Spain is not specially pro-Fascist or pro-Nazi; the government is humanitarian but of a variety peculiar to itself.

Since the conclusion of World War II the Allies have made pronouncements against General Franco, charging that he should be removed on account of his former pro-Fascist sympathies. Spain has admitted this, but represents that its sympathy did not include hostile acts, such as those of Italy, Austria, Hungary and other nations, which seem to have been forgiven by the Allies.

At the end of February, France closed its frontier, ceased relations with Spain, and made plea to obtaining planes from the United States or Great Britain for French use in event of war. Spain, on its part, mobilized increased forces on the French frontier. These forces include some Moorish divisions which are attack troops.

The United States, Great Britain and France on 4 March made a common declaration inviting the Spaniards to oust General Franco, as they did their then President in 1936. The declaration disclaims any idea of military intervention. The history of Spain indicates that foreign interference is likely to unite all or most of the Spanish parties. Spaniards have often had differences among themselves, but have preferred to settle their own problems without outside interference.

THE LEVANT

INCLUDING TURKEY, IRAN AND ARAB STATES

Unrest, coupled with minor disorders, is general. Main factors and interests are:

A general desire of the native races to be completely independent.

A desire of the British to retain control of the Suez Canal, including adjacent Palestine and Egypt.

A joint American and British desire to continue to dominate the valuable oil industry.

A desire of Russia to obtain oil properties so far denied her, plus military bases throughout the Levant.

RUSSIA'S DEMANDS IN THE MEDITERRANEAN SECTOR

According to German papers, Russia asked as early as 1940 for acknowledgement of her right to military occupation of Rumania and Bulgaria and the establishment of military bases on both the Bosphorus and Dardanelles Straits. The refusal of Germany to agree to this resulted in the Russo-German war, which started in June, 1941. As a result Russia gained Rumania and Bulgaria for military purposes, despite the fact that the western Allies have not agreed to this.

The Russian demand for bases on the Istanbul Straits has been unofficial, but appears government-inspired. Likewise, a new demand, made on 20 December 1945, asked for concession by Turkey of a 180-mile strip along the Black Sea from Trabzon (inclusive), to the Russian frontier. An official application has been made for assignment to Russia of a military base in the Dodecanese Islands for occupation

of Libya and/or Cyrenaica and a base on the Red Sea from former Italian colonies.

The foregoing Russian demands are an extension of a century-old effort of Russian governments to control the exit to the Mediterranean Sea via Istanbul. The demand for bases beyond the Istanbul area is new. If Russia succeeds, it will have a north and south line of bases across the eastern Mediterranean, cutting the existing British west to east line. Turkey has definitely announced that she will fight rather than cede territory to Russia and has mobilized her three armies. Of these one guards Istanbul, one is on the Caucasus frontier, and the third is in GHQ reserve.

AZERBAIJAN

There are two states of this name. One is a Soviet Republic within Russia, and the other is the northwest province of Iran. The two adjoin and are inhabited by the same race, which is different in language, customs and religion from that in the rest of Iran, which is occupied by the Persian race.

The two Azerbaijanans were originally one state. By successive attacks during the last century, Russia captured that part now incorporated within the Soviet Union. In July, 1941, Russia and Great Britain attacked Iran, overthrew its government, and installed a new government. By treaty in January, 1942, Iran agreed to foreign occupation—Russia in the north, and British in the south—for the duration of the war and six months thereafter. The United States soon after participated with the British occupation and developed an important rail and truck line of communications from the Persian Gulf to Russia over which an immense quantity of Lend-Lease goods were shipped. The United States never had any treaty right for its action but assumed it as a British ally.

Prior to the war the British and Americans had oil concessions in south and central Iran. The British developments have been opened in Arab territory south of Iran.

Iran Azerbaijan is a fertile province and normally raises a surplus of food. This is much needed in Iran but is valuable to Russia also. There are also valuable mineral deposits including unproved oil fields. Russia in 1944, and subsequently, asked for a concession for these fields but which Iran denied, on the ground that no further foreign concessions would be granted to anyone.

In November, 1945, a revolt occurred in Azerbaijan. According to Iran claims this was a put-up job. Russia, which had occupied Azerbaijan, immediately interned all Iran troops on the ground that this avoided disorders and prohibited the sending of any Iran troops into Azerbaijan. As a result of this action an autonomous government was established. It is understood that this autonomous government is prepared to grant Russia the desired oil concessions, and is to ask for the retention of Russian troops in order to preserve law and order.

According to the treaty, occupation was to end on 2 March 1946, six months after the surrender of Japan. There was, however, no evacuation of Russian troops. In the meantime the United States forces were withdrawn by 31 December 1945, and the British have nearly completed withdrawal.

The Russian occupation of Azerbaijan, if unopposed, will

presumably result eventually in the uniting of the two Azerbaijanians into a single Soviet state, but whether or not the inhabitants wish this is unknown. Occupation of Azerbaijan increased the Russian frontier with Turkey by 200 miles, and would be a material strategical factor should war occur.

The Russian occupation also opens contact with the Kurds. These are a turbulent people, who roam about the area where the frontiers of Turkey, Iran and Iraq come together. The Kurds used to be armed by the Turks for the purpose of exterminating Armenians. Iraq reports indicate that the Kurds may now be armed by Russia, and may attack the Iraq oil fields during the coming summer. To meet this possibility, the British maintain two air bases within Iraq.

PALESTINE

Palestine covers the Suez Canal and is a valuable base to the British. The local situation revolves around the effort to impose a Jewish state where the majority of the present inhabitants are Arab.

The Arab states have a League, which is active. Its CP is at Cairo. From a military point of view, Arabs are good fighters, but they lack industrial resources to maintain an army, have no naval or air forces, and are scattered over an immense collection of first-class deserts. They are consequently unable to maintain effective military opposition to the great Powers.

The Arabs, being all Moslems, have a strong moral influence among their coreligionists in Iran, in India and in French North Africa and some influence in Turkey. To unnecessarily incur the antagonism of the Arab League is to invite trouble, particularly in India and North Africa. Consequently the situation is delicate.

After various statements the Arab League announced on 2 March a new formal objection to a Jewish state in Palestine. The substance of the objection is:

The promises made to the Jews to establish a Jewish state were contrary to the promise to make no territorial changes without the free consent of the peoples involved. The Arabs have never consented.

While all Arab states, animated by a spirit of charity, are willing to open their countries to Jewish refugees, this is contingent upon the British and Americans doing the same, and proportionately to their populations and wealth. Palestine should take no more Jews than they now have, since it has already largely exceeded its prorata share.

Russia has shown an interest in the Arab cause and has increased its consuls and agents in Palestine and adjacent countries. The Arabs are neither pro-Russia nor Communist and have not heretofore shown any special interest in Russia. Yet there is a danger that they might accept Russian aid if forced by insistence on unlimited Jewish immigrations into Palestine.

In Palestine, the British have naval, air and ground bases. The Jews have started minor guerrilla activities, which to date have had a nuisance value only, but keep the country disturbed.

SYRIA AND LEBANON

This is the Levant proper. Since World War I it has

been a French mandate, and some French troops remain. The dominant Power is Great Britain, which conquered the country from France in 1941. The people are clamoring for withdrawal of all British and French troops, and acknowledgment of their independence. There has been some rioting but no serious military operations have occurred.

British and French have agreed in principle to evacuate their troops. The French, by letter of 13 December 1945, declined to withdraw immediately, claiming it was first necessary for the UNO to guarantee measures of security which were not specified. Since the French are retaining troops, the British feel it necessary to do the same.

CHINA

For some twenty years there has been civil war in China between the Kuomintang (Nationalist) Party headed by Generalissimo Chiang Kai-shek, and the Kung-hantang (Communist) Party, headed by Chairman Mao Tse-tung.

On 10 January, 1946, through the mediation of the American ambassador, General George C. Marshall, a truce was signed. This prescribed cessation of hostilities and preliminary measures for a permanent peace. With minor exceptions there has been a cessation of hostilities on the basis of freezing the troop positions of both sides. The truce made an exception—the Nationalist troops were authorized to go ahead with the relief of Russian troops in Manchuria.

This truce is remarkably similar to a truce signed between the same parties, who at the time had the same leaders, on 22 September, 1937. That truce was not complied with by either side. In view of that experience, judgment should be reserved as to the prospects of the present truce having better success.

Both truces were made under similar military conditions—the overwhelming superiority of the Kuomintang armies. In 1946, this had come about through the surrender of vast quantities of Japanese weapons and munitions to the Kuomintang while the Communists received little. The Kuomintang for years has been the recipient of Lend-Lease supplies and since the surrender of Japan, the United States has sold (on credit) to China large additional supplies. Furthermore the United States has trained the Kuomintang forces.

In view of all this aid, which has been denied to the Communists, the latter are relatively weak. They have no armor, probably not over 16 batteries of artillery and little ammunition for these, no air forces, and no naval forces. The U. S. Navy transports Kuomintang troops as necessary, the Air Transport Command flies troops and supplies for them.

For other reasons, in 1937, the Communists were hopelessly outclassed. The truce then made gave them an opportunity to avoid decisive battles and possible defeat. The same situation has again arisen. It is therefore probable that the truce will be kept temporarily, regardless of the ultimate outcome, which cannot be foreseen.

MANCHURIA

According to a treaty between China and Russia signed on 14 August, 1945, and which the United States approved, China ceded jurisdiction over the large province

Outer Mongolia, contingent on the inhabitants of that area voting for independence. Outer Mongolia has been controlled by Russia, in about the same way as Japan controlled Manchukuo. Both Mongolia and Manchukuo were ostensibly independent states, and both had their own diplomatic services. The "election" was duly held, and as expected one vote was cast for China. All votes were unanimous for continued control by Russia.

In return for this important cession, Russia agreed to evacuate Manchukuo (now renamed Manchuria) within three months of the end of the war, which would have been December 1945, subject to retention of Port Arthur as a military base, and Dairen as a commercial base, together with a 50% interest in the main railroad line to those places.

The Russian occupation was extended a month at a time until 2 February. It was a fact that China had no troops available to relieve the Russians until January. At that time, using American air and naval transportation, the 5th and 2nd Infantry Armies and the 13th Armored Army had been concentrated southwest from Mukden while the 1st Airborne Force (92d and 94th Armies) was in the Weiping area. (Chinese armies are equivalent to American troops, having 2 or 3 divisions, nominally of 10,000 combat strength each.) China announced that she was ready to relieve the Russians.

The evidence now available is that Russia did evacuate troops until 15 January. After that date, but prior to the end of the month, a change of policy occurred and the evacuation stopped. A small force of Chinese was admitted to Mukden, and has since been confined to quarters. Chinese "governors" have been admitted to the sub-provinces but as they have no troops or other command, they are helpless.

On 21 January, Russia officially demanded from China acknowledgement that all Japanese industries in Manchuria were lawful booty for Russia. Manchukuo, under Japanese rule, had extensive industries—about nine times as much as all the rest of China. Russia claims these were primarily for war purposes against her, and consequently a proper prize of war.

China has refused to accede to the Russian demand and has appealed to the United States. As this account closes, the Russians continue to hold Manchukuo, less the railroad from southwest of Mukden toward Tientsin.

THE SOUTHEAST ASIA COMMAND

The Command at the end of the war was a joint British-American one, under Lord Louis Mountbatten, British Army, as Commander in Chief. Thereafter, except for liaison detachments, American participation was withdrawn. By General MacArthur's GO I, of 1 September 1945, the mission of the SEA was to accept the surrender and evacuate the Japanese forces in Burma, Malaya, Thailand, Indo-China and the Netherlands Indies. French troops soon arrived to aid in taking over Indo-China, and

Netherlands troops came for duty in their former possessions.

No military operations have taken place in Burma and Malaya. The Japanese surrendered and have been concentrated in the Riouw Archipelago (near Singapore). Dissident natives, reported as having numerous arms, have fled to the mountains and jungle.

A peace treaty was signed in Thailand on 1 January. By its terms, certain areas in Malaya mainly inhabited by Thais, were re-ceded back to the British. To avoid the Thais considering themselves as one nation, the use of Thailand as a national designation was prohibited, and Siam assigned as a name. The name Siam is unknown locally. Siam agreed to furnish the British, without compensation, one and a half million tons of rice. There were other onerous conditions. This treaty has caused bad feeling in Thailand as the quantity of rice demanded is claimed to be way beyond what is economically possible. It is reported that the Siamese army, which is intact and Japanese equipped, maintains liaison by radio and messenger with all the other countries in the SEA.

Indo-China was in the past autumn the scene of severe fighting. The natives are organized for independence under the Viet Nam Party. The French have employed their 2d Armored Division (previously with our 7th Army in France) and a Colonial Division. At the end of February, the French announced that an agreement had been reached with the Viet Nam for independence within the French Empire. The terms are not yet known. Thereupon the SEA relieved the French from further duty except that the SEA reserved command as to evacuation of Japanese troops, which has not yet been undertaken.

Main military operations have been in Java and to a lesser extent elsewhere in the Netherlands Indies. The native populations of Sumatra and Java are respectively about ten and forty-five millions. In Sumatra, British troops hold Palembang, Padang and Medan. Japanese troops hold their stations. No Dutch troops are reported.

In Java, the British with the 5th, 23d and 26th India Divisions, and the 6th Airborne Division (previously in the Arnheim campaign) hold Batavia, Semarang and Soerabaja on the north coast, and the interior stations of Buitenzorg and Bandoeng. The British are closely besieged, but since the first of the year, only patrol activities have taken place. The 16th Japanese Army is functioning and has cooperated with the British. The British have allowed no Dutch troops to come in contact with native forces, but are conducting secret negotiations between the natives and the Dutch.

The natives have a force of about ten divisions fairly well equipped, and based on Soerakarta which is their GHQ. There are only meager facilities for manufacturing munitions and when existing stocks are expended it would seem impracticable to maintain a war against the white races who can receive unlimited supplies and replacements by sea and air. The natives could probably maintain a guerilla warfare for a long time and completely disrupt business. For this reason a war is undesirable, and a peaceful settlement is being sought.

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The purpose of the Association shall be to promote the efficiency of the Coast Artillery Corps by maintaining its standards and traditions, by disseminating professional knowledge, by inspiring greater effort towards the improvement of matériel and methods of training and by fostering mutual understanding, respect and cooperation among all arms, branches and components of the Regular Army, National Guard, Organized Reserves, and Reserve Officers' Training Corps.

News and Comment



THIS MONTH'S COVER

Of all the diversified equipment and arms of our branch the 90mm antiaircraft gun is probably the most representative of the glory we won in every Theater of this war. In a manner, it symbolizes teamwork, the keynote of successful operations.

Mr. Dean Cornwell has captured and recorded the spirit in his exciting painting of the 90's reproduced here. The scene is authentic and is based on numerous sketches each of which was carefully checked for correctness of detail before the action was reduced to canvas.

The JOURNAL is grateful to Brown & Bigelow of St. Paul, Minnesota, for permission to reproduce Mr. Dean Cornwell's now famous painting.

Unit Histories

The following unit histories have been received at the JOURNAL office:

Hawaiian AAA Command	IX Air Defense Command
Third Army AAA	34th AAA Brigade
Fifth Army AAA	44th AAA Brigade

24th AAA Brigade	440th AAA AW Battalion
25th AAA Brigade	441st AAA AW Battalion
26th AAA Brigade	455th AAA AW Battalion
27th AAA Group	463d AAA AW Battalion
28th CA Battalion (155mm)	516th AAA Gun Battalion (120mm)
29th CA (AA) Battalion	534th AAA AW Battalion
30th AAA Gun Battalion	548th AAA AW Battalion
31st AAA Gun Battalion	567th AAA AW Battalion

Other units which have published histories or contemplate doing so are urged to send copies to the JOURNAL for permanent file, which will be used as a readily accessible source of CAC history.

Civil Schooling For Regular Army Officers

In order to keep abreast of scientific developments, evaluate them and apply them to the use of the Army, a large number of officers highly educated in the basic sciences is required. To provide such officers, it is planned, as part of the postwar educational system of the Army, to provide postgraduate instruction at selected educational institutions for as many officers as possible.

Courses generally will be of two years' duration, starting with a term of refresher training usually during the summer session. They are designed to give the student advanced instruction in mathematics and the basic sciences, and to provide also in the latter part of the course a certain amount of specialized instruction for each student, to qualify him in the field of engineering, or science, which is of interest to the Army Ground Forces. The level of education to be attained is the master's degree.

The options as to specialization and the universities tentatively selected to conduct the courses are shown below. The list possibly may be changed or expanded.

Option	Institution
Communications Engineering	University of Illinois
Electronics	Massachusetts Institute of Technology University of Pennsylvania Illinois Institute of Technology
Automotive Engineering	University of Michigan
Optics and Light	University of Rochester
Acoustics	University of California (Los Angeles)
Meteorology	University of California (Los Angeles)
Guided Missiles (Propulsion and aerodynamics of)	California Institute of Technology
Guided Missiles (Guidance of Atomic Energy)	Johns Hopkins University University of California (Berkeley) University of Chicago Princeton University

This program applies only to officers commissioned in a branch of the Army Ground Forces, i.e., Infantry, Cavalry, Field Artillery, Coast Artillery, Tank Destroyer and

Armored. Other components of the Army have their own programs for the higher education of officers.

It is planned to start the first courses with the summer sessions of 1946. Most summer sessions start in June or early July.

Enrollment is limited to officers of the Regular Army and to officers of the National Guard, Organized Reserve Corps, and the Army of the United States who have submitted applications for commission in the Regular Army or who are Category I volunteers and who indicate their willingness to continue on active duty for a period of at least four years subsequent to the completion of the course, unless commissioned in the Regular Army prior to the expiration of that period.

To be selected for detail as a student, the officer must:

Be commissioned in a basic branch of the Army Ground Forces; be a volunteer for schooling under this program; have a current efficiency rating of at least excellent; have a minimum of one year of commissioned service; have a degree of Bachelor of Science or its equivalent, with a good foundation in mathematics; not have passed his 28th birthday on 1 June of the year he is to begin the course. This last requirement may be waived in the case of very well qualified applicants who are under 35 years of age, or even older, if the applicant has been engaged in work specially qualifying him as a student. The length of time away from study is the final governing factor.

Refresher Courses for R.A. Instructors

It is contemplated that all army officers detailed for duty with the ROTC will attend a refresher course immediately prior to such assignment. This refresher course will consist of two periods, a ten-day course of instruction at Fort Belvoir, Virginia, and a twenty-one-day course of instruction at the branch school for AA officers, Fort Bliss, Texas.

Instruction at Fort Belvoir will consist of branch-immateral courses of indoctrination and administrative duties in ROTC and will include a series of lectures by prominent civilians, such as college professors, and by senior officers on duty in Washington. Instruction at Fort Bliss will constitute a general refresher course in AAA.

It is believed that no seacoast artillery instruction will be given in ROTC.

A refresher course for officers detailed for duty with the National Guard or ORC will be held immediately prior to such assignment and will consist of a thirty-day course of instruction at the Coast Artillery School, Fort Monroe, Virginia, or the AAA School at Fort Bliss, Texas.

Reactivation of Advanced Course, ROTC

War Department Circular No. 300 dated 3 October 1945 authorized the reactivation of the CAC advanced course, ROTC, at the following universities and colleges:

University of Maine; Massachusetts Institute of Technology; University of New Hampshire; University of Delaware; Fordham University; University of Pittsburgh; Hampton Institute; Virginia Polytechnic Institute; Univer-

sity of Alabama; George School of Technology; Mississippi State College; The Citadel; University of Cincinnati; University of Illinois; Michigan State College; Kansas State College; University of Kansas; University of Minnesota; Washington University (St. Louis, Mo.); Agriculture and Mechanical College of Texas; University of California; University of California at Los Angeles; University of San Francisco; Utah State College; University of Washington.

In addition, a number of Universities and Colleges have recently submitted requests to the War Department for the installation of senior units. It is possible that CAC units may be activated at some of these schools. The following schools have requested "CAC," "Senior Unit," "Field Artillery," or "Artillery":

College of the Holy Cross, Worcester, Mass., Artillery; University of Virginia, Charlottesville, Va., F.A. and Inf.; LaSalle College, Philadelphia, Penna., F.A. and Inf.; Florida A and M College, Tallahassee, Fla., Senior Unit; University of North Carolina, Chapel Hill, N. C., F. A.; Mercer University, Macon, Ga., Artillery; John Carroll University, Cleveland, Ohio, CAC; University of Toledo, Toledo, Ohio, Senior Unit; Bradley Polytechnic Institute, Peoria, Ill., Senior Unit; Chicago City Junior College, Chicago, Ill., Senior Unit; Lake Forest College, Lake Forest, Ill., Senior Unit; Grand Rapids Junior College, Grand Rapids, Mich., Senior Unit; University of Detroit, Detroit, Michigan, F.A.; Loyola University, Chicago, Illinois, F.A. and Med.; Wayne University, Detroit, Michigan, CAC and F.A.; Marquette University, Milwaukee, Wis., Artillery and Inf.; Drury College, Springfield, Mo., Senior Unit; Wentworth Military Academy, Lexington, Mo., Senior Unit; Louisiana State Normal College, Natchitoches, La., CAC (AA); A and M College of Arkansas, Monticello, Ark., CAC; St. Mary's University, San Antonio, Texas, F.A.; Texas Technological College, Lubbock, Texas, F.A.; University of New Mexico, Albuquerque, N. M., F.A.; Gonzaga University, Spokane, Wash., F.A.; Phoenix Junior College, Phoenix, Ariz., Senior Unit.

ORC

Officers of the Organized Reserve Corps today are giving serious thought to future policies and plans for the training and employment of this vital force in our National Security System. This is shown by the marked increase of memberships in the Reserve Officers' Association, and the organized Reserve Corps.

The plan drafted for the United States military establishment calls for a three component set-up, the Regular Army, the National Guard and the Organized Reserve Corps.

The Organized Reserve Corps will be composed of the Active Reserve, and an Inactive Reserve. The Active Reserve will consist of those individuals and units sufficient in numbers and types which will, together with other components, constitute an over-all balanced force in the Army of the United States. The number and types of units to be activated will be dependent upon the approved War Department Troop Basis for the Organized Reserve.

The plan calls for the organization of the Reserve component into three classes. Class A will include fully or-

ganized units, complete with full T/O complement of officers and enlisted men with all organizational equipment. Class B units will be provided with a full complement of officer personnel and enlisted cadre plus a portion of unit equipment. Class C units will be those provided only with a full complement of officer personnel.

Allocation of these units will be based on the density of male population of military age within certain sections of the country so as to provide proper distribution of the units within military areas, the availability of personnel for the units requiring technically trained personnel, and the availability of regular army and National Guard units to facilitate training.

Reserve Units will be organized initially as class C units and will progress until they have reached the A class.

Officers who receive assignments in one of these units will be assigned in the grade held in the ORC; however, officers with wartime experience who have satisfactorily performed duties of a higher grade may be promoted to fill T/O vacancies in such units. Graduates of ROTC and Officer Candidate School will form a source of subsequent procurement as well as officers who served honorably in the armed services.

Initial assignments of enlisted men will be made from volunteers who are veterans having served honorably in the armed services in the present war. Other sources of enlistment will be the men being discharged from the armed services and from the voluntary enlistments in the ORC.

Officers and enlisted men who are not assigned to ORC units will constitute a reservoir of strength needed for the expansion of the Army of the United States and as replacements for all components. All enlisted men will be considered in the Active Reserve, and Officers who meet the standard prescribed by the War Department will be classed as Active Reserve. Officers who fail to meet these standards will be classed as Inactive Reserve.

Training objectives will be accomplished through: (1) active duty, (2) attendance at service schools, (3) active duty training, (4) Army Extension Courses.

Every opportunity will be provided for enlisted men and officers to advance and earn promotion. Included will be the opportunity to progress through the entire system of military schooling for both enlisted men and officers. Reserve officers will be offered the opportunity to attend the same courses as officers of the Regular Army. Selected enlisted men will be detailed to officer candidate schools and become eligible for appointment as second lieutenants. The grades and ratings for enlisted men assigned to units will be the same as those prescribed for Regular Army.

Instructors will be assigned to the Organized Reserve Corps in sufficient numbers to efficiently supervise the instruction and administration of all units. Warrant Officers or enlisted instructors will be assigned to assist commissioned instructors on the basis of one or more for each commissioned instructor.

The provision for fully manned and equipped Reserve Units probably is the most progressive step yet taken in training members of the Reserve component. In addition to the training value of uninterrupted contact between enlisted men and officers in perfecting themselves as well as their unit for emergency service, the *esprit de corps* de-

...ed by membership in a unit with flesh and blood identity
...ber than one on paper is inestimable.

Although it is realized that the information presented
...ere is scant, it is all that is available at the present time.
As plans progress and new information becomes avail-
...le it will be disseminated to the field.

ROTC Program

THE COAST ARTILLERY JOURNAL

Gentlemen:

Here are my ideas on the ROTC program.
The worst single thing about the past ROTC program
I know it is the fact that students are, under the condi-
...ons which I studied, learning the higher arts before they
...arn the basic techniques, and before they acquire the
...ame of mind of the disciplined soldier. I believe that the
...st thing to be pounded into ROTC students is the fact
...at officers are soldiers, and that soldiers live a different
...e from civilians.

Basic IDR, military courtesy, group living, military bear-
...ng and neatness, and the other basic qualities that are im-
...bed in the word *soldier* are best taught in a camp—even a
...mp of short duration. The ideal solution would be to
...ve students attend this camp during the summer vaca-
...on between the freshman and sophomore years. Since the
...vanced students are the perfect instructors for this basic
...mp, and would learn while teaching, a suggested camp
...chedule would be:

1st two weeks: Advance students only attend preparatory
... arrival of basic students.

3d, 4th, 5th and 6th weeks: Combined training.

7th week: Advanced students only.

The freshman year should be devoted to branch-imma-
...terial subjects. The goal should be to make the students
...ink and act like soldiers, and to make them *want* to think
...d act like soldiers.

Begin the advanced course with the second year. This
...ill permit more hours of instruction and will appeal to
...me students because of the pay received. Spend the year
...becoming familiar with all the armament and equipment
...the branch, skipping lightly the repairs and maintenance
...at a mechanic can learn in a few days, but bear heavily
...such things as what it is used for, why it is used for that
...urpose, what it developed from, what is wrong with it and
...hat is being done toward future development and some,
...ut very little, drill in its use. Include the basic branch sub-
...cts that were not given in summer camp. Don't waste
...me instructing in how to adjust valves on the Diamond-T
...-ton truck or on the nomenclature of small arms and
...atériel.

The third year should be devoted to branch subjects
...th special emphasis on gunnery and communications, to
...clude the operations of an AAOR. Do not attempt to
...ualify students in individual operations. Teach them the
...Why—don't devote many hours to conducting a drill
...here one man learns only one job. A few hours of artillery
...ill may be conducted if equipment is available. If equip-
...ent is not available, no time should be spent in teaching
...illery drill from a book. The use of Juniors as provisional

second lieutenants at camp is strongly recommended; the
...pay will interest them and the glory will put the clincher
...on it. The ignorance they will display should make them
...buckle down to wear off any rough spots displayed.

The fourth year should be devoted to branch-immaterial
...subjects, such as leadership, administration, courts-martial,
...mess management, and a few hours of military history. A
...few hours should be devoted to instruction in combined
...arms, but it must be remembered that the young Reserve
...officer must specialize in a particular arm to be of value in
...event of war.

During the entire four years, don't waste time on teach-
...ing the students basic things that add nothing to his stature
...as an officer. Setting B' arm for seven weeks didn't teach
...me much, nor did the time I spent learning the workings
...of the old 10-ton Holt tractor that used to be used to tow
...GPFs. A lot of time may be saved if the instructor uses a
...little imagination and keeps in mind the duties of Reserve
...junior officers. Teach him what a B' arm is, but don't
...make him set it for more than five minutes. The function
...of a starting motor is important but not important enough
...to devote five class hours to it when a qualified motor me-
...chanic will do the fixing anyhow.

These ideas are in rough form, but they may be of some
...value. One final thought is important: there should be a
...few men selected OUT at the end of each year—enough to
...get rid of the coasters who don't give a darn anyhow, and
...to make the rest decide whether they want a Reserve com-
...mission badly enough to work for it. If they don't, the
...Reserve Corps will be healthier without them. For good-
...ness sake, stop coaxing and babying men to take Reserve
...commissions.

COLONEL, CA-Reserve.

Inspectors vs. Instructors

The Coast Artillery Journal

Gentlemen:

Most of the officers who served in one or more training
...centers became disgusted with inspectors, especially the in-
...spectors who had spent many years in the army, were pre-
...sumably well qualified, and could have been of great assist-
...ance to us—but weren't. After leaving the training centers,
...we hoped we had seen the last of the inspectors. Unfortu-
...nately, we had not; they still plagued us to the war's end.

In the ETO I commanded a 90mm Gun Battalion. One
...day I was asked if I desired my battalion to be visited by
...a Gunnery Instruction Team that had been organized at
...the Camp Davis AAA School for the purpose of instruction
...in the new SCR 584 Radar and M-9 Director. My im-
...mediate reaction was "no," because I had had too many so-
...called instructors only to find out that they were inspecting
...or snooping, and I presumed these would be no different.
...However, I agreed to their coming because we needed in-
...struction badly. The team actually instructed rather than
...inspected and we profited immensely. Other battalion com-
...manders became familiar with the purpose of these teams
...and they, too, requested their assistance. The Instruction
...Teams received numerous commendations from units in
...the field and were always in demand. I never heard of an

inspector receiving a unit commendation, much less being in demand.

In all fairness, I must state that many Brigade, Group, and Battalion commanders acted as individual instruction teams and offered assistance and advice based on their experience, but many still stuck to the old style formal inspection. Formal inspections are admittedly necessary, but I believe they should be made infrequently.*

The expansion of the army at the beginning of the war was so great and the necessity for battalion commanders such that it was impossible to select all good ones. Too, they had had no opportunity for making a thorough study of the equipment they were to use. In my particular case the SCR 268 was still a big secret when I went overseas. Everyone had somewhat of a fear of it, and in early 1941 we weren't even allowed to visit the building in which it was housed at Fort Monroe. With the arrival of the SCR 584 in England in 1943, and the necessity for all operators and battery officers to receive instruction, there was little chance and no time available for battalion commanders to take training.

From my experience, a good battalion commander is one who has spent years with a battery and was a good battery commander; he has been confronted with the same problems his present batteries are facing. If a battalion commander acts as an instructor rather than an inspector he will be much in demand and will be welcomed to a battery area.

Let there be more instructors and fewer inspectors.

J. S. ALBERGOTTI
Lt. Col., CAC Res.
(CO, 184th AAA Gun Bn.)

*EDITOR'S NOTE: It is believed that in brigades, groups and battalions, inspections should be made by the executive officers.

The Simpson Board

The Washington (D. C.) Post, on 28 March 1946, reported that the Secretary of War has approved the Simpson Board report on reorganization of the Army to take effect between 15 April and 15 May, and that provisions of the Simpson Board recommendations will be placed in effect by executive order.

Verification of this action cannot be secured from the War Department at the time this issue goes to press.

Reorganization

In line with streamlining of the Army, it has been proposed that Headquarters Army Ground Forces be converted to a Headquarters Army Group and be moved to Fort Monroe, Virginia. In event of above change, it is probable that the Coast Artillery School would be moved to Fort Story, Virginia, or Fort Scott, California.

Aerial Counterspies

Special aircraft, known as "Ferrets," packed full of elec-

tronic equipment, served during the war as aerial counterspies in ferreting out the enemy's most closely guarded radar secrets. Details of their equipment and activities were revealed by Headquarters, Air Technical Service Command.

The Ferret carried equipment which not only received and recorded enemy radar signals but analyzed them for rate, size and shape of pulse, determined their frequency and established the geographic location of the radar. So and established the geographic location of the radar.—*Science News Letter*.

German V-2 Rocket Tests

The Army Ordnance has acquired a number of captured parts of the German V-2 rocket bomb and have assembled a number of these bombs in the U.S.A. These rockets are to be test fired this summer at White Sands Proving Ground, near Las Cruces, New Mexico. The primary purpose of these firings is to develop a defense against such rockets.

The Army Ordnance has invited the Navy, Army Air Forces, and Army Signal Corps to participate in the test firings in order to obtain all possible research data pertaining to missiles of this type.

Known characteristics of the German V-2:

Maximum range, 210 miles; Maximum ordinate, 50 miles; maximum speed, 3,600 mph (5,600 f/s); maximum terminal speed, 2,400 mph (3,600 f/s); length overall, 46.7 feet; diameter of body, 5.4 feet; total weight, 13 tons with liquid fuel; warhead, 2,200 pounds, H.E.

Rocket is launched vertically. It is radar tracked and radio controlled until it is pointed in direction of target.



Assembling the German V-2 Rocket

Courtesy of Army Ordnance

SEACOAST SERVICE



TEST SECTION

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 Seacoast Service Test Section, Army Ground Forces Board No. 1, or to present any new problem that may properly be considered by the Section. Communications should be addressed to the President, Seacoast Service Test Section, Army Ground Forces Board No. 1, Fort Monroe, Virginia.

Items pertaining to Antiaircraft Artillery should be sent to the Antiaircraft Test Section, Army Ground Forces Board No. 1, Fort Bliss, Texas.

COLONEL R. E. DINGEMAN, Director

LT. COL. JAMES T. BARBER
LT. COL. ANDREW W. CLEMENT
LT. COL. WILLIAM R. MURRIN
LT. COL. GEORGE B. WEBSTER, JR.

MAJOR DALE W. OLSEN
MAJOR JOHN C. LINDERMAN
CAPTAIN C. W. ZIEGLER, O.D.

The Plotting Board T13. The Plotting Board T13, recently service tested, has not been recommended for adoption as a standard item of equipment. Although it will not become a standard item, a brief description of this automatic plotting board is offered for the academic interest of Seacoast Artillery personnel. The Plotting Board T13 has been used successfully for instruction and training purposes.

The T13 is an automatic plotting board for use with gun data computers of the M8 series. The present position of the target and its predicted position are plotted continuously and automatically by electro mechanical means to a scale of 400 yards to the inch. X_0 and Y_0 voltages which represent the coordinates of the present position, and ΔX and ΔY voltages are introduced from the computer into summing amplifiers in the plotting board. Through servo mechanisms the pen carriages are then automatically positioned. It does not furnish independent means of reading ranges and azimuths. The plot is made by two automatic pens, one present and one predicted position, on a 30-inch square of paper drawn from a roll over a stressed glass surface. Two plotting zone selector switches permit the ready selection of the part of the field of fire desired to be covered by the plotting board. Zones are 9,000 yards on a side and selection is arranged so that there is a 1,500-yard overlap between zones. A display board mounted on a wall near the plotting unit indicates which target area is represented on the plotting unit.

The 400 watts of power required for operation of the plotting board is obtained from the gun data computer M8 by way of the junction box and interconnecting cables.

The plotting board cannot be placed in the semi-trailer housing the Gun Data Computer M8N but it must be emplaced indoors in order to protect it from the elements. It weighs approximately 1,000 pounds.

Instructions for installation of base-end data transmission systems. A test installation of base-end data transmission system facilities, made in accordance with tentative Signal

Corps instructions, has been completed in the Harbor Defenses of New York. This installation embodies features found desirable in previous Coast Artillery Board tests. Members of this Section recently inspected the installation and checked its operation, which was found to be satisfactory. As a result of this inspection, it has been recommended that the instructions be published by the Signal Corps as a guide for future installations in harbor defenses.

Battle Announcing System, Navy Type MCT. The service test of the Battle Announcing System, Navy Type MCT, has been completed recently. Included with this test was a comprehensive study of announcing and intercommunicating equipment for seacoast artillery use. Used in conjunction with the battle announcing system is the Navy Type 1A intercommunication unit and a proposed amplifier speaker which form a complete system for furnishing alarms, battle announcing and intercommunication.

The need for an efficient and effective system for conveying commands at noisy locations, such as gun emplacements, power rooms, and quarters, has long been recognized. As a result of this service test, it has been found that the Navy Turret Battle Announcing System, Type MCT, fulfills the requirement in modern seacoast defenses for high level announcing equipment. This turret announcing system consists of a central control station and up to ten remote talk-back stations. It will provide amplified, high level, two-way communication between the control station and the remote stations. The system operates on 110-volt, single-phase, 60-cycle power.

The Navy Type 1A intercommunicating unit has been found suitable for providing instantaneous selective transmission of information and instructions within batteries and command posts, limiting the necessity for repetition of messages by telephone operators. This intercommunicating unit, with suitable interconnecting cables, provides amplified and selected communication in a system of 2 to 11 stations. It operates on 110-volt, single-phase, 60-cycle power and is enclosed in a splashproof case with shock mountings.

To provide amplified voice communication over normal fire control telephone circuits between command posts, an amplified speaker has been proposed as an adjunct to the intercommunicating system. This unit will amplify relatively low level incoming signals to give an output of one watt on the loudspeaker and will give a level of approximately one milliwatt on the outgoing line. It will be blast-proof and sprayproof.

Harbor defense mine planter. A study was undertaken to develop a harbor defense mine planter to replace the M1 mine planters which have many undesirable features. In conjunction with the Transportation Corps, military and technical characteristics of the proposed mine planter were presented and were later approved. Plans and specifications for the mine planter were prepared under the direction of the Transportation Corps and were submitted to the Seacoast Service Test Section for comments and recommendations. The plans and specifications were approved with minor corrections and it was recommended that a pilot model of the craft be built. The following are some of the general characteristics which were included in the plans and specifications. The mine planter will have: length of 126 feet; beam of 35 feet; depth of 12 feet; draft, when loaded, of 7 feet forward and 9 feet aft; displacement of

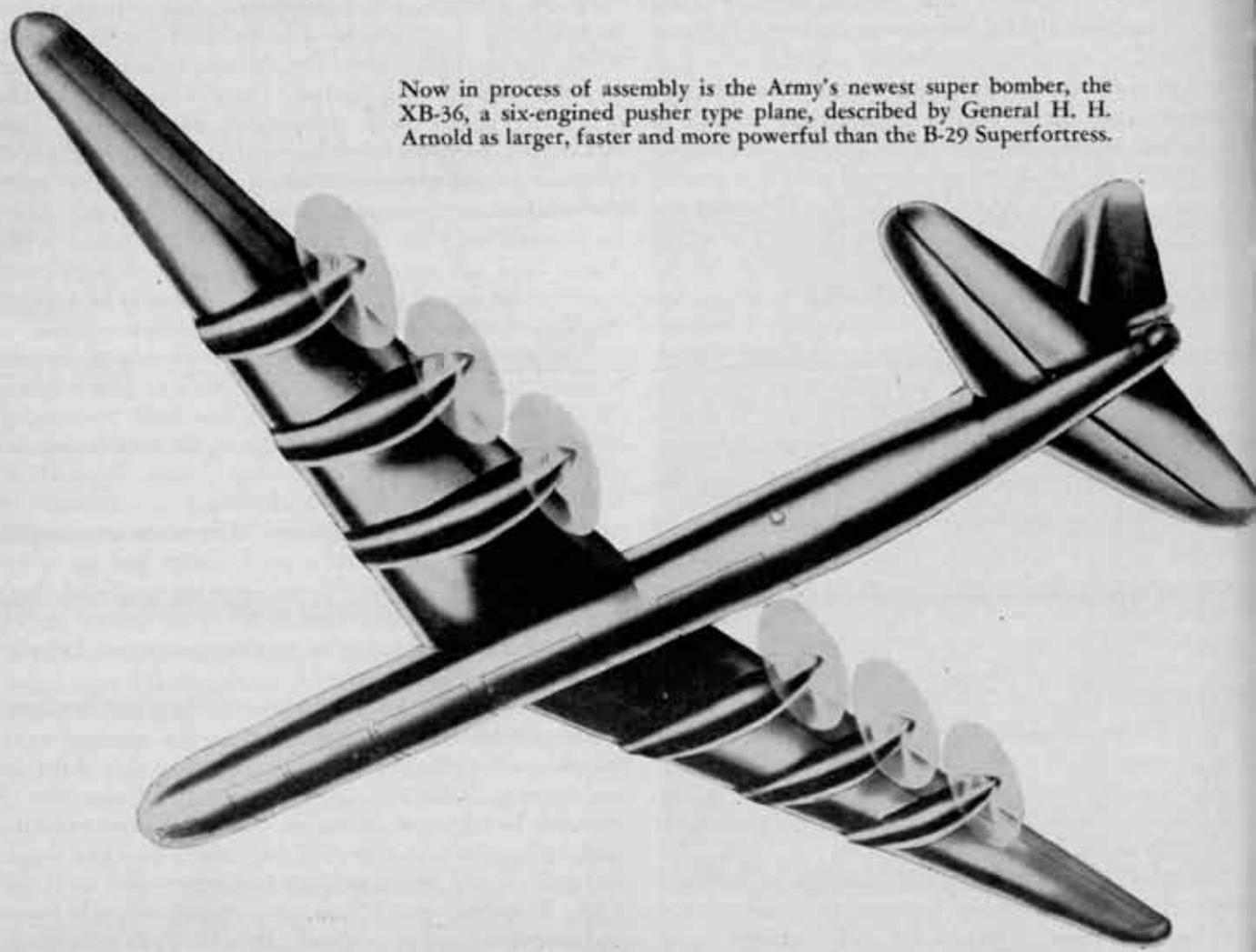
380 tons to load waterline; and a speed of approximately 12 knots. It shall be of all welded steel hull construction and powered by two diesel engines which will develop 300 HP at 675 rpm. The final determination of the type of drive to be used will be dependent upon the results of tests of captured German vessels equipped with cycloidal propellers.

Firing Circuits, 6-inch Barbette Carriages M1, M2, M3, and M4. Considerable difficulty has been experienced by various batteries with failures of the firing circuits of 6-inch Barbette Carriages M1, M2, M3, and M4. The First Service Command traced the difficulty to Receptacle Plug A218926 on the firing key cable and the Series Receptacle A218927 in the Receptacle Box Assembly C8750. This Service Command recommended installation of an enclosed moistureproof switch having two positions, one for Case II and one for Case III fire. The findings and recommendations were concurred in by this Section and it was recommended that action be taken to accomplish the modification of all subject batteries.

It is desired to point out that the majority of subjects handled by the Seacoast Service Test Section are classified and that information pertaining to them cannot be published in the JOURNAL.



Now in process of assembly is the Army's newest super bomber, the XB-36, a six-engined pusher type plane, described by General H. H. Arnold as larger, faster and more powerful than the B-29 Superfortress.



Coast Artillery News Letters



Fort Bliss



Trainees consequently must be prepared for overseas shipment within slightly more than two months after they report to induction centers and don the army uniform.

Despite the condensed program, the quality of the instruction and the number of required basic subjects remains approximately the same under the accelerated program. A new map-reading field problem has been designed by the S-2 Section under Major Rex Ragan, and is now being conducted on the desert terrain in the Forest Park-Anapra area. The problem gives the recruits practical application of such apparently complicated concepts as resection, intersection, contours, and marching on compass traverse. Small-arms training naturally cannot be reduced and consequently occupies a large portion of the training schedule, including qualification on the M-1 rifle, and familiarization with the Thompson submachine gun, hand grenades, the carbine, and bazooka.

To satisfy requisitions for replacement troops, all artillery training at the present time is on 40mm automatic weapons matériel, eliminating the training formerly required for self-propelled weapons, searchlight, and 90mm specialists at the Centralized Schools.

The demobilization program has resulted in the loss of experienced overhead personnel. This seriously handicapped the training center for a period of several weeks. Cadre replacements, however, have been brought in from those infantry replacement training centers which recently have been closed.



2273d AAA Command

By Colonel Clifford R. Jones

Major General George F. Moore arrived in Hawaii on February 1946 to assume command of the Hawaiian Artillery Command vice Major General Henry T. Burgin, who will soon complete 45 years of service. On 21 November 1945, Brigadier General Leonard L. Davis assumed command of the 2273d Antiaircraft Artillery Command (Hawaiian) succeeding Brigadier General W. W. Irvine, who was appointed commanding general, Western Pacific Base Command.

With the 48th and 70th Brigades and the 128th and 123d Groups deactivated, the command is now comprised of three groups. The 36th AAA Group is commanded by Colonel W. L. McPherson, the 139th Group by Colonel Donald C. Tredennick, and the 98th Group by Colonel Pierre B. Denson.

The primary problem of the command has been to keep pace with the demobilization program. Emphasis has also been given the procurement of the maximum number of

Regular Army enlistments, the postwar restoration program, Information and Education activity, and the training of key personnel. Outstanding progress has been made.

All of our units are now garrisoned on permanent posts, Forts Shafter, Ruger, and Kamehameha, and Schofield Barracks.

During January, the 120mm guns of the AAA Command were calibrated by the 251st Ordnance Ballistics Detachment, which has spent considerable time "down under." It was their first calibration of this type of weapon. Thirty-two guns were calibrated by the electronic equipment of the detachment and a mean corrected muzzle velocity was calculated for each gun. This and other tests produced interesting results and indicated the value and advisability of continued experimentation of this type on a broader scope if possible, so that the results may be more definite and of greater value to the other commands. It is worthy of note here that Master Sergeant Joseph V. D'Onafrio, and Technicians Third Grade Alvin W. McDermott and Eugene V. West, already overdue for release from the Army, volunteered to delay their return to the mainland in order to conduct these tests.





FORT BLISS, TEXAS

BRIGADIER GENERAL ROBERT H. VAN VOLKENBURGH
Acting Commandant

In the development of the postwar program, the Antiaircraft Artillery School has, within the last few months, undertaken a series of interesting new projects.

The First Antiaircraft Artillery Guided Missile Battalion has been activated to assist the Army Service Forces in developing ground-to-air guided missiles. The Battalion is now commanded by Lieutenant Colonel George F. Pindar. It consists not only of antiaircraft personnel but also has former ordnance and signal corps officers on its staff. Tactical doctrine and suitable tables of organization for guided missiles are being formulated.

The Flak Analysis Test Firing Project is seeking to obtain basic data on the accuracy of AAA fire. Photographic records will be obtained on 12,000 rounds fired with 90mm guns and 5,000 rounds fired with 40mm guns. The most modern weapons are used under a wide variety of conditions against targets flying at combat speeds and faster. The amount of error contributed by each piece of equipment involved in the firing is being computed. The project requires the obtaining of data not secured in ordinary firing practices. When completed, the information obtained will enable the air forces to minimize loss and damage to aircraft from AAA fire.

The school now has a display of captured German, Italian, and Japanese antiaircraft matériel for instructional purposes. Among the more important pieces are a German K-36 fire control director, two models of the German 88mm gun, the Japanese 120mm dual purpose gun, and a wide variety of automatic weapons, including such types as the German 20mm and the Japanese dual 25mm guns.

Over 32,000 documents pertaining to antiaircraft have been filed at the school library. These provide valuable information on antiaircraft phases of tactics, military engineering, and history of World War II. The collection is consulted by Army Ground Forces boards for material on development of ground-to-air guided missiles.

The Research and Analysis Course represents the progressive trend at the AAA School. The course prepares officers to conduct independent analytical studies and to translate their findings into logical conclusions and recommendations. Part of the course is devoted to research methods, current matériel, and accepted technique, followed by research on a problem of the student officer's own choosing.

Two Air Officers Courses are being given currently. One is for officers from Army Air Bases throughout the country. The course includes such subjects as antiaircraft tactics, AAA matériel, both foreign and our own, and flak and

request of the XIX Tactical Air Command at Biggs Field, Texas.

Other officers programs include an officers refresher course, an instructors course, two radar courses, a professional of military science and tactics course, three signal communications courses, and two motor courses.

The enlisted program includes a master gunners course, a fire control course, a searchlight electricians course, a course for artillery mechanics, and a noncommissioned officers course. Most courses have a 14-week program.

The 284th AAA Automatic Weapons Battalion (Self-Propelled) has been activated here and is training under the supervision of the AAA School. It is commanded by Lieutenant Colonel Joseph H. Twyman, Jr.

First Sergeant Stewart T. Campbell of the Searchlight Detachment has been decorated with the Bronze Star Medal for meritorious service with the 895th AAA AW Battalion in France, Germany, and Austria.

PERSONNEL CHANGES

The following changes during the month of January 1946 occurred at the Antiaircraft Artillery School:

ARRIVALS

Name	New Duty
Lt. Col. Lynn C. Chamberlain	Dept. of Miscellaneous Subjects
Lt. Col. Philip V. Doyle	Dept. of Miscellaneous Subjects
Lt. Col. Fred J. Newman	S-4, AAAS
Lt. Col. William H. Price	Division of Instruction
Maj. Veto Blekaitis	Dept. of Training Literature and Visual Aids
Maj. Palmore A. Ferrell	S-3, AAAS
Maj. George L. Ford	Dept. of Fire Control
Maj. William E. Holmes	Dept. of Extension Course
Maj. Eugene M. Lill	Dept. of Flak Analysis
Maj. Jack C. Maldonado	Dept. of Tactics
Maj. Edward J. Mathes	Dept. of Miscellaneous Subjects
Maj. Lawrence N. Reiman	Dept. of Fire Control
Capt. Benjamin Bell	Dept. of Radar
Capt. Casper S. Bornman	Automotive Dept.
Capt. Roy L. Carpenter	Dept. of Tactics
Capt. David E. Deines	Dept. of Miscellaneous Subjects
Capt. Howard W. Feindel	Dept. of Material and Technique
Capt. Robert H. Kassner	Dept. of Flak Analysis
Capt. Millard F. Lowrance	JAGD
Capt. Carl F. Modine	Dept. of S-4
Capt. Victor F. Thomas	Dept. of Miscellaneous Subjects
Capt. Charles W. Thompson	Dept. of Material and Technique
Capt. Ralph J. Truex	Dept. of Fire Control
Capt. Charles A. Wooten, Jr.	Dept. of Material and Technique
Capt. James L. Zipf	Dept. of Training Literature and Visual Aids
1st Lt. Carl E. Anderson	Dept. of Radar
1st Lt. William J. Arnold	S-4, AAAS
1st Lt. Paul H. Bachelor	Dept. of Tactics
1st Lt. William C. Cramer	Dept. of Material and Technique
1st Lt. Stanley J. Davies	Dept. of Communications
1st Lt. David L. Eickhoff	Dept. of Material and Technique
1st Lt. Benjamin H. Fallin	S-4, AAAS

Headquarters Building of the Antiaircraft Artillery School at Fort Bliss, Texas.

Lt. Robert A. Inman	Dept. of Radar	Maj. William J. Bennett	Dept. of Tactics
Lt. Alvin L. Jonker	S-4, AAAS	Maj. Charles W. Brandt	TL & VA
Lt. John M. Keenan	S-4, AAAS	Maj. John T. Browne	Dept. of Misc Subj
Lt. Roy S. Lutes	S-4, AAAS	Maj. William A. De Palo	Dept. of Ext Courses
Lt. Robert L. Saville, Jr.	Dept. of Flak Analysis	Maj. Alvis F. Jackson	Dept. of Fire Control
Lt. Charles R. Fish	S-4, AAAS	Maj. Harry C. Laudenslager	Dept. of Ext Courses
WOJG Newton F. Freeland	Automotive Dept.	Maj. Jack L. Oakey,	Dept. of Tactics
WOJG Horace M. Birch	S-1, AAAS	Maj. Woodrow J. Steichen	Dept. of Ext Courses
WOJG Eugene W. Coe	S-4, AAAS	Maj. John H. Walters	I. G. D.
WOJG Walter B. Fike	Automotive Dept.	Capt. John E. Boyd	Dept. of Misc Subj
WOJG Francis A. Klaiber	Hq. AAAS	Capt. Lewis H. Burruss	Dept. of Misc Subj
WOJG Jake K. Meyers	S-4, AAAS	Capt. Carmine J. Cianfrocca	Dept. of Misc Subj
WOJG Joe G. Taylor	Automotive Dept.	Capt. Jethro T. Hudgins	FATFP
WO Erastus N. Hamrick	Automotive Dept.	Capt. Manning E. Hutchinson	Dept. of Mat & Tech
		Capt. Paul Loeser, Jr.	S-2 Section
		Capt. Charles W. Matthews	Dept. of Fire Control
		Capt. John E. Morton	TL & VA
		Capt. Roland W. Robinson	S-4 Section
		Capt. George W. Seabrook	S-4 Section
		Capt. Paul L. Terry	Dept. of Mat & Tech
		1st Lt. Joe W. Alexander	Dept. of Fire Control
		1st Lt. Leo D. Babb	S-4 Section
		1st Lt. George Beck	Radar Dept.
		1st Lt. Frank S. Benford	Radar Dept.
		1st Lt. Barton C. Brown	Radar Dept.
		1st Lt. George R. Calkin	Dept. of Ext Courses
		1st Lt. Theodore H. Cooper	S-3 Section
		1st Lt. Garold W. Curo	Dept. of Ext Courses
		1st Lt. Joseph P. Fraser, Jr.	Dept. of Misc Subjects
		1st Lt. James E. Hollihand	Dept. of Misc Subjects
		1st Lt. Howard Jackson	Dept. of Material & Technique
		1st Lt. William L. Mitchell	Dept. of Ext Courses
		1st Lt. Lawrence B. Peterson	Dept. of Misc Subjects
		1st Lt. Kindall L. Peterson	FATFP
		1st Lt. Walter E. Rahte	S-1 Section
		1st Lt. Clarence S. Reburn	Dept. of Material & Technique
		1st Lt. Stuart N. Senninger	Radar Dept.
		1st Lt. Granger G. Speed	Dept. of Misc Subjects
		1st Lt. Jack W. Wright	Dept. of Ext Courses
		1st Lt. William Ettingoff	Radar Dept.
		2d Lt. Norman C. Hammond	Radar Dept.
		2d Lt. James H. Thomason, Jr.	Radar Dept.
		CWO Gustave H. Belot	Radar Dept.
		CWO Richard C. Colburn	Fire Control Dept.
		CWO Abraham E. Fishkin	Fire Control Dept.
		CWO John W. Sullivan	S-4 Section

DEPARTURES

Name	Duty
Col. Thomas B. White	Naval War College, Newport, R. I.
Col. Benjamin D. Whedbee	The Armored Sch., Fort Knox, Ky.
Maj. Tom B. Strother	MI SVC Language Sch., Ft. Snelling, Minn.
Capt. William G. Day	AGF Repl Depot #1, Camp Pickett, Va.
Capt. John O. McCahon	AGF Repl Depot #1, Camp Pickett, Va.
Lt. Michael Halkewicz	AGF Repl Depot #1, Camp Pickett, Va.
Lt. James A. Suddeth	AGF Repl Depot #1, Camp Pickett, Va.
Lt. Clarence S. Reburn	AGF Repl Depot #1, Camp Pickett, Va.

The following changes, during the month of February 1946 occurred at the Antiaircraft Artillery School:

ARRIVALS

Name	New Duty
Lt. Archibald D. Fiskin	Executive Officer
Col. Ramon C. Dougan	FATFP
Col. Fred F. Newman	S-4 Section
Col. James N. Sexton	Dept. of Instruction
Col. Wm. A. Stricklen, Jr.	S-3 Section
Paul A. Anson	Dept. of Instruction

DEPARTURES

Name	Duty
Maj. Gen. G. Ralph Meyers	Det. of Patients, WBGH, El Paso, Texas
Lt. Col. Joseph H. Twyman	284th AAA AW Bn (Commanding Officer)
Capt. Dalton Moore, Jr.	Det. of Patients, WBGH, El Paso, Texas
Capt. Edward Y. Ridgeley	School Troops
Capt. Herbert C. McKee	284th AAA AW Bn
1st Lt. Milton W. Garber	284th AAA AW Bn
1st Lt. Arthur P. Muenks	284th AAA AW Bn
1st Lt. Paul E. Adams	284th AAA AW Bn
1st Lt. Robert Evans	383d Ord. Maint. Company
1st Lt. John M. Coonan, Jr.	School Troops
1st Lt. Roy E. Albery	284th AAA AW Bn

1st Lt. Jay E. Chambers
 1st Lt. Edward Z. Trieskey
 1st Lt. Charles W. Despain
 1st Lt. Joseph H. Huneke
 1st Lt. Russel C. Pearce
 1st Lt. Rufus I. Gann
 1st Lt. Charles W. Johnson

2d Lt. Harold O. Taylor

2d Lt. Richard C. Solow
 CWO Verl M. Curtis

WOJG Robert A. Erickson
 WOJG John C. Harper

284th AAA AW Bn
 AARTC, Ft Bliss, Texas
 1st AAA GM Bn, Ft Bliss, Texas
 AGF Repl Depot #1, Camp Pickett, Va.
 284th AAA AW Bn
 AGF Repl Depot #2, Ft Ord, Calif.
 284th AAA AW Bn
 AGF Repl Depot #1, Camp Pickett, Va.



The Coast Artillery School

MAJOR GENERAL ROBERT T. FREDERICK, *Commandant*

PERSONNEL CHANGES

1 NOVEMBER 1945—31 JANUARY 1946

ARRIVALS

Name	New Duty
Maj. Gen. Robert T. Frederick	Commandant, The Coast Artillery School
Col. Kenneth G. Wickham	Secretary
Lt. Col. Homer B. Chandler	Dept. of Tactics
Lt. Col. Frederick E. Day	Dept. of Artillery
Lt. Col. Alexander Grendon	Dept. of Engineering
Lt. Col. Charles W. Hill	Dept. of Tactics
Lt. Col. John M. Moore	Dept. of Training Publications
Lt. Col. Richard R. Moorman	Dept. of Artillery
Lt. Col. Frank B. Moses	Dept. of Engineering
Lt. Col. George F. Peirce	Dept. of Submarine Mining
Maj. Thomas D. Caulfield	Dept. of Engineering
Maj. James T. Hennessy	Dept. of Submarine Mining
Maj. William F. Kuhn	Dept. of Training Publications
Maj. Frank J. Polifka	Dept. of Artillery
Maj. Elton D. Winstead	Dept. of Engineering
Capt. Paul S. Burger	Dept. of Engineering
Capt. Thomas Clements	Dept. of Engineering
Capt. John L. David	Dept. of Engineering
Capt. William H. Deadwyler	Dept. of Training Publications
Capt. George F. Heide	Dept. of Artillery
Capt. Benjamin I. Hill	Dept. of Engineering

Capt. Addison C. Kistle
 Capt. George A. Peirce
 Capt. Arthur E. Planitz
 Capt. Fin W. Roll
 Capt. Lester B. Townsend, Jr.
 Capt. James S. Tretten
 1st Lt. Gregory M. Dillon
 1st Lt. Joseph T. Donohue, Jr.
 1st Lt. L. T. Gray, Jr.
 1st Lt. Philip W. Groetzinger
 1st Lt. John P. King
 1st Lt. Roy B. Koeneman
 1st Lt. Walter A. Lohmann
 1st Lt. Joseph C. Polancic
 1st Lt. Max E. Weeks
 1st Lt. Blaine E. Young

Judge Advocate General's Dept.
 Dept. of Submarine Mining
 Training Aids Officer
 Aide-de-camp
 Dept. of Engineering
 Assistant Personnel Officer
 Dept. of Artillery
 Dept. of Artillery
 Field Artillery Liaison Pilot
 Artillery Training Detachment
 Motor Transportation Officer
 Mine Training Detachment
 Assistant Supply Officer
 Field Artillery Liaison Pilot
 Dept. of Artillery
 Dept. of Artillery

DEPARTURES

Name	New Duty
Brig. Gen. Lawrence B. Weeks	Office Chief of Staff, National Guard Bureau, Washington, D. C.
Col. Charles E. Atkinson	Retired
Lt. Col. Roger A. MacArthur	Separated from service
Lt. Col. Walter A. Rude	ASF Personnel Repl Depot, Camp Beale Calif., with temporary duty en route to Yale University
Maj. Albert W. Adams	Separated from service
Maj. Robert S. P. Rumazza	AGF Repl Depot #1, Camp Pickett, Va.
Maj. James K. Searcy	Separated from service
Maj. Hugh L. Stewart, Jr.	Separated from service
Maj. Frank L. Thornhill	Separated from service
Maj. Theo F. Treadway, Jr.	Separated from service
Maj. Walter L. Wood	Separated from service
Capt. John R. Armstrong	Separated from service
Capt. Everett C. Brill	Separated from service
Capt. Warren C. Francis	Separated from service
Capt. Lawrence C. Gordon	1321st SCU, Fort Eustis, Va.
Capt. Orville R. Harris	Separated from service
Capt. James E. Mason	Separated from service
Capt. Edmund F. McLaughlin	Separated from service
Capt. Alfred L. Raiche	McGuire General Hospital

Capt. Andrew J. Stewart	Separated from service	Capt. Alfred B. Cooper	Coast Artillery School Detachment
Lt. Harry S. Achey	AGF Repl Depot #1, Camp Pickett, Va.	Capt. Thomas E. Leachman	Librarian
Lt. Francis E. Bashaw	Separated from service	1st Lt. John L. Lester	Dept. of Engineering
Lt. William J. Berger	AGF Repl Depot #1, Camp Pickett, Va.	1st Lt. Charles C. Reischel	Mine Training Detachment
Lt. Raymond E. Bitticks	Separated from service	1st Lt. Francis W. Welch, Jr.	Mine Training Detachment
Lt. Samuel F. Crabtree, Jr.	Separated from service	2d Lt. John Zito	Dept. of Engineering
Lt. Frederick M. Daly	AGF Repl Depot #1, Camp Pickett, Va.	CWO Charles B. Duckworth	Supply Section, CA School
Lt. Norman J. Dorff	Separated from service	WOJG Lester O. Haines	Dept. of Training Publications
Lt. John R. Fee	AGF Repl Depot #1, Camp Pickett, Va.		
Lt. Charles B. Harris	AGF Repl Depot #1, Camp Pickett, Va.		
Lt. Robert F. Kendall	Separated from service		
Lt. Walter V. Kirkwood, Jr.	AGF Repl Depot #1, Camp Pickett, Va.		
Lt. Francis C. Kull	AGF Repl Depot #1, Camp Pickett, Va.		
Lt. Charles A. Palm, Jr.	Separated from service		
Lt. Leland M. Phillips	Separated from service		
Lt. Arthur C. Skinner, Jr.	Separated from service		
Lt. Franklyn A. Smith	Separated from service		
Lt. William P. Wolf	QMRP, ASFTC, Camp Lee, Va.		

PERSONNEL CHANGES

1 FEBRUARY-28 FEBRUARY 1946

ARRIVALS

Name	New Duty
Col. Frank S. Harris	Dept. of Tactics
Col. George F. Main	Dept. of Training Publications

DEPARTURES

Name	New Duty
Maj. Walter A. Johnson	Separated from service
Maj. Leonard H. Meermans	Separated from service
Maj. William H. Nicolson	Separated from service
Capt. Karl G. Baresel	Separated from service
Capt. Richard D. Brady	Separated from service
Capt. Lorse U. Brook	Separated from service
Capt. Lewis M. Eisaman	Separated from service
Capt. Frank R. Hamlett, Jr.	Separated from service
1st Lt. Olof W. Aho	Separated from service
1st Lt. Gregory M. Dillon	Separated from service
1st Lt. Kenneth J. Gross	Separated from service
1st Lt. Roy B. Koeneman	Transferred to HD of San Francisco, Fort Winfield Scott, Calif.
1st Lt. Francis C. Newsome	Separated from service
1st Lt. Howard R. Roos	Separated from service
CWO Marion G. Brashear	Transferred to Office of Military Attache, Tegucigalpa, Honduras
WOJG Kurt L. Moritz	Separated from service
WOJG James E. Sullenger	Separated from service
WOJG Marvin L. Trinkle	Separated from service



Harbor Defenses of Puget Sound

Brigadier General James H. Cunningham, who had been in command of the Harbor Defenses of Puget Sound since May 1939, is now on leave in Florida and will retire from active service on 30 April. Colonel Kenneth Rowntree is the new Harbor Defenses Commander.

Activity in the Harbor Defenses has been confined almost entirely to the liberal application of compound, rust preventive, heavy, to all armament. In spite of tremendous casualties via the discharge route the cosmoline coup appears to have been successful, and this Army establishment is prepared to cope with any emergency except one which involves shooting or manpower.

The decrease in personnel has resulted in the placing of Forts Casey, Flagler, Ebey, and Camp Hayden on a caretaking status and almost total curtailment of military activities at Fort Worden. Present indications are that in the near future the military species on the Olympic Peninsula will become extinct.

Postwar planning, however, is progressing on an optimistic scale in spite of the present situation. The Harbor Defenses of Puget Sound can point with pride to its selection as one of the permanent postwar establishments, although very few individuals here have enough faith in their personal permanence in this area to begin preparing their fishing tackle for the spring salmon runs.



BEST

General

THE EGG AND I. By *Betty MacDonald*. In 1927 the author married a man who was fired with the idea of opening a chicken ranch in the Northwest. They moved to a ranch on the Olympic Peninsula, and with a great deal of humor she chronicles her complete disenchantment with chickens and farm life. There is much, too, in her story about her neighbors, the thrifty and critical Hickses and the carefree and borrowing Kettles. *Lippincott* \$2.75.

THE CIANO DIARIES, 1939-1943. By *Count Galeazzo Ciano*. Complete and unabridged, this diary written by Count Ciano, son-in-law of Benito Mussolini and Italy's Foreign Minister from 1936-1943, is all-revealing of Nazi machinations and of Mussolini's treachery, during those fateful years of 1939-1943. It is edited by Hugh Gibson and has an Introduction by Sumner Welles. A small portion was serialized in newspapers and portions were introduced in evidence at the German War Crimes Trials. *Doubleday Doran* \$4.00.

THE ANATOMY OF PEACE. By *Emery Reves*. This is a journey into the realm of world politics with the future of world peace as stake. Albert Einstein has called it "The answer to the present political problem precipitated by the release of atomic energy." *Harper* \$2.00.

UP FRONT. By *Sgt. Bill Mauldin*. Cartoons and text which complement each other perfectly, giving the reactions of the author-artist who spent three years with the 45th Division, to

front-line fighting and the men who fought. Sgt. Mauldin's toons have been awarded the Pulitzer Prize. *World* \$3.00.

SOLDIER OF DEMOCRACY. By *Kenneth S. Davis*. This length biography of Dwight Eisenhower, the boy from wrong side of the tracks who rose by the democratic process to become one of the greatest commanders of history, required years in the writing. The author has given us an important story, one of a state, a family, and a man. *Doubleday* \$3.50.

PLEASANT VALLEY. By *Louis Bromfield*. By Bromfield farmer, not the novelist. The author tells how he brought together four derelict farms in Pleasant Valley, Ohio, and rest of them. It has much about the animals of his farm, some of the legends of the valley. It also expounds some of his theories about farming. *Harper* \$3.00.

THE AGE OF JACKSON. By *Arthur M. Schlesinger, Jr.* long, solid volume on Andrew Jackson and the Democratic Party, from the aftermath of Jeffersonian ideas through the Civil War, with special emphasis upon politics and political life. *Little Brown* \$5.00.

LOVELY IS THE LEE. By *Robert Gibbings*. The author of rambles through the River Lee country of Ireland with a mixture of anecdote and story, folklore and scenery, bird lore, fishing, and good talk. Illustrated with wood engravings by author-artist. *Dutton* \$3.00.

REVEILLE FOR RADICALS. By *Saul Alinsky*. Little known to most Americans are the People's Organizations which have sprung up, composed of underprivileged people who have banded together to fight their own economic, social, religious, and political battles. One of the leaders takes his readers every step of the way, from the reasons for the movement's inception to build-up and its accomplishments. *University of Chicago* \$2.00.

THE LIFE OF THE HEART. By *Frances Winwar*. A colorful story of George Sand, a dazzling woman who in her romantic period dared to be modern. As in her biography of Rossetti, Oscar Wilde, and Walt Whitman, Frances Winwar succeeds in portraying the famous novelist vividly against the background of her times. *Harper* \$3.50.

PLANTATION PARADE. By *Harnett T. Kane*. A human intimate study and a sharply etched social picture of the Creole, French, and American world of 18th and 19th century Louisiana. Here are tales of the great plantations and plantation houses, and of the families who own them. *Morrow* \$3.50.

FARMER TAKES A WIFE. By *John Gould*. The author of "Pre-Natal Care for Fathers" has collected a number of New England stories of his ancestors and the queer character of his Maine farming community. It is dry rather than uproarious humor (though there's some of that) and local color. *Morrow* \$2.00.

WASHINGTON TAPESTRY. By *Olive Ewing Clapper*. Based on the diaries, notes, and writings left by the famous newspaper man, Raymond Clapper, this is the inside story of Washington officialdom during the last twenty-five years, of the events that made history from Roosevelt's inauguration in 1932 to his death in 1945. It is interspersed with Mrs. Clapper's own personal stories and anecdotes of prominent Washington personalities. *Whittlesey* \$2.75.

TRY AND STOP ME. By *Bennett Cerf*. The funniest comments, and stories of our wittiest citizens in the literary and entertainment worlds, as reported by Mr. Cerf in his writings for the magazines, have been collected in book form with illustrations by Carl Rose. *Simon & Schuster* \$3.00.

THE PRACTICAL COGITATOR. By *Charles P. Curtis Ferris Greenslet*. An anthology of thought-compelling selections, long and short, prose and verse, from many languages in translations, covering a wide range of world literature. Its pages hold a liberal education which may be taken consecutively or nibbled at intermittently. *Houghton Mifflin* \$3.00.

BOOK CLUB SELECTIONS

MARCH

Book-of-the-Month Club

THE AUTOBIOGRAPHY OF WILLIAM ALLEN WHITE\$3.75
Macmillan

People's Book Club

PORTRAIT OF A MARRIAGE\$2.50
By Pearl Buck. *Day*

Literary Guild

DAVID THE KING\$3.00
By Gladys Schmitt. *Dial*

Junior Literary Guild

6, 7, 8 Year Olds
WIND ISLAND\$2.00
By Hedvig Collin. *Viking*

9, 10, 11 Year Olds

THE WONDERFUL VOYAGE\$2.00
By Ruth L. Holberg. *Doubleday Doran*

Girls 12-16

THE STORY BEHIND GREAT MEDICAL STORIES\$2.00
By Elizabeth R. Montgomery. *McBride*

Boy 12-16

BRAVE COMPANIONS\$2.00
By Ruth A. Knight. *Doubleday Doran*

Religious Book Club

DAVID THE KING\$3.00
By Gladys Schmitt. *Dial*

Scientific Book Club

YOU AND THE UNIVERSE\$3.50
By John J. O'Neill. *Washburn*

ELLERS*

Fiction

ARCH OF TRIUMPH. By *Erich Maria Remarque*. Ravic is a German refugee doctor in Paris, just before the war, who must escape clandestinely and be ready for flight or deportation at any time. He falls in love with Joan Madou, breaks with her because she becomes the mistress of an actor, and kills the Gestapo agent who had tortured him in Germany. With the outbreak of war he is off to a French concentration camp. The story is long, not too swift and full of philosophical conversations. *Appleton-Century* \$3.00.

THE KING'S GENERAL. By *Daphne du Maurier*. This is probably the best of the author's historical novels. After a rather epic-like prologue, it skips sixteen years and becomes a straight dramatic adventure story of the English Civil War, with the spotlight on Sir Richard Grenville, arrogant General whom the parliamentarians called "Skellum" and whom the bigwigs on his own side hated for his caustic tongue and his military brilliance. Crippled Honor Harris tells the story—set largely in a plot with a "ghost," a secret tunnel, etc. *Doubleday Doran* \$2.75.

THE BLACK ROSE. By *Thomas B. Costain*. A long, colorful, and well-done historical novel by the author of "Ride with Me." It deals with the experiences of the thirteenth-century Walter Garnie, his friend Tristram Griffen, and the beautiful Maryam (the Black Rose) on the road to Cathay and back in feudal England. *Doubleday Doran* \$3.00.

SHESHEAD REVISITED. By *Evelyn Waugh*. A long, substantial picture of English society between wars, and of a family constantly in conflict with its own spiritual urge. Charles Ryder is of his friendship for young Sebastian Flyte, who became a bankrupt to escape his family; of his love for Lady Julia, Sebastian's sister, and her sacrifice of love to conscience. It is full of odd, sophisticated people—wealthy, aristocratic, frustrated. *Little Brown* \$2.50.

THE RIVER ROAD. By *Frances Parkinson Keyes*. An absorbing panoramic story of life on a great Louisiana sugar plantation, Belle Heloise, in the turbulent years between the ending of World War I and the present, and of its owners, the proud and passionate d'Alvery family. A long colorful novel filled with dramatic action, romance, surprise, and suspense. *Messner* \$3.00.

BEFORE THE SUN GOES DOWN. By *Elizabeth Metzger Goodard*. The story is a sort of super-Dr. Christian, "Our Town" type, set in Willowspring, Pa., in the 80's. Here Dr. Dan Field (who has loved Pris Sargent from afar all his life) does his best to bring the wealthy Sargents and Albrights in touch with the people of Mudtown. There is no plot—just the life of the town, the clash of prejudices, the hope in the younger generation. *Doubleday Doran* \$2.75.

CASTELAND. By *Jo Sinclair*. A study of John Brown (born as Braunowitz), who hates his father and is ashamed of his family and his religion. Gradually his doctor and his sister Abby bring him to mental health, and give him understanding. A psychoanalytic tale with a fairy-tale ending. *Harper* \$2.50.

THE TURQUOISE. By *Arya Seton*. The setting of this story is Santa Fe and New York in the 70's. When Terry Dillon deserted her in New York, Fey steeled herself to the pursuit of money and position through marriage to financial wizard Simeon Over. But she found her ultimate happiness was in self-abnegation. *Houghton Mifflin* \$2.50.

WRITTEN ON THE WIND. By *Robert Wilder*. Piratical old Andrew Whitfield had made millions out of the tobacco business in North Carolina; his children, Cary and Ann-Charlotte, were spoiled brats as youngsters, bored neurotics as adults. This is the story of their lives and the lives of their friends and lovers. *Putnam* \$2.75.

THE ZEBRA DERBY. By *Max Shulman*. Shulman's special brand of zany humor in a travesty on the postwar world pictured by the planners. As a Hearthrug, of "Barefoot Boy with a Book," is now out of the Army and looking for a job. He tries

becomes so disgusted with determined efforts to treat him as a mental case that he goes home to the farm and his girl. *Lode-stone LaToole*. Illustrated by Will Crawford. *Doubleday Doran* \$2.00.

FOREVER AMBER. By *Kathleen Winsor*. Set in Restoration England, this long (over 1,000 pages), vigorous, bustling, picaresque romance depicts the step by step rise of the ambitious Amber St. Clark, illegitimate child of noble blood, from the lowest level of society to the highest as favorite mistress of Charles II. It is utterly realistic in its portrayal of the squalor of the underworld and the glamor and intrigues of the court. *Macmillan* \$3.00.

THE WHITE TOWER. By *James Ramsey Ullman*. When Captain Martin Ordway parachuted from his wrecked plane, he landed near the White Tower, the Swiss mountain he had tried to climb years ago. He and Carla Dehn (fugitive from a Nazi husband), German soldier Hein, Frenchman Delambre, and others try once more to climb the mountain, each finding some emotional fulfillment. Essentially a story of mountain climbing, sometimes exciting, occasionally dull and over philosophical. *Lippincott* \$3.00.

THE STREET. By *Ann Petry*. The "street" of the title is Harlem's 116th Street, where Lutie Johnson, a good-looking Negress, struggles to earn security for herself and her young son against the pressure of social circumstances and the violence of overcrowded streets and housing conditions. *Houghton Mifflin* \$2.50.

BOOK CLUB SELECTIONS

APRIL

Book-of-the-Month Club

- (1) MAN-EATERS OF KUMAON...\$2.00
By Jim Corbett. *Oxford*
- (2) THE SNAKE PIT.....\$2.50
By Mary Jane Ward. *Random*

Literary Guild

- WAKE OF THE RED WITCH.....\$2.75
By Garland Roark. *Little Brown*

Junior Literary Guild

- 6, 7, 8 Year Olds
THE RUNWAY SHUTTLE TRAIN...\$2.00
By Muriel Fuller. *McKay*
- 9, 10, 11 Year Olds
WE ARE THE GOVERNMENT.....\$2.00
By Mary Elting & Margaret Gossett.
Doubleday

Girls 12-16

- GOING ON SIXTEEN.....\$2.00
By Betty Cavanna. *Westminster*

Boy 12-16

- PETAR'S TREASURE.....\$2.00
By Clara Ingram Judson. *Houghton Mifflin*

Order from

The Coast Artillery Journal

631 Pennsylvania Ave., N.W., Washington 4, D. C.

COAST ARTILLERY ORDERS

(W.D. and A.G.F. orders covering the period 1 January 1946 through 28 February 1946. Promotions and demotions are not included.)

JANUARY

Colonels

Aldrich, Harry S.
Bowman, Otley DeF
Carter, Clifton C.
Carter, Marshall S.
Cook, Thomas C.
Coyne, Vincent P.

Dunsworth, James L.
Flanigen, Barrington L.
French, Avery J.
Gough, Deane A.

Gross, Felix A.
Henn, John S.
Jeffords, William Q.

Kenerick, Kenneth R.
Kreuger, Robert H.
Lavery, Arthur L.

Lincoln, Francis H.
Morrow, Samuel H.

Reybold, Franklin B.
Ruddell, James C.

Sanger, Donald B.
Sharpe, Russell T.
Sturman, J. Foxhall, Jr.

Tomlin, Robert F.

Weddell, William A.

Whittemore, Irving C.

Lieutenant Colonels

Cory, Ira W.

Day, Philip S.
Drake, Leland R.
Fultz, William S.

Gilman, Seymour I.

Holterman, Gordon H.

Larson, Werner

McBride, Robert W.
Nelson, John G.

Orman, Leonard M.
Stricklen, William A. Jr.
Vischer, Peter
Williams, Herbert A. Jr.

Assignment

Hq. ARC, Alexandria, Va.
To retire
AGD
CASW, Washington, D. C.
To retire
6th Service Command, Camp Grant, Illinois
To retire
To retire
To retire
Procurement Div. ASF, Washington, D. C.
To home to await retirement
To retire
AGF Repl Depot No. 1, Camp Pickett, Va.
USMA, West Point, N. Y.
AGO, Washington, D. C.
Hq. 1st Serv. Command, Boston, Massachusetts
Relieved from active duty
Readjustment Div. ASF, Washington, D. C.
To retire
Det. Patients, Walter Reed Hosp. Washington, D. C.
To home to await retirement
Relieved from active duty
Planning Div. ASF, Washington, D. C.
Det. Patients, ASF Regional Hosp. Fort Belvoir, Va.
Command and General Staff School, Fort Leavenworth, Kansas.
Relieved from active duty

Assignment

Planning Div. ASF, Washington, D. C.
To retire
To retire
Nat'l Hq. SS System, Washington, D. C.
Hq. AGF, Gen'l Elec. Mfg. Co. Syracuse, N. Y.
Hq. AGF, Applied Physics Laboratory, Johns Hopkins University, Baltimore, Maryland
OC of S, I and E Div., Washington, D. C.
To retire
PMS&T, North Carolina State College, Raleigh, N. C.
USMA, West Point, N. Y.
AAA School, Fort Bliss, Texas
Relieved from active duty
Relieved from active duty

Majors

Baker, Marshall W.
Brooks, Robert L.

Cretys, Harold G.
Dietz, Waldemare E.
Ebeling, Edward C.
Farr, Richard
Grow, Neville L.

Gulick, John McM.
Hahn, Edward H. Jr.

Hall, Glenn O.

Johnson, Ralph M. Jr.
Karr, Stephen W.
Linderman, John C.

Osthues, Henry E.

Reynolds, Walter R.
Walker, John W.
Ward, Frederick G.

Captains

Bernique, Roger P.
Callahan, Charles M. Jr.
Camp, Sanders
Catlin, John E.

Christiansen, Lawrence W.
Cook, William T.
DeMarco, Michael A.
English, Howard L.

Farwick, Harry A. C.

Ghaster, Earl F.
Houston, Turner O.

Leland, James D.
Lynahan, John K.
Maker, Charles M.
Matthews, William G.
Moore, David J.

Mumma, Van I.
McCarthy, William B.
McLaughlin, John J.
Peirce, George A.

Polak, Edward T.
Sauter, Frank
Schwager, Martin J.

Senn, Arthur L.
Sheridan, Thomas J.
Shirley, William M.
Stephens, Richard H.
Vanderslice, Granberry A.
Von Nonnen, Leopold M. Z.

Assignment

IRTC, Camp Croft, S. C.
Ofc. Dir. Mil. Tng. ASF, Washington, D. C.
AAAORP, Fort Bliss, Texas
Relieved from detail in IGD
Relieved from active duty
Hq. First Army, Fort Bragg, N. C.
HD of Los Angeles, Fort Meade, California
Detailed in Air Corps
Counter Intelligence Corps Center, Holabird Signal Depot, Baltimore, Maryland
Special Services Division, ASF, New York, New York
To retire
Relieved from active duty
AGF Board No. 1, CA Section, Fort Monroe, Virginia
AGF Board No. 1, AA Section, Fort Bliss, Texas
Detailed in CE
AAAORP, Fort Bliss, Texas
OC of S, I & E Division, Washington, D. C.

Assignment

Relieved from active duty
Relieved from active duty
Relieved from active duty
Student, School of Military Government, Charlottesville, Va.
Relieved from detail in AGD
Relieved from active duty
Relieved from active duty
Army Information School, Carlisle Barracks, Pa.
Distribution Division, ASF, Washington, D. C.
Relieved from active duty
HD of Delaware, Fort Miles, Delaware
Relieved from active duty
Relieved from active duty
Relieved from detail with Infantry
Relieved from detail with F.A. 3d Service Command, Baltimore, Md.
Relieved from active duty
Relieved from active duty
Relieved from active duty
Coast Artillery School, Fort Monroe, Virginia
Relieved from detail in AGD
Relieved from active duty
AGF Board No. 1, AA Section, Fort Bliss, Texas
Detailed in T.C.
Relieved from active duty
Relieved from active duty
Detailed in IGD
Hq. First Army, Fort Bragg, N. C.
Relieved from active duty

Assignment

Walker, Sidney R. Relieved from detail in AGD
 Ward, Charles W. Detailed in JAGD
 Weiss, William P. AAAORP, Fort Bliss, Texas
 Wittaker, William W. 2d Service Command, Fort Slocum, N. Y.

Assignment

Anderson, Joe W. AAAORP, Fort Bliss, Texas
 Anderson, Richard F. HD of Boston, Fort Banks, Mass.
 Baker, Clement C. Detailed in AGD
 Barnes, Benjamin R. Detailed in T.C.
 Bremer, Benjamin F. Military Intelligence Service, Washington, D. C.
 Brown, Robert T. Relieved from active duty
 Cunningham, Harry L. Jr. Relieved from detail in F.A.
 Hall, George E. Jr. Relieved from active duty
 Daniels, George B. Counter Intelligence Corps Manhattan Engineering District, Oakridge, Tennessee
 Deacon, John C. Relieved from active duty
 Depatrick, David A. HD of Los Angeles, Fort MacArthur, California
 Ford, George W. Relieved from active duty
 Fruthey, Thomas J. Relieved from active duty
 Gillet, Louis E. Hq. Fifth Service Command, Fort Hayes, Ohio

Henson, Charles J. HD of New Bedford, Fort Rodman, Mass.
 Kapeman, Elmer N. HD of Los Angeles, Fort MacArthur, California
 Kersey, George E. Relieved from active duty
 Kibbs, William M. OC of S, I and E. Division
 Korn, Carl, Jr. Relieved from active duty
 Kuy, Clyde F. FDRP, ASF Training Center, Fort Benjamin Harrison, Ind.
 McCain, Isaac F. Relieved from active duty
 McCann, Thomas A. Relieved from active duty
 McCloud, Robert R. Relieved from detail in AGD
 McPherson, Thomas L. Detailed in JAGD
 Madlin, Myron Detailed in MAC
 Monson, Norman C. AAAORP, Fort Bliss, Texas
 Rosenberg, David CARP, Fort Monroe, Virginia
 Sherman, Kenneth R. PMGO, Fort Kearny, R. I.
 Simmons, Robert Detailed in AGD
 Singleton, Jordan C. 2d Service Command, Pine Camp, New York

Widuth, James A. Relieved from detail in F.A.
 Winthorst, Frank J. Jr. Relieved from active duty
 Wachsismuth, John E. OASW, WD Strategic Services Unit, Washington, D. C.
 Weinberg, Lee S. Relieved from detail in Cavalry
 Wichter, Theodore M. Relieved from active duty
 Whiteman, Truman C. Jr. Relieved from detail in AGD
 Williams, David B. Readjustment Div. ASF, Washington, D. C.

Assignment

Black, Alexander 916th AAF Base Unit, Orlando, Florida
 Brewster, Seymour Relieved from active duty
 Conball, William N. 9th Service Command, Phoenix, Arizona
 Copp, Frederick E. Relieved from detail in F.A.
 DeBarn, Clarence S. Relieved from detail in F.A.
 DeBor, Harold O. Relieved from detail in F.A.

Colonels

Adams, Carl R.
 Arthur, Robert
 Benz, Herbert T.
 Chapman, Charles A.
 Christian, Francis L.
 Crews, Leonard D.

Davis, William V.
 Doney, Carl S.
 Easterday, George W.
 Gibson, Roy S.

Guyer, Lawrence M.
 Hill, Ira B.
 Holden, Frank H.
 Jablonsky, Harvey J.
 Mackin, Robert N.
 Moore, Russell Y.
 Morgan, Maurice
 McCatty, Kenneth

Potts, Adam E.

Rowland, Arthur E.
 Scheer, Charles H. E.
 Stuart, LaRhett L.

Van Buskirk, Robert J.

Walker, E. B.

White, Leon A.
 Young, Ellsworth

Zimmer, Layton A.

Lieutenant Colonels

Barron, Clarence B.
 Beaumont, Charles R.

Biswanger, Theodore, Jr.
 Blair, Ben B.
 Bourne, Robert F.
 Brewerton, Henry R.
 Congodon, Norman A.
 Davis, Edward G.

Ervin, Thomas E.
 Fultz, William S.

Gilbreth, Joseph H.
 Hartman, Roland F.

Hayman, Firman K.
 Hillberg, Lauri J.

McCormick, John K.

Payne, Raymond G.
 Peay, James H. B. Jr.

FEBRUARY

Assignment

Discharge Review Board, OSW, St. Louis, Mo.

To retire
 To home to await retirement
 To retire
 To home to await retirement
 To attend AGF Orientation Course for Officer POWs

To retire
 To home to await retirement
 AAORP, Fort Bliss

Commandant Pacific Coast Receiving Branch, Disciplinary Barracks, Camp McQuade, Cal.
 Transferred to Air Corps

To retire
 Detailed in GSC
 Transferred to Infantry

To retire
 Detailed in GSC
 To home to await retirement
 HD of Chesapeake Bay, Fort Story, Va.

Coast Artillery School, Fort Monroe, Virginia

To retire
 Detailed in GSC
 PMS&T, University of San Francisco, San Francisco, California

Department of State, Washington, D. C.

Detachment of Patients, ASF Regional Hospital, Fort Belvoir, Virginia

To home to await retirement
 Distribution Division ASF, Kansas City, Missouri

University of Delaware, Newark, Delaware

Assignment

Relieved from active duty
 Mobilization Division, ASF, Washington, D. C.

Transferred to QMC
 Relieved from active duty
 CAORP, Fort Monroe, Virginia

To retire
 To retire
 Military Intelligence Service Washington, D. C.

Relieved from active duty
 Hq. SS System, Fort Lewis, Washington

To retire
 Civil Affairs Division OC of S, Washington, D. C.

Detailed in CMP
 Headquarters, AGF, Washington, D. C.

9th Service Command WDPC, Fort Lewis, Washington

Relieved from active duty
 To GSC with troops

Lieutenant Colonels

Peterson, Arthur C.

Schutz, Alvin H.
Simons, Maurice M.
Symons, Arthur
Vail, William H. Jr.
Virag, AlfredWarner, Arthur H.
Wertz, William W.
Weyand, Fred C.
Wirth, Arthur J.*Majors*Bauserman, Warren V.
Decker, Willis F.
Doulens, Roger B.Fasce, Egi V.
Fribance, Austin E.
George, Robert B.
Hoag, Raymond W.

Hubbard, Mahlon G.

Kirk, Robert D.
Lewis, Harold F.
Lewis, Jesse L.

Lynn, Edison A. Jr.

Merrill, Richard N.

Motherhead, Charles J. Jr.
Parker, John T.Pratt, Richard G.
Scott, Edwin G.
Stano, FerdinandTellalian, Aram H. Jr.
Walker, John W.

Yates, Jules D.

Captains

Andrews, William C.

Babcock, Russell B.
Barlow, Wallace D.

Brown, Milton H.

Brundage, Lyle D.
Burgan, Kenneth L.Bye, Cecil J.
Cooney, John T. Jr.
Crook, Sydney L.
Feeny, Clinton*Assignment*Military Intelligence Service,
Washington, D. C.Hq. SS System, Louisville, Ky.
Transferred to Air Corps
Relieved from active duty
USMA, West Point
HD of San Francisco, Fort Win-
field Scott, California
Relieved from active duty
Relieved from active duty
To GSC with troops
HD of San Francisco, Fort Win-
field Scott, California*Assignment*Relieved from active duty
Relieved from active duty
OC of S, WDBPR, Washington,
D. C.Relieved from active duty
Relieved from active duty
Relieved from active duty
AGF Board No. 1, Fort Bragg,
N. C.Det Patients, Birmingham General
Hospital, Van Nuys, California
Relieved from active duty
Detailed in Cavalry
Military Intelligence Service,
Washington, D. C.Transferred to Ordnance Depart-
ment
8th Service Command
Dallas, TexasRelieved from active duty
Legislative & Liaison Division, OC
of S, Washington, D. C.Relieved from active duty
Camp Atterbury, Indiana
AGF Board No. 1, AA Section,
Fort Bliss, TexasRelieved from active duty
Military Intelligence Service,
Washington, D. C.

Transferred to Infantry

*Assignment*Intelligence Division, ASF, Wash-
ington, D. C.Relieved from active duty
HD of Portsmouth, Camp Lang-
don, N. H.Military Intelligence Service,
Washington, D. C.Relieved from active duty
HD of Los Angeles, Fort Mac-
Arthur, CaliforniaRelieved from active duty
Relieved from active duty
Relieved from active duty
Camp McCoy, Wisconsin*Captains*Ferrand, Robert L.
Garnhart, George H.Green, Irwin R.
Halbert, Edward S.
Halliday, Michael
Henderson, Charles A.
Hinshaw, Foster A.
Israelson, Nathaniel H.
Jonelis, Frank G.
Law, Fraser C.
Lea, Alfred L.

Logan, William T.

Marshall, John F.
Plant, Otis M.
Robblee, Paul A.
Vanderslice, Grandberry A.
Weader, Richard J.
West, John C.
Wilkerson, Dewitt C. Jr.*First Lieutenants*Barsky, Lawrence I.
Bridges, Jim L.
Cunningham, Martin J.
Geaney, John J.
Hankins, Charles F.
Herring, Charles T.

Hobbs, William M.

Kehoe, William M.
Kelsey, DavidMannen, Maurice L.
Miller, William T.

Mishkoff, Walter

McArdle, John F. X.
Nichols, Rosswell C.
Preller, Frederick A.Rose, Frank W. Jr.
Sievwright, Elmer B. Jr.

Slater, David W.

Smith, George A.
Snider, William C.
Straubel, Louis A. Jr.
Trinter, Vernon E.
Willcox, Jake M.*Second Lieutenants*

Lloyd, Frederick W.

*Assignment*Relieved from active duty
AGF Board No. 1, AA Sec
Fort Bliss, TexasDetailed in T.C.
Relieved from active duty
Detailed in IGD
Relieved from active duty
Relieved from active duty
WDPC Camp Atterbury, Ind.
Detailed in QMG
Hq. SS System, Atlanta, Ga.
AGF Board No. 1, Fort Bragg,
N. C.Staff and Faculty, Command
General Staff School, Fort
Leavenworth, Kansas
Camp McCoy, Wisconsin
Detailed in AGD
Detailed in JAGD
Hq. First Army, Fort Bragg, N.
HD of Delaware, Fort Miles, D.
Relieved from active duty
Relieved from active duty*Assignment*Relieved from active duty
PMGO, Washington, D. C.
Relieved from active duty
AAORP, Fort Bliss, Texas
Relieved from active duty
Counter Intelligence Corps Cen-
tral Signal Depot, Bal-
more, Maryland2d Service Command, NYPE
Brooklyn, New York
Relieved from active duty
916th AAF Base Unit, Orlando,
FloridaRelieved from active duty
Military Intelligence Service,
Washington, D. C.
2d Service Command, Fort D.
New JerseyTo home to await retirement
Relieved from active duty
2d Service Command, Fort Har-
ton, New YorkRelieved from active duty
244th AAA Searchlight Bn,
Orlando, Florida
HD of Narragansett Bay, Fort
Adams, Rhode Island
IRP, Fort McClellan, Ala.
Detailed in T.C.
Relieved from active duty
To home to await retirement
CARP, Fort Bliss, Texas*Assignment*4th Service Command, Memphis,
Tennessee

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