COAST ARTILLERY JOURNAL

MAY-JUNE 1948

FEATURING THE 44th AAA BRIGADE

EXPANSION OF AAA CONTEMPLATED

As another concrete step toward National security, the present Regular Army troop basis will probably be expanded by the addition of three brigades, eleven groups and forty battalions of antiaircraft artillery.

The first positive indication of this contemplated expansion came from Secretary of the Army Royall when he made the following statement in an Army Day address: "If another war should come, we could hope to escape direct attack only if we ourselves have the military power to keep the fight away from our shores. This power must be defensive and offensive. The defensive weapons must include antiaircraft for our cities and vital installations. Today this would require additional and more modern equipment than we have—and we would need to increase our personnel strength from our present two antiaircraft battalions at least to forty."

Although the activation of and assignment of personnel to those units is contingent upon several factors, there is much optimism regarding the successful consummation of the program.

This will undoubtedly mean that officers with antiaircraft experience will be in great demand and it will also mean that new vistas of opportunity will be opened to members of the Coast Artillery Corps, young and old alike.

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Activities of The

This story might better be called "The Saga of the 44th AAA Brigade" since Mr. Webster defines the word saga, as meaning a legend or a mythical story of ancient times

While there was nothing ancient about the 44th AAA Brigade which was activated in the early summer of 1942, some of its later assignments were so unusual in AAA history as to now seem almost mythical—certainly unique. It was a far cry from the Battle of the "Slit Trench" and "Operation Cadre" at Camp Hulen, Texas to a Task Force Command in the Alpes Maritimes of roughly 15,000 Infantry Troops, a Naval Flank Force of two cruisers and six destroyers and a Two Squadron Air Force. This command to be followed by orders to organize and command a brain child of SHAEF, namely the original "Security Command" first tried out, we believe, in the Seventh U. S. Army. With the end of the War and the Security Command came an assignment from Third U.S. Army to take over Occupational Command of that Nazi Holy of Holies, Berchtesgaden, its three surrounding Kreises and the largest entertainment job in Germany.

In August 1942 Brigadier General Ralph C. Tobin was assigned to command the Brigade. Reporting for duty in September of that year, his first task was to select a staff. Realizing the importance of a team and being an Infantryman by instinct and training and a "Gunner" by direction of the War Department and the blessing of Fort Monroe, he naturally looked to his old Regiment for his official family. Thus, before the Brigade sailed for Africa in April 1943 not only its Commanding General but the Executive Officer, the Chiefs of every Section, the Communications Officer and one Chief Warrant Officer were all converted Infantrymen hailing from the old 7th New York—reorganized for the War as the 207th CA (AA).

All of these Officers had trained together for thirteen months on the Staff of the 207th under Major General Sanderford Jarman and Colonel G. M. O'Connell. In addition they had all gained considerable experience through their old Regiment's assignment to the Defenses of the Naval Installations at Newport, R. I. The result was that from the very beginning the Brigade was combat minded and aggressive, refusing to be cooped up in an airtight AAA compartment because of its deep and nostalgia-like interest in the development and action of all the new and powerfully armed elements of the Ground Forces.

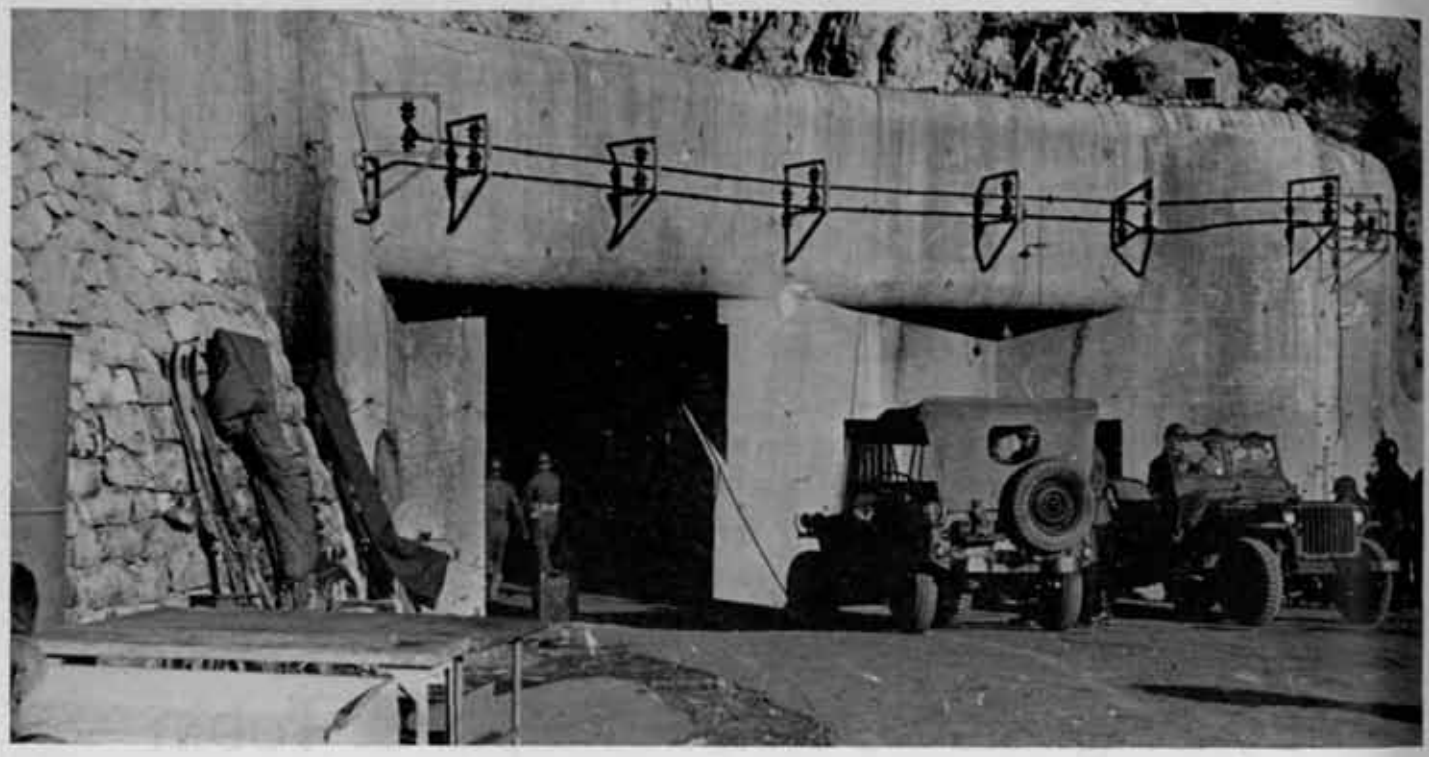
It was perhaps due to this attitude more than to anything else that the Brigade received and was ready for its unusual and interesting assignments. Even during the dull days of Africa, its Battle Maps were not confined to the disposition of its own AAA weapons but covered all operations throughout the theatre with the entire Staff and appropriate enlisted personnel being briefed daily on the general situation.

As this is to be a brief history, the seven months training at Camp Hulen, Texas can, from the viewpoint of the soldiers, be safely skipped. It seems sufficient to say that there they learned that Sherman was wrong, that a training camp and not war is Hell. On the other hand it is equally safe to say that by and large the training and equipment provided by the AA Command at Richmond gave the American Army the most effective AAA to be found in any Army.

44th AAA BRIGADE

By Brigadier General Ralph C. Tobin

Men of D Battery, 454th AAA Battalion man their gun in front of the Municipal Casino, Algiers.



Entrance to an Alpine Fort manned by 442d R.C.T. attached to the Brigade. (Note skis and sleds on left to remove wounded through passes.)

After many false alarms and one excursion (Brigade baggage to Boston and back to Texas) the 44th finally staged at Camp Miles Standish under the kindly and efficient eye of Colonel Fountain, and sailed for Africa on the 28th of April 1943 on the Army Transport Edmund B. Alexander, skippered by Captain Edwin L. Cline.

Off at last on the great adventure, no one paid much attention to the tall tales of the Naval Gun Crew. In fact there was a bit of a feeling that not a "Pack" perhaps, but just a sub or two might add a bit of spice to the trip—and make a thrilling yarn for the folks back home.

After a few hours at sea however our complacency was rudely jolted by a report from the Naval Gun Crew Commander to the effect that before sailing an attempt had been made to sabotage the ammunition drums of his 20mm guns. This through the expedient of placing safety pins, screws and other bits of metal in the drum springs. The condition was soon remedied by turning out machine gun troops to assist the Naval crew in stripping, reassembling and reloading the drums. With this behind us all went well for a few days until we suddenly began to lose speed as a result of trouble with the rudder and the ship's inability to maneuver in convoy formation.

Though the Commander of the Task Force was annoyed no end, we managed to limp along, keeping up more or less with the Convoy. This however was not to be all. In the wee small hours of a certain morning, when about two-thirds of the way across the Atlantic, there was a terrific explosion—boat stations were promptly taken and the original idea of a sub or two didn't seem quite so romantic. After a short, tense wait we abandoned not the ship, but the boat stations—we had blown a cylinder head. To the the Army, at the moment, this was just a routine affair to be handled with appropriate dispatch by the engine room crew. With dawn however, and the first trip topside came the knowledge of our error. Blowing a cylinder head was no joke—we were sailing the Atlantic alone, a sitting duck for any chance Pig Boat that came along. Later we were cheered to discover that though the Task Force Commander had left us to our fate, he at least had given us an escort of one destroyer.

With a great Skipper, an excellent Troop Transport Commander and a superior steward, the spirit of the troops was not daunted, it was still a happy ship and we arrived at Gibraltar without further alarms or mishaps. Here, after much conferring with high Naval Ranks it was decided not to transfer us to another ship, so we proceeded, limping badly and heavily escorted, to Oran where we disembarked on the 12th of May—one day before the surrender in Tunisia and the end of the shooting war, as far as Africa and the AAA were concerned. Such air raids as ensued from then on were wholly of nuisance value, seldom carried out with any spirit of aggressiveness and always without serious damage.

Our thirteen months tour of North Africa began after a brief staging period at Assi Ben Okba and with orders to report to the Commanding General, Fifth Army, for further assignment. Within a few days the Brigade was on its way to Casablanca with responsibility for the AAA defenses of the Western Coast of North Africa. The principal targets were Casablanca, Fedhala, Port Lyautey and Rabat, not to mention the protection of the Sultan's palace in the latter town, with two 50 cal. machine guns! !

Though many millions of dollars worth of vital supplies were being gathered together in this area for the coming invasion of Sicily, and though the Navy operated an important air patrol base at Fort Lyautey, the AAA defenses were negligible. It was here we first learned of a "Calculated

risk," this after beseeching Headquarters in Algiers for more guns, which we didn't get. However, as long as AFHQ was calculating the risk it was all right with us and we must admit that Generals Partiger and Bradshaw did a nice bit of calculating—there were many alerts but no raids.

Our chief concern rapidly centered in training ten French 40mm Battalions. Fortunately these were scattered from Casablanca to Marrakech, affording a nice opportunity for pleasant and interesting tours of inspection.

On the 2nd of July 1943, the Brigade was relieved from assignment to the VIth Corps, Fifth Army and attached to Allied Force Headquarters for operations. New orders took us to Constantine with the mission of defending a few air fields and supply dumps. Our stay there was brief for by the middle of August 1943 we were again on the move, this time to Ferryville to relieve the 2626th Brigade, taking over its mission of protecting many air fields used by our fighters and bombers and the important though badly bombed French Submarine Base located there.

Here we got a bit closer to the War. Before we were through dinner the first evening we were alerted for a sizable raid of some twenty-five planes. The attack however was directed primarily against Bizerte and Tunis though a few bombs were dropped in Ferryville. The damage was negligible, but the raid did much to boost the morale of the Headquarters Battery which, incidentally, had been caught short on its Slit Trenches—the day was saved however by a large, and fortunately new, Honey Pit.

The highlight of our stay at Ferryville was the surrender of the Italians. On the morning of the 7th of September, the day preceding their capitulation, the General accompanied by Major Lincoln T. Miller S-2 reported with much secrecy for a conference at the Air Command Post in Carthage. There, then Brigadier General Lauris Norstead (U.S. Air Force) of the Midland Air Command conducted the conference with clarity and dispatch. General Eisenhower then Deputy Commander of the Theater and Air Vice-Marshal Lloyd (British Air Force) of the Coastal Command were among those present at the Command Post. Plans for certain angles of the surrender were disclosed and discussed in great secrecy. Finally our Brigade Commander was directed to immediately prepare Top Secret orders for all AAA units in the area except, and it was an important exception, those British units defending Ports. These plans were to insure the safe and harmless landing, on our African air fields, of the major portion of some 1800 Italian planes. During the course of the conference the General pointed out that there was no one present at the meeting representing the British AAA units defending the Ports. He was advised by Air Vice-Marshal Lloyd that necessary orders would be issued direct to them through the Coastal Command. The number of Italian planes surrendering on air fields in North Africa was far from that contemplated and hoped for, probably because the Italian pilots experienced as much difficulty finding our air fields to land on and surrender as they had in locating them for bombing purposes.

One-man submarine captured by Brigade personnel in a "naval engagement."

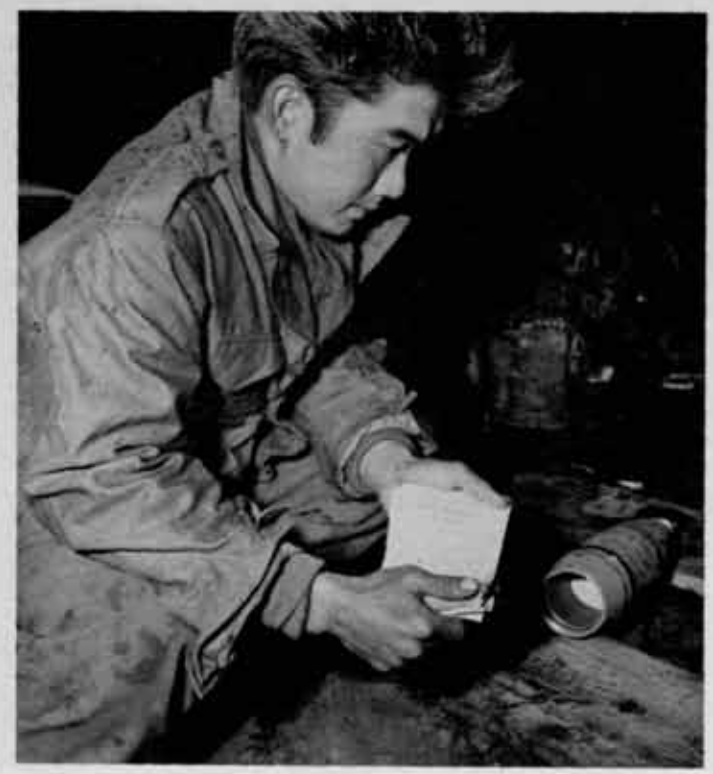
October 1943 saw the Brigade again on the move, this time to take over the mission of protecting the Ports of Phillipeville and Bone. Here for the first time, British AAA Units passed to our control and with them a really sizable problem from the viewpoint of communication, especially early warning. Their method of alerting their 40mm guns by firing one was too alarming to permit of continuation, however the Chief Signal Officer at AFHQ, who incidentally was thoroughly familiar with the complex problem of AAA communication, was sympathetic and issued sufficient additional equipment to promptly enable us to tie the British into our net in accordance with our system of Communication and Early Warning.

Our assignment in this instance was as a whole uneventful, and by the early part of December 1943 we were on our way to Algiers to take over Command of all AAA in North Oran to Bizerte.

Having set up housekeeping in an apartment comprising the sixth, seventh and eighth floors of the most modern and truly "elegant" apartment house in Algiers, we rapidly got down to the job of organizing the Communications, Early Warning and tactical disposition of weapons in what was perhaps the largest defensive area ever assigned to a single brigade—606 air line miles from its Western to Eastern boundary. However enemy air power was on its way out, so that the task involved promised to be one of organization rather than serious combat. Here also the T.O.E's were changed and we lost C. W. O. Kenneth L. Montgomery of the original "Hulen" Staff.

The several months spent in Algiers were far and away the most interesting of all our experiences in Africa. The visit of the reconditioned and beautiful French cruiser *Richelieu* gave us a few very anxious days. Riding the waters of the Bay like a sitting duck, she was fair prey for any aggressive German airman. A well directed hit or two would have been good for someone's ticket home, but she finally sailed with flags flying and bands playing, a gallant symbol of the resurrection of the French Navy.

While alerts were frequent they resulted primarily from J.U. 88's on reconnaissance missions though we did have one sizable raid in March 1944. No bombs were dropped in the Port, and the action was chiefly notable for its Fourth of July like characteristics and a really imposing "Fire



A soldier of Battery A, 522d F.A. Battalion, 442d R.C.T. places propaganda leaflets in the head of a shell

Fight" staged by the "Ships Afloat" including two French Cruisers.

An incident in connection with this raid was advice from high quarters concerning the "displacement"—official language—"of all windows in the residence of his Majesty's Consul."

While this naturally distressed us considerably, we were cheered no end when we discovered that the gentleman concerned resided on "the line of misses" some seven miles outside the Port, and that this was the closest the Germans came to scoring a hit on the target. As time passed we often thought of those windows and hoped that something really nice was done about them.

No story of the defenses of Algiers would be complete without a word or two regarding a British gadget known to the initiated as a Zed Battery, in this instance commanded by a charming Irishman, one Major Tobias. The enemy never did give us a real chance to find out what this weird weapon could do, but its practice firing was always an event which could be counted on to scare the mischief, or at least some of it, out of the Arabs and give Colonel Edward E. Scovill, S-3, a terrific headache, for his was the responsibility of clearing the local waters, thus preventing damage to ships resulting from the fall of literally tons of scrap iron which sooner or later landed in the Mediterranean. It was a grand Battery and its "scare" value must have been terrific.

Another interesting event during our stay in Algiers was the receipt one evening of very sudden, verbal, hush-hush orders to move two battalions, one gun and one 40mm by forced march to Marrakech.

Not knowing what it was all about, the General accompanied by his S-3 flew to Morocco for a look-see and check up on the mission. Upon arrival at Marrakech it was soon discovered that the cause of the excitement was the presence there, in the Taylor villa, of Mr. Churchill recuperating from an attack of pneumonia. With 40mm guns sprouting all over the place, the villa appeared more like a Concentration Camp than a sanatorium. An American Battalion of Armor had also been ordered to the scene. The Patient did nicely.

Algiers was always interesting but it was far from the shooting War and we were becoming daily more restless. On the 1st of July 1944 there was a bit of a flurry when we received overseas movement orders—but of all places to Sardinia. Though we did not know it at the time however, our luck was coming in, for within a month, August 2, 1944 to be exact, we were again on our way, this time to Corsica and to our first contact with the Sixth Army Group of blessed memory. Commanded by General Jacob L. Devers, this was the outfit which in the next few months was to rescue us from complete stagnation and one too many brush-offs.

Sardinia was chiefly notable for two things: our close and friendly association with General Webster and Colonel Doyle of the 42nd Wing, who later on was to help us out in a very tight spot, and next for our introduction to our co-Belligerents—the Italian Army. These underfed and barefooted soldiers made a good impression because of their enthusiasm and willingness to do most anything to prove their worth.

The move to Corsica was made in high spirits as it was more or less understood to be a forerunner of an assignment to the Seventh Army and the invasion of Southern France. Our high hopes however were soon dashed for fate or the "System" once again relegated us to a rear area mission—the defense of the Corsican springboard into Southern France.

While this assignment was of course important because of the vast concentration of troops and supplies it was still too far from the war—even for the Germans. However, it was here that we were finally relieved from Allied Force Headquarters and passed to the Sixth Army Group.

The only participation the Brigade had in actual D-Day

The Tunnel entrance to the elevator to the Eagle's Nest. The huge doors are of bronze and the stone over the arch bears the date 1938.

The first American flag to fly over Berchtesgaden is packed carefully for return to the United States by 1st Sergeant Zabowski and Staff Sergeant Newka of the 44th Brigade.

operations was through the dispatch of the Executive Officer Colonel, now Brigadier General William M. Hamilton, to the Island of Elba with instructions to take over, during the night and morning of August 14th-15th, the operational control of all AAA on the Island. This to prevent any trigger happiness on the part of the French troops concerned.

It was here in Corsica also that we had the second "Loss" from the original Camp Hulen Staff, this through the transfer of Mayor Wendell B. Sell, asst. S-3, to the AAA Section of Sixth Army Group, where he was soon promoted to Lieutenant Colonel.

With the more than successful completion of the early phases of the invasion, the Brigade settled down to the belated task of converting some fifteen to twenty thousand AAA troops into Infantry and Field Artillery. Hereby hangs a tale too lengthy to go into. Due solely to the time element this effort was doomed to almost complete failure. Had the plan been devised and implemented a year sooner when it was self-evident that the need and importance of AAA was diminishing in exact ratio to the destruction of enemy air power, many fine infantry and field artillery troops would have been available when most needed. As it developed, too many splendid AAA battalions went into the hopper and came out utility troops, used for many purposes other than combat—a sad ending for some of the best and most highly trained troops in the Ground Forces.

However the time was not entirely wasted, two or three Battalions were saved and converted to Mortar Battalions, etc. and sent to Italy. Extensive and successful experiments were carried on by Major John W. Green, Brigade Radar Officer, in connection with the use of Radar for the location of Field Artillery targets. He was finally sent to the Seventh Army to put his theories into practice and enjoyed considerable success.

Late in October 1944 when the spirits of all were low, came the "Break" for which the Brigade had been praying for seventeen months—the General was ordered to proceed without delay to Headquarters Sixth Army Group at Vittel, France, for orders.

The excitement around Headquarters was terrific. While the General had an inkling of what was up he wasn't talking—hopes had been dashed too often. Accompanied by the S-3 and the Communications Officer, Lieutenant John G. Carolin, he was off in nothing flat, and on November 5, 1944 Major General David Barr, Chief of Staff Sixth Army Group, handed him Operational Memorandum No. 3, the following paragraphs of which are quoted:

"3A. The 44th AAA Brigade is established as a separate Command directly under this Headquarters. Effective 1200A hours 15th November 1944 Headquarters 44 AAA Brigade, augmented, will assume command of the sector currently assigned to the First Airborne Task Force (Alpes Maritime).

"3B. The 44th AAA Brigade will protect right (East) flank along Franco-Italian border south of line Allos—St. Etienne de Tinee-Cuneo all inclusive. Establish contact patrols with First French Army elements on the north."

There was much more to memo No. 3 but to the Brigade that part quoted was the meat.

We were a part of the Sixth Army Group, a Separate Command and back in the Infantry.

From then on things happened fast. Making Marseille

(Continued on page 49)

Seacoast Artillery Radar

By Colonel Andrew W. Clement, CA-Res.

In the short span of World War II, the Seacoast Artillery was transformed into a striking force capable of hard-hitting action at any time of the day or night and in any kind of weather—through the miracle called RADAR. Yet such was the course of the war that this branch of the artillery found practically no opportunity to employ radar in combat against enemy surface craft. For this reason, radar is regarded by many seacoast artillerymen as a somewhat mysterious device whose secrets are known only to a few of their number who happened to be sent to radar schools. It is to attempt to dispel this feeling and to picture radar in true perspective as the seacoast artilleryman's most effective observation and fire control instrument that this article is written.

Dr. Louis N. Ridenour, who contributed greatly to the phenomenal scientific advances embodied in radar, has stated that radar is a very simple subject. However that may be, it certainly can be said that it is NOT difficult to operate and employ radar effectively for seacoast artillery surveillance and fire control.

The theory underlying radar, and a general description of most of our coast artillery corps radar sets have been presented in a series of articles in recent issues of the JOURNAL, so a brief review of some of the highlights will suffice here. A radar set may be said to consist essentially of the following parts. First, there is a means of generating short pulses of high-frequency energy. These pulses are amplified and pass through a transmitter to the antenna, where they are directed in a concentrated beam toward the target. They travel at the speed of light, 186,000 miles per second or 328 yards per microsecond. A small portion of the energy, upon striking the target, is reflected back in the direction from which it came, and is intercepted by the antenna. From the antenna, it is passed on to the receiver, where it is amplified to usable proportions and applied to the indicators. Associated with these basic components are means for pointing the antenna at the target and devices for measuring range and direction. The set may also include automatic or aided-tracking mechanisms and data transmitters, if used for fire control.

The particular types of radar sets furnished to seacoast artillery units are determined by military requirements peculiar to the combat operation of the arm. The primary need for radar arises from limitations to visual observation at night, during periods of haze, fog, snow and heavy rain, and in the presence of smoke screens, both accidental and planned. Under such circumstances, radar should provide the surveillance and fire control observation that is not possible by visual means. Thus, radar sets for seacoast artillery fall naturally into two basic classifications, surveillance and fire control.

The surveillance, or search radar should provide observation over a large area, perhaps encompassing the field of fire of several batteries. In addition to detecting the presence of all hostile and friendly vessels in the defended area, the radar should enable the commander to determine the location of each target accurately enough to permit the assignment of any particular one to the appropriate battery, so that it may be taken under fire, if necessary.

Fire control radar, on the other hand, should permit determination of the position of the target continuously and with sufficient accuracy that effective fire may be brought to bear on it without delay, whenever ordered. It is necessary that accurate data be provided, regardless of the proximity of other targets to the one being tracked. If the resolution of the set is such as to permit tracking the assigned target in the presence of other nearby targets, then, should the initial target be destroyed or disabled, fire can be transferred immediately to the next most important one. Equally as vital, the set should permit accurate spotting of fall of shot. If possible, fire control radar should be equipped with its own means of target acquisition, so as to be as independent as possible of search radar during the critical period of getting on target just prior to the opening of fire.

There are three surveillance radars in use currently by seacoast artillery. The Radio Sets SCR-582 and SCR-682-A will be found in the fixed harbor defenses, while the SCR-682-A and the Navy SO-12-N Radar are authorized for use by mobile 155mm gun battalions. In all these sets, signals are presented on a Plan Position Indicator, or PPI oscilloscope. On this type of oscilloscope, target signals and signals from shorelines and prominent geographical features appear in a map-like presentation of the area surrounding the antenna. The maximum range scales on the scopes of the three sets are: SCR-582—90,000 yards; SCR-682-A—240,000 yards; and SO-12-N—160,000 yards.

The SCR-582 was designed for installation in fixed harbor defenses. The SCR-682-A is transportable, having been designed for use by mobile organizations; but it may also be used in fixed installations. The latter can be erected and placed in operation in from 3 to 5 hours by a trained crew of five. The peak power output of the SCR-682-A is about five times that of the SCR-582, which not only permits utilization of the maximum range scale much of the time, but results in detection of given classes of targets at greater ranges from the same antenna height. For example, the reliable maximum range of the SCR-582 on a destroyer is about 25,000 yards, while that of the SCR-682-A is about 35,000 yards, from normal heights of site.

Two extremely valuable accessories developed for surveillance radar during the last war are suitable for use with the sets described above. These are the precision plan position indicator, or P^{3}I for short; and the Navy VG remote indicator. The P^{3}I unit is an indicator that will reproduce

Typical field installation of the AN/MPG-1.

in rectangular coordinates, signals from any area 4,000 yards deep in range and 40 degrees wide in azimuth, selected from the field of coverage of the parent radar set. Because of the more favorable scale factor, range and azimuth can be read considerably more accurately than on the parent radar, particularly at long ranges. Resolution is correspondingly greater; and indications that appear on the scope of the parent radar to be signals from single targets frequently will be found to come from several separately distinguishable targets, when examined on the P²I scope. The P²I units may be operated at distances as great as 1,000 feet from the radar; and several units may be connected to the same set simultaneously, without interfering with the operation of the set. The primary use for the P²I units is for close surveillance of a given target while the parent radar is maintaining general surveillance of a large area. The units might also be used for emergency fire control.

The VG remote indicator is a projection-type, dark-trace oscilloscope. It includes a special cathode-ray tube, called a Skiatron, on which signals appear in a dark magenta color against a light background. The image is projected, through a magnifiying lens system, upon the under surface of a ground-glass screen about 30 inches in diameter. A translucent overlay bearing a map of the local area may be placed over the ground-glass screen, for maintaining a plot of target courses. The VG unit, or Skiatron, as it is somewhat improperly known, possesses a real advantage as a remote indicator for surveillance radar, in Group or Harbor Defense Command Posts and in Harbor Entrance Control Posts. It may be viewed in a fully lighted room, in contrast to the usual types of radar indicators, which must be operated in subdued light or total darkness. Thus anyone may observe the screen at any time without waiting until his eyes are fully adapted to a radical change in illumination levels. Since the screen of the Skiatron tube is of the long-persistence type, images of successive positions of the target signal remain for a long time, leaving a continuous "track." Watch officers, staff officers or other interested individuals can note at a glance not only the present position of the target, but also the course of its past travel.

The fire control radar used in the harbor defenses throughout most of the war was the Radio Set SCR-296-A. This is the Army version of a Navy set (FC or Mk III) that was responsible in a large measure for some of our early spectacular successes at sea. From its original design, the SCR-296-A has been improved by the addition of mechanisms for aided tracking in range and azimuth, data transmission systems, and units providing increased signal amplification and more accurate azimuth indication. As a result, the average tracking errors on single, isolated targets have been reduced to about 25 yards in range and 0.15 degree in azimuth. Accuracies of this order are barely acceptable for fire control purposes, however. Other deficiencies greatly reduce the effectiveness of the SCR-296-A. The set contains no suitable means for target acquisition; so that it is extremely difficult for the operators to pick up an assigned target if there are other targets nearby, without considerable coaching from a surveillance radar. Resolution in azimuth is poor; and, as a result, interference between signals from two or more targets at approximately the same range may make it impossible to track any one of them accurately. It is extremely difficult to spot shell splashes accurately, because of the poor resolution of the set. Another serious limitation of the SCR-296-A is its susceptibility to both electronic and "window" jamming, as a consequence of operating on the medium-long radar wavelength (43 centimeters).

The Seacoast Artillery was particularly fortunate in having developed for it what is believed by many competent authorities to be the finest fire control radar produced during the late war—the Radar Set AN/MPG-1. This set has its own means of target acquisition, is extremely accurate, has excellent resolution in both range and azimuth, and is equipped with means for spotting fall of shot accurately. Initially, it was planned to develop the set for use against fast-moving, highly maneuverable motor torpedo boats, but this threat faded from the picture early in the war. However, it was realized that all the characteristics planned for an AMTB set were equally desirable in radar for all other types of seacoast artillery fire control. Consequently, the design was easily adapted for application in the heavier caliber gun batteries.

As finally produced, the AN/MPG-1 consists of the following items, which are transported in a semi-trailer that is used also as the operating shelter in mobile gun batteries: the radar set proper, the antenna, a 17-foot demountable steel tower, one power plant, the spotting oscilloscope, and the most essential of the test equipment, spare parts and supplies. These items comprise the minimum required to place the set in operation quickly, and keep it on the air for a limited time. Among the additional items furnished with the set is a dolly that permits towing the trailer as a full-trailed load. Over good roads and hard, level terrain, the AN/MPG-1 may be towed as a semi-trailer by the 5-6 ton truck tractor; while in sand, soft soil and rough terrain, the set should be towed as a full-trailed load by a caterpillar tractor. A typical field installation of the AN/MPG-1 is shown in the photograph, Fig. 1.

Because the wavelength of the AN/MPG-1 is only about

3 centimeters, or a little over an inch, it has been possible to concentrate the energy transmitted by the set into a beam only 0.6 degree wide, with an antenna of practicable size. With such a narrow beam, extreme accuracy and resolution in azimuth become possible. The use of transmitted pulses of very short duration results in comparable accuracy and resolution in range.

These basic capabilities are utilized fully in the search, tracking and spotting facilities of the AN/MPG-1. The operating console contains two 7-inch oscilloscopes, one of which is the PPI scope and the other the tracking scope. Two range scales are available on the PPI scope—30,000 yards and 80,000 yards maximum. When the range is less than 28,000 yards, the signal from any target may be transferred from the PPI to the tracking scope by a simple manipulation of the controls. The tracking scope utilizes the so-called B-type presentation, in which signals are positioned in rectangular coordinates, with the horizontal coordinate representing azimuth and the vertical coordinate representing range. In normal operation, signals from any selected area 2,000 yards deep in range and 10 degrees wide in azimuth at ranges up to 28,000 yards may be placed on the oscilloscope. Index lines are placed on the screen of the B-scope electronically; and, since they are in the same plane as the target signals, there is no parallax in alligning signal with index. Horizontal lines at the top, center and bottom mark off range intervals of 1,000 yards. Vertical lines at the center and about one-half inch on each side mark off azimuth intervals of one degree. The target is being tracked correctly when the signal is bisected by the center vertical index line, with its lower edge just resting on, or tangent to the center horizontal line. Figure 2 shows signals from six transports of a convoy. The operators are tracking on the stern of the center left ship, which is at a range of 23,800 yards.

The range and azimuth operators on the AN/MPG-1 are provided with aided-tracking mechanisms for smooth target following. Two ratios are available, one for use on fast, close-in targets, and the other for targets moving at slower rates. The features described above have been combined in the production of an extremely accurate fire control instrument. Repeated tests and extensive use of this radar have demonstrated dynamic accuracies of about 10 yards in range and 0.05 degree in azimuth, and static accuracies of approximately 5 yards in range and 0.03 degree in azimuth. In fact, it is extremely difficult to obtain visual observation of sufficient accuracy to evaluate the accuracy of the radar. During demonstrations of the experimental model of the AN/MPG-1 in Hawaii, a three-yard error in the position given for the antenna was discovered by repeated radar observations, even though the position had been surveyed from several different control points and the coordinates had been checked and rechecked. It is not surprising, therefore, that many seacoast artillerymen who are familiar with the capabilities of the AN/MPG-1 believe that it is to be preferred, even under conditions of excellent visibility, to a two-station horizontal-base visual tracking system.

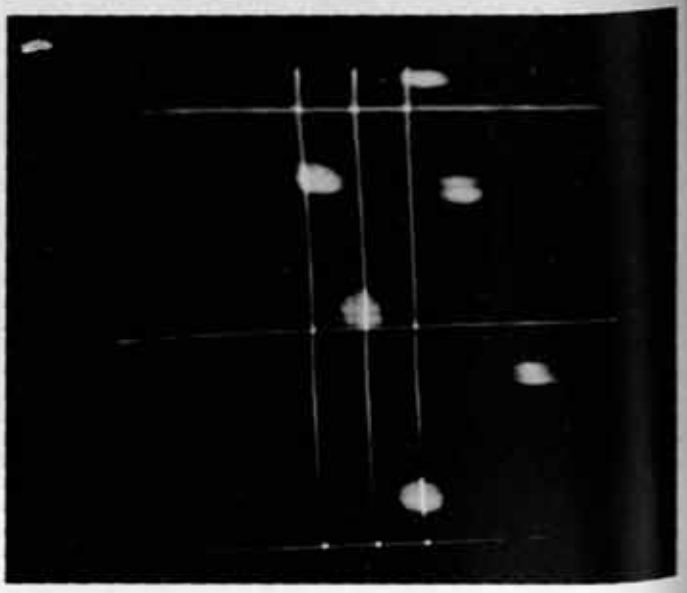
The spotting oscilloscope of the AN/MPG-1 is unique in fire control radar. The signal presentation on this scope is identical to that on the tracking scope. The unit is equipped with a transparent platen bearing suitable index lines, which is moved in a plane parallel to the scope face by a "joystick" control. If the tracking operators keep the target signal in the proper position in the center of the scope, the spotter can measure the deviation of a splash from the target by moving the platen until the intersection of the perpendicular index lines rests at the bottom center of the splash signal. If splashes occur too rapidly for readings on individual impacts, the center of impact of a number of splashes is used. The range and lateral spot readers then read off corrections in reference numbers. These spotting data can be applied on the fire adjustment boards without further transformation, if the radar is in close proximity to the directing point of the battery.

While not quite as accurate as the tracking system, the spotting system of the AN/MPG-1 is unquestionably far superior to any visual system used previously. Accuracies of about 15 yards in range and 0.06 degree in azimuth can be expected of reasonably well-trained spotters. As high proportions as 40% target practice hits have been scored in radar shoots by batteries equipped with plotting boards and gun data computers. A fairly consistent average somewhat greater than 20% was attained by a 155mm battery using the AN/MPG-1 in combination with the M8N computer. Figure 3 shows a 155mm shell splash signal at 20,000 yards range (lower). The other signals are from the target (center) and towing vessel (left).

When the AN/MPG-1 was under development, it was contemplated that most of the sets would be transferred to the harbor defenses after the war. In line with this assumption, the design was made such that the components could be located readily in fixed emplacements. For major caliber batteries, primarily 16-inch, an experimental model of a longer-range version has been designed and built. This set, designated AN/FPG-2, has a maximum tracking range of 50,000 yards.

Now that radar equipment capable of high quality performance has been made available to Seacoast Artillery organizations, it is of primary importance that it be used with maximum effectiveness. Remembering that, to quote Dr. Ridenour again, radar is an addition to man's sensory

Signals from six transports in formation as seen in the B-scope of the AN/MPG-1.

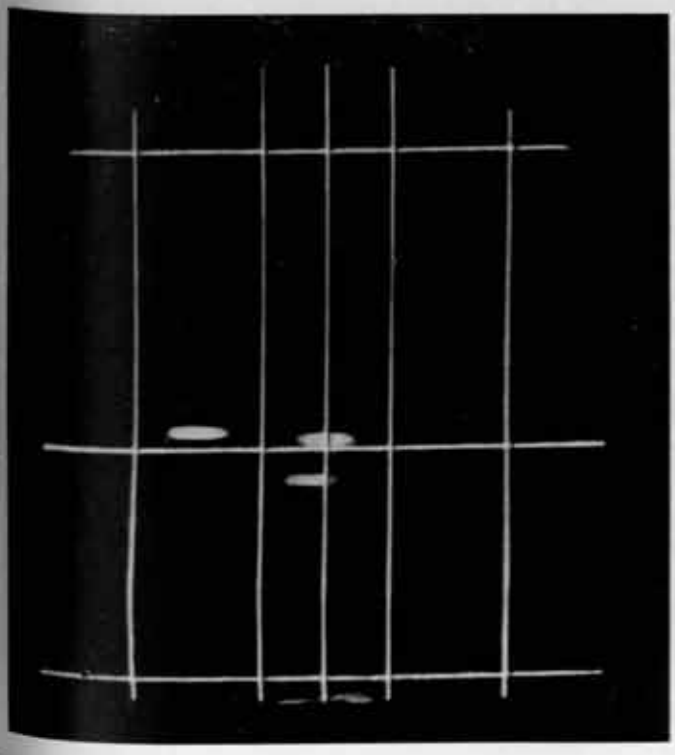


equipment which affords genuinely new facilities. The first requirements of the user are a real interest in this new class of matériel and diligent study of its operational characteristics. This interest and curiosity should extend from the very top to the very bottom of the organization. Intelligent high-level planning requires a thorough understanding of the capabilities and limitations of radar sets of many types. At each lower level, success in battle and personal security depend more and more on efficient operation of radar equipment.

There is such an abundance of military and technical literature on radar that the interested student of its effective employment may be at a loss to know where to start. For the seacoast artilleryman, perhaps the best place is Coast Artillery Training Bulletin, Vol. 3, No. 15, December 1944, "A Guide to the Employment of Seacoast Artillery Radar Sets," published and distributed by the Coast Artillery School. This is a comprehensive treatment containing references to basic technical material; and it was accurate and up-to-date as of the time of publication. No attempt will be made here even to outline the material in this text. Instead, there will be presented information that has been made available since publication of the bulletin, and a few observations based on several years' close association with all types of seacoast artillery radar.

In the problem of selecting the most advantageous site for a radar set, the phenomenon known as anomalous propagation should be taken into account. When meteorological conditions are just right, a layer of cooler air may be trapped between the surface of the sea and a warmer layer of air above. The duct thus formed seems to conduct radar energy of the proper wavelength along the surface of the water around the earth's curvature, instead of straight out into space. Under these circumstances, targets may be detected at abnormally long ranges. The shorter the wavelength of the radar set, the more frequently anomalous propagation is encountered. Thus the phenomenon is observed much more often when using the AN/MPG-1 and the SO-12-N than when using the SCR-682-A or the SCR-296-A. Tests made in various parts of the world indicate that the condition is present most of the time in certain regions.* When anomalous propagation occurs, longer ranges may be achieved with the antenna located at elevations from ten to twenty feet above the surface of the water than from greater heights of site. In the case of the AN/MPG-1, the occurrence is so frequent in some regions that it probably would be better to take advantage of this phenomenon and locate the antenna at a low elevation than to attempt to find higher sites. In landing operations, it probably would be feasible to set up initially with the antenna pedestal right on the beach, without waiting for the erection of the antenna tower.

A 155mm shell splash during target practice as seen on the spotting scope of the AN/MPG-1. The other signals are from the target (center) and the towing vessel (left).



After the radar set is installed and operating, it is very important that battery and higher commanders be familiar enough with what constitutes normally good radar performance to recognize the situation when the sets are in need of maintenance or adjustment. While this is the primary responsibility of the radar officer and crew, this knowledge on the part of the commander discourages any tendency of the radar personnel to blame substandard performance on the weather or other improbable causes.

Fire control radar should be completely integrated in the fire control section of the battery, if its full potentialities are to be realized. In too many cases, the radar section seems to live in a world apart, either because of the radically different nature of their activities or because of a lack of interest on the part of the battery commander or range officer. Training should be conducted with the rest of the range section at every opportunity; and every effort should be made to foster a community of interest. Much of the value of radar tracking practice is lost if the radar data are not analyzed thoroughly for both random and systematic errors. Comparison of radar and visual tracking data serves to keep both groups of observers on the alert, and is a most valuable means of keeping the range officer informed of the efficiency of the whole range section. Since the aided tracking mechanisms in fire control radar are generally unfamiliar to the average individual, the training of the operators can be enhanced by practice on visual instruments equipped for aided tracking, such as the Azimuth Instrument M2. When observing visually, the operator is aware instantly of any improper operating technique, and soon acquires mastery of the mechanism.

Although all our radar sets were designed for specific primary missions, their capabilities for other purposes should not be overlooked. Although the SCR-682-A was designed for surface search, it proved to be almost as effective for long-range coverage against low-flying aircraft as some of the sets developed specifically for the latter purpose. In the Mediterranean and Southwest Pacific Theaters, both the SCR-582 and the SCR-682-A were employed in independent organizations called Coast Artillery Surface Warning Batteries for air search, for guarding convoys against air and motor torpedo boat attack and for guiding convoys

*See "Weather and Radar" on page 26 of July-August 1946 JOURNAL.

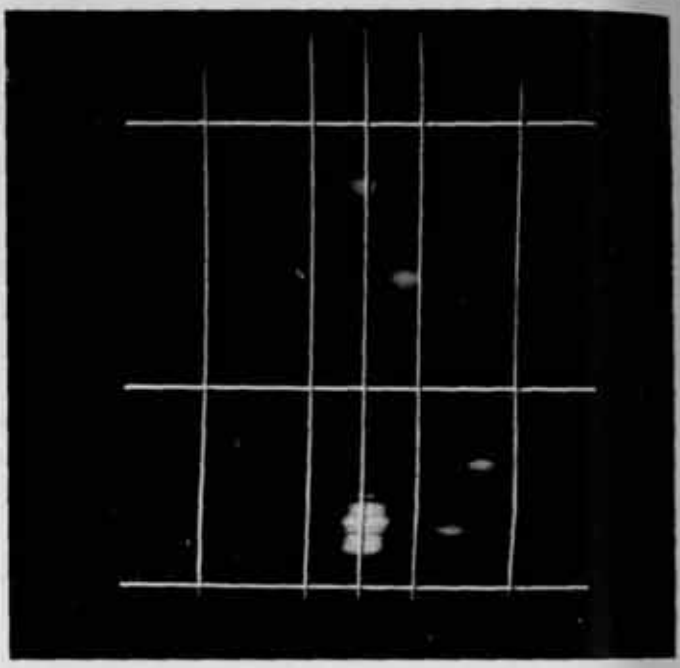
through dangerous waters. In both theaters, timely warnings by the operators of these sets kept convoys from going aground in the early stages of the war, before radar was available in adequate quantity for shipboard use.

Intimate knowledge of the operational characteristics of radar sets often provides valuable information quite apart from the position data normally obtained. An alert operator on the AN/MPG-1, for instance, frequently can identify his targets as to type, from the size and shape of the signals on the B-scope. With a little mental arithmetic, even the length and beam of a ship can be determined within a few yards. Many classes of ships cause characteristically shaped signals. Signals from aircraft carriers are nearly rectangular, indicative of the shape of the flight deck, when viewed bow-on or stern-on. At other angles of aspect, the shape is roughly a skewed parallelogram. Signals from submarines on the surface have a larger oval part, from the conning tower, and a smaller adjacent portion of somewhat indeterminate shape, coming from the bow or stern low in the water.

The photograph, Figure 4, illustrates strikingly the various bits of information that can be obtained from an intelligent interpretation of the signal presentation on the AN/MPG-1 B-scope. The various signals, which are characteristic of these classes of ships, are from the carrier *Midway* (lower center), two destroyers (right) and two transports (above). But the *Midway* and the two destroyers are about 105,000 yards from the radar, while the transports are only about 65,000 yards away. Exceptionally strong anomalous propagation conditions prevailed at the time the photograph was taken. Although the maximum tracking range of the AN/MPG-1 is nominally 28,000 yards, pulses transmitted just prior to the one that normally is illuminating the scope at the moment may cause signals when reflected from greater distances, if propagation conditions are exceptionally good. This phenomenon is known as previous pulse reception. In this case, the 65,000-yard signals are cause by the first previous pulse and the 105,000-yard signals are from the second previous pulse.

Because of its unusual performance characteristics, the AN/MPG-1 has been used for many purposes not connected with gun battery fire control; and many additional uses can be envisioned. Some of the early studies of mortar location by radar means were made with the experimental model of the set. The progress of moving storm areas has been noted on both scopes at sufficient ranges to permit timely warning to small craft and movement of matériel and personnel to shelter. On more than one occasion vessels in the vicinity of dangerous mine fields have been located and directed to safety in dense fogs. The set would be invaluable for the control of ship traffic in fog-bound or crowded harbors and in treacherous channels. It is quite probable that techniques for mine planting under poor conditions of visibility can be worked out, using the AN/MPG-1.

Since the effectiveness of radar depends so greatly upon the operators, maintenance men and the officers charged with its employment, the technical and professional skill of radar-trained personnel should be hoarded carefully. In World War II, a very large percentage of all radar activity was carried on by individuals who left active service at the war's termination. In order that our country may be fully prepared for any future emergency, the interest of these individuals must be retained; and their ranks must be augmented continuously by younger technically trained men (and women). Furthermore, they must be accorded an opportunity to keep their proficiency at a high level. It would seem that the best medium for such stimulation of interest and continuity of training would be the organized civilian components of the services—the Reserve and the National Guard.



Ships show up as various characteristic signals on the AN/MPG-1 B-scope. At lower center is the carrier *Midway*, two destroyers appear at the right and two transports above.

The Navy has adopted a realistic approach to the solution of the problem, at least in some instances, by establishing radar centers where civilian component personnel can train on the latest types of equipment. While the inactivation of most Regular Army seacoast artillery organizations makes a similar solution somewhat more difficult, there are many fully organized Reserve and National Guard units in being; and war-trained radar personnel are available to carry on courses of instruction. To avoid a further drain on the depleted Regular Army ranks, the administration and conduct of a radar training program could be turned over to these units, with a bare minimum of supervision and assistance from the Regular establishment. Suitable facilities should be established in close proximity to large centers of population; and radar equipment of the latest types should be made available for training purposes. In the case of the Organized Reserve, a system of property accountability and responsibility would have to be worked out, but this seems a small matter with so much of the country's security at stake.

This article would not be complete without a sincere tribute to the individuals whose magnificent labors produced for the Seacoast Artillery the finest in radar equipment. Their very number precludes their mention by name, but each is richly deserving of the accolade "Well done!"

The Defensive Face of Air Power

By Lieutenant Colonel William R. Kintner, Infantry

As an exploding volcano pushes new islands far above the flat surface of the sea, the advent of air power has shattered the landmarks around which world strategy was formerly based. Because the air war is fought in the endless blanket of air which covers the surface of the land and sea, it has become an accepted military axiom that the battle of the air must be won before there can be any final decision on land or on the sea. Many amateur strategists and some professionals advance from this truism to the conclusion that air power will, in the next war, be the sole instrument of victory. Entranced by the closing stages of World War II, when air superiority had been gained and offensive air power often ran the show, they seem to think that offensive air power will always operate over hostile skies as freely as the finally dominant Allied Air Forces once did. But can military planning safely rest on the assumption that the offensive air power of tomorrow will command the air unchallenged?

Will offensive air power always hold the whip hand over air defense? To this question many writers answer an emphatic "Yes." As Hanson W. Baldwin expresses it, "The services are agreed . . . that the offense now has such an edge over the defense that bigger and better retaliation is the best defense." This expectation of the incontestable supremacy of air power, which means in effect, offensive air power, is repeated frequently and persuasively. But is it valid? A proposition so basic to successful military planning, as the current concept of offensive air power, demands the most careful scrutiny and examination.

Speculation on the relative strength of air offense and defense would be fruitless unless some attention were paid to the military history in which air power has come to play so prominent a role. The history of war, when properly understood, reveals to us those general patterns of conflict which are likely to be repeated. One such general pattern can be found in the line of development followed by each weapon. Every new weapon is introduced in an experimental fashion. If it makes good, it is developed into a decisive offensive weapon. If it achieves overwhelming offensive power, means of stopping it become the chief concern of military men. Eventually the weapon is checked. Then the weapon itself, or the tactics governing its employment, either are discarded or go through a metamorphosis. If the weaknesses of the weapon can be eliminated, it is reintroduced into battle in a rejuvenated form. This alternating cycle between the power of the offense and the defense has been repeated with respect to every combat weapon throughout all military history.

Does the airplane fit into this pattern of military evolution? The answer is that it does and it doesn't. As an individual weapon it has much in common with other individual weapons, such as the first knight on horseback or the first tank. But as the machine which introduced warfare into the third dimension of the air, the airplane is something fundamentally different than just a new weapon. Yet even in this revolutionary category a historic parallel can be drawn. The effect of the arrival of the airplane on combat in our time must be somewhat like the first use of sea power in ancient times. The first ancient people to employ boats in an amphibian role enjoyed the immense tactical success which always comes from the introduction of a new weapon. Unknowingly, they were also enlarging the theater of war. The advent of the airplane has enlarged the theater of war in a far more fundamental fashion.

Once warfare enters a new medium, the established principles of war apply in that medium. In the cyclic story of sea power, for example, we find periods when offensive sea power was unbeatable. There are other periods when shore defenses prevented sea power from directly imposing its strength on a hostile land. In the ebb and flow of offensive sea power, a host of weapons and special ships came into being. Each new naval device aided either the offensive or the defensive face of the one coin—sea power.

It is from this point of view that we must regard air power. There are both offensive and defensive elements in the vast conglomeration of forces and material which we call air power. These forces are always changing. Marshalling these forces at a given moment, in a given way, will permit them to be employed offensively. These same forces marshalled in another way may prevent the successful offensive employment of air power. The way in which these forces are marshalled at a given period is determined by the national policy which they are created to implement.

Critical examination of the history of the recent air war implies more than a mere recounting of operations. If the direction of offensive and defensive trends can be isolated, there is a possibility of seeing the general outline of future developments.

Both Germany and Japan began hostilities in their respective theaters of war possessing superior offensive air power. Each retained air superiority during the initial stages of the conflict. Germany's offensive air power was first checked in the 1940 Battle of Britain. Japan's air power was first halted in the Battle of Midway. After a varying length of time, the Allies achieved air superiority in both theaters of war.

The case history most clearly illustrating the relative strength of air offense and defense can be found in the Battle of Britain. The Luftwaffe tried to bring England to her knees with air power. From a surface examination, it seems that the German attempt failed because the British possessed the Spitfire, and the Spitfire could knock down more bombers than the Germans wanted to lose.

Actually the problem runs deeper than that. The British

had a relatively good air defense in terms of the 1940 air war, while the Germans had a relatively poor strategic offense both in the planes and logistics of its Luftwaffe and in the concepts of air power by which Goering directed this force. It was a combination of Britain's better prepared defenses and Germany's poorly conceived offense that gave the verdict of the Battle of Britain to the fighter pilots of the RAF.

Airmen will argue correctly that the Battle of Britain is a poor example of the offensive use of air power. They will contend that the German effort to knock Britain out of the war with air power failed because the Germans lacked the correct doctrinal concept of strategic air power. Because the German air doctrine was false, these airmen will say, the Luftwaffe was improperly designed to defeat Britain in the air. On the other hand, the Germans might have had the finest doctrine in the world, but as long as British Spitfires could inflict a disproportionate share of losses on the Luftwaffe, their air attack would have been doomed to failure. In planning for the future, an offense must be provided a total edge over an air defense in terms of the equipment, concepts and organization. The superior destructiveness of the atom bomb may reduce the size of this edge but it doesn't eliminate the necessity for the offense to have a relative superiority over the defender's air space if he wants to win.

An important basic principle can be learned here. An effective air defense may be established provided it can inflict a sufficiently high percentage of losses on attacking air power. In certain situations offensive air power may be stopped, whatever its doctrine and whatever its organization.

Our experience in the last war should not prevent us from seeing this principle. Yet history teaches that the real lessons of a war are learned more readily by the vanquished than by the victors. We did gain air superiority. We did overwhelm our enemies through the air. But does this fact imply that offensive air power will in any or all circumstances achieve the same mastery over air defense?

Air power is the creature of a complex, industrial age. During World War II, the Allied coalition possessed infinitely greater industrial and technical resources than its enemies. The enemies gained head start in industrial mobilization. They channeled this head start into early air superiority. The British, however, politically non aggressive, wisely invested in an air defense shield. Superior fighter planes, a better warning service than the world thought possible, and disciplined civil air defenses enabled the British to withstand the first air blows of Germany. The British held the line long enough for us to marshal our potentially superior industrial resources. When we started to build vast fleets of airplanes, we out-produced our enemies. We soon overcame them through the sheer weight of superior air mass. Admittedly, we pioneered in many technical developments; but our opponents led the way in V-1s, V-2s, jets, rockets, rocket launching sites, etc. In the final count, most airmen will agree, it was air mass that brought us our World War II victory in the air.

Once air superiority was gained (the actual date is indeterminate) Allied air defense efforts were greatly, and properly, curtailed. But in the period of uncertainty, when air superiority had to be won, there was an urgent need to create strong air defenses. This need led to the Allied development of many remarkable air defense measures. Further technical advances of air defense equipment may, in the future, tip the scales against conventional strategic air power.

The last war indicated a technical trend toward increased capability of air defense. This trend, however, was obscured by the fact that offensive air power and air defense were both most highly developed by one side, the Allies. The more spectacular achievements of offensive air power were more fully publicized, and more widely understood, than the equally significant growth of certain air defense countermeasures.

There are three active means of air defense: Air Warning, Fighter Aircraft, and Antiaircraft. A glance at the record reveals that all of them possess the capacity for immense future improvement.

As to Air Warning, the doctrine of the superiority of offensive air power was advanced by the Italian General, Douhet, before the existence of radar was even suspected. Yet, tactical surprise was an essential element in his concept of offensive superiority. Douhet maintained that the defense, in order to be effective, "Must know where it can meet the enemy force before the objective is reached." Radar has been developed to such a degree that the defense can now generally count on this kind of warning. Fortunately for us, the Allies enjoyed technical superiority in radar throughout the war. The necessity of war, however, did not force us to exploit its defensive capabilities to the utmost. There is time for us to do this now. The defensive use of radar will be aided by the current trend of building high flying air dreadnaughts as large as or larger than the B-36. Radar can pick up a high flying plane much farther out than it can a plane hugging the ground. It remains to be seen whether future developments of radar will tend to aid the defender more than the attacker.

How will fighter planes fare in the future? The defensive victory of the Spitfire in the Battle of Britain had two divergent effects. With the Allies, it produced more heavily armed bombers; it also led to the development of tight-formation tactics designed to reduce the effectiveness of enemy fighter planes. In Germany, it led to the conviction that the fighter plane could stop any formation. Consequently, the Germans invested their defensive chips in the FW 190 and overlooked the possibility that new tactics might reduce the power of the fighter plane. But even this defensive investment was made in a niggardly fashion. No substantial program of increased fighter plane production was authorized until September, 1942—two years after the Battle of Britain. In spite of this apathy, the Germans who were so late in creating an air defense were able to put up a strong shield against our air formations. In the Schweinfurt raid the success of the German fighters against our bombers retarded air offensive against Germany. Only the arrival of our long-range escort fighter planes permitted the air war against the interior of Germany to be effectively resumed in force. Had Germany possessed the fighter planes which adequate planning should have provided, the arrival of our long-range escorts might not have turned the tide. The lesson which should not be forgotten is that there was a period when we

barely held onto the offensive edge by the skin of our teeth.

Future fighter planes will improve and, if the defensive tactics governing their employment are superior to those of the attacker, air defense may gain the upper hand long enough to change the character of a war. The air war must be regarded as an involved campaign, now favoring the attacker, now the defender, as new tricks are pulled out of the bag. There may be periods in the future when fighter planes will enjoy several advantages over attacking bombers. They should have the advantage of superior speed. No one plane can have high performance in every respect. The bomber plane may develop long range and great life, but it will do so at the expense of speed and maneuverability. Hence the home-based fighter plane should always have superior speed and maneuverability over the invader. This should be true no matter what type of propulsion is used. The defending fighter plane will be directed into action by radar. It may drop on the attacking bomber fleet some form of air to air guided missile, equipped with a target homing device. Against this class of opposition, the conventional type bomber, whether a prototype of the B-36 or the B-XX, may find itself almost helpless.

The improved antiaircraft of tomorrow will supplement and support these deadly fighter planes. One mission of antiaircraft will be to disperse bomber formations and open them up for easier attack by fighter planes. The other mission will be to knock attacking bombers out of the sky. Antiaircraft will be in a much better position to do this than ever before. Some military observers have ignored this fact because many of the advances made by antiaircraft during the recent war were made by our side, where, because of our air superiority, they were not so noticeable. Consequently, German and Japanese antiaircraft performance is held up as a criterion of what AA can and will be able to do. Such a practice is both dangerous and fallacious. Japanese equipment was primitive. German AA equipment was not always first rate. The Germans employed an inferior kind of radar, mechanical directors and mechanical fuses. But even with this sort of equipment, the massed German flak defenses were able to inflict serious damage, as any Eighth Air Force pilot will admit. Yet, on the whole, German flak hampered but never stopped our air operations.

The so-so record of enemy AA has tended to obscure the better performance of our own. Allied AA, for example, was credited with destroying from one-third to one-half of the 700 Luftwaffe planes which attacked behind the lines of the Western Front on New Year's Day, 1945. No air force could sustain losses of this magnitude for very long. Similarly, naval AA in the Pacific, and especially at Okinawa, knocked down an amazing proportion of attacking Japanese planes. These fruitless offensive attacks were the last straw which broke the back of the Japanese Air Force.

Superior tracking radar, electrical fire direction, and proximity fuses were the elements responsible for the marked effectiveness of our AA. These devices will be improved—other AA aids will be found. The chief weakness of AA has been its inability to keep up with a fast target, rapidly changing its course. This weakness may be overcome by greatly increasing the velocity of the AA projectile, simultaneously decreasing the prediction time and increasing accuracy. Another method, probably the more feasible, would be to create effective guided missiles. By such measures and other devices stolen from the Buck Rogers comic strip, tremendous development of the capabilities of AA is possible.

No mention has been made of passive defense. It seems foolhardy to assume that any nation will provoke a future war without first applying some of the passive air defense lessons so convincingly presented by the ruins of Berlin, Tokyo, and Hiroshima. Eighth Air Force men can recount the frustration which comes from thoroughly plastering pasture land made to look like a factory. Whatever improvements are made in passive air defense measures, we can be certain that decisive targets will be harder to find and more difficult to destroy than they were in the recent war.

No future aggressor will make war until he has thoroughly learned the passive defense lessons of the recent conflict. An aggressor will first disperse his economy. He will place a large part of his vital industry underground. Not until he makes a proportion of his industrial plants (including the necessary labor force) relatively safe from air raids will he start a war. Dictatorial methods may be necessary to develop adequate passive defense, and for this reason the United States may not likely do an adequate job with passive air defense. Totalitarian states will not find these difficulties insurmountable. To the degree that such measures are successful, the effectiveness of offensive air power against such targets will diminish. The German experience with underground construction reveals that a program undertaken in time of peace can provide safe and efficient production sites for a wide range of industrial operations. Air power means more than a vast array of bombers dropping destruction over a defenseless city. Air power implies the ability to select and destroy decisive targets. Decisive targets are those which prove, after elimination, to have been absolutely essential to the enemy's war effort. Selection of decisive targets is a function of intelligence. Determination of proper targets is an immense task in itself. Serious errors were made in this critical field in World War II. Destruction of such targets is a technical problem in which the balance of offensive and defensive forces existing at a given moment may give victory to either the defender or the attacker. While no war can be won by defense alone, attack, under certain conditions, may be as fruitless.

A successful air offense must enjoy superiority over the defense of the target. Such superiority may be won by surprise, better tactics, greater mass, or it may be achieved if the offense enjoys technical superiority over the defense. Surprise can never be ruled out in war, but the problem of achieving it at the onslaught of an inter-continental war may make it impossible to knock out a continental power like the United States with one coordinated air blow. Of the remaining factors of air superiority, technical advantage is by far the most important. The superior mass and tactical skill of a million savages against a few men equipped with machine guns would not be of much value. It is the same with air power; only when the technical capabilities of the attacker and defender approximate each other can tactics and mass play a significant role.

With these thoughts in mind let us look at tomorrow's war. In order not to muddle the problem with other con-

siderations, let us imagine a war fought solely in the air. Will offensive air power triumph, or will air defense, under certain conditions, have a chance?

Before uncovering the crystal ball to see how the cards will stack up in such a struggle, it will be necessary to establish a few limitations. First, we will assume, as General Spaatz does, that long-range, conventional-type bombers will continue to be the main offensive air weapon for a "long time in the future." Offensive air power will continue to rely on piloted aircraft to deliver its bombs most of the way to the target. The use of guided missiles in an important offensive role will likely be subsidiary for some time to come. Use may be made of guided missiles to deliver bombs launched from conventional bombers close to the end of the bomb trip. But it will be an appreciable number of years before spectacular and effective rocket projectiles of intercontinental range are developed. Short-range missiles may lend themselves more easily to employment in a defensive role. We are confining ourselves to that stage in the development of air power which began at Hiroshima, and which will end with the advent of proven long-range missiles.

Hiroshima calls to mind the fact that air power and the atomic bomb have been so frequently associated that they have become almost synonymous. It is anticipated, and quite properly so, that the air highway will provide the most efficient route for the delivery of atomic bombs. It is also universally acknowledged that these bombs pack sufficient wallop to put most cities, as presently designed, out of business. Consequently, popular writers glibly assert that only a few bomb-carrying planes need to reach a target in order for offensive air power to cinch a victory.

A statement of this kind was made in an issue of *Business Week* (6 July 1946). "The bombs can be made in ample quantity and paid for, but can they be delivered? The answer is: Yes, by the time the bombs are ready they can be delivered anywhere and overnight. If the defenses of the target country are weak, piloted planes can get through in ample number. Ten per cent would be enough."

Although a single atom bomb carries a powerful wallop, the mission of paralyzing a gigantic continental power will require a number of such bombs. Many centers of production must be destroyed before the enemy's power to resist will be broken. The difficult task of delivering a large number of bombs over the hostile target must be considered.

Neglecting for the moment whether any air force could mount, as *Business Week* suggests, missions in which a casualty rate of 90 per cent was sustained, several important questions present themselves. Will any major power provoke a war in which atom bombs might be used against itself if its own air defenses are weak? Can the bombs be made in the quantity necessary to destroy all priority targets? Is the supply of fissionable raw material unlimited? Will mass production of A-bombs be prevented by the exhaustion of the raw material? Will there be production of atomic bombs in quantities sufficient to arm huge air fleets, similar to the wartime Eighth Air Force?

These questions are significant. If air defenses can be developed which can check air raids conducted by a relatively few piloted planes, offensive air power must resort to mass saturation raids. There is no airtight defense against large-scale raids which take every advantage of feint and maneuver. Two factors, however, might operate against the decisive success of mass air raids. Will it be possible to arm every plane participating in a huge formation with atomic bombs? Will enough planes armed with the atomic bombs get safely through to the target? Unless this could be guaranteed, military planners could not be certain that "ten per cent" or whatever other figure they selected, would be "enough."

Unless the attacking air force is able to destroy all the decisive objectives simultaneously, a series of raids will be necessary. Most airmen state, as a result of World War II experiences, that an air force cannot maintain sustained operations if it suffers more than 5 per cent casualties per raid.

The task of air defense against piloted aircraft armed with atomic bombs appears to boil down to two basic principles: (1) Knock enough planes out of the sky to keep atom bomb carrying planes from either getting through to decisive targets or dropping these bombs accurately with respect to the targets. (2) Knock enough planes out of the sky to demoralize the pilots of the attacking air force, in order to prevent sustained operations. A limited air defense producing these results can be realized somewhere short of a perfect air defense.

Such an air defense will not prevent some planes carrying atom bombs from hitting the target system. But unless these planes, and the bombs they carry, destroy an appreciable number of decisive targets, offensive air power will not gain a victory. Only such an air defense will assure us the means and time for retaliation. Perhaps General Spaatz had this thought in mind when, in response to the question, "Could the Air Force prevent enemy bombers from making a successful attack on the United States?" he replied: "They could drop bombs on us but they could not deliver a decisive attack, at this moment."

Needless to say, if an air defense against conventional planes carrying atomic bombs can be developed, defenses against planes carrying less deadly destructive agencies will be that much more effective.

This discussion has a direct bearing on the air defense policies of the United States. Every American has a vital interest in the soundness of these policies. These policies form a part of our over-all military program. They must be designed with a twofold purpose: (1) To prevent war, and (2) to win an unwanted war.

Aggressive wars are not made by the votes of the average man, but by powerful leaders who give the orders that march peoples off to war. These men make war only when they think they can win, as no dictatorial ruler will willingly sign his own death warrant.

No aggressor will make war in the future without studying the lessons of 1939-1945. It does not seem likely that an aggressor will undertake a future war until he has developed an industrial base approximately the capacity of any possible opponent. There is little chance of a future air war taking place between industrially unequal foes such as Japan and the United States were in the recent war. But in war fought between industrially matched nations, the air decision cannot be won solely by superior mass, but by the conflicting capabilities of air offense and air defense.

The advent of the atomic bomb has had world-wide military repercussions. Will an aggressor make war without first creating means of blunting an atomic blow? While there is no superficial defense against the bomb, *a serious relocation of a nation's economy may make some country more immune to A-bomb attacks than another.* The country that is more vulnerable above ground will enter an atomic war severely handicapped. This will be especially true if the aggressor is willing to follow a checker strategy of trading industrial complex for industrial complex until the offensive base he was able to place underground tips the scale in his favor.

Although we have entered every past war woefully weak, we have always had time to build an attacking force. Since we cannot depend on having enough time in the future, the concept of a striking air force, capable of instant retaliation, is currently in vogue. It is a sound concept. A striking air force is an essential part of air defense, but not the only part.

De Seversky, the most outspoken advocate of offensive air power, describes such a striking air force as a ramrod battering against the wall of defensive air power. He asserts: "Our number one job is to build the ramrod—the striking air force—capable of breaking through and destroying the air walls of the enemy fortress."

While an offensive ramrod is absolutely essential to ultimate victory, the number one job of any nation, the number one principle of any military organization, is to provide for its own security. Only after the national base is relatively immune from pulverization can we safely concentrate on smashing the enemy.

Most Americans agree that we are committed by our political institutions and traditions to a strategic defensive in the initial stages of the war. Military planning must take into account this political reality.

We are the most highly industrialized nation on earth. We have the most complex economy in the world. The heart of our economy is concentrated in comparatively few places. We must be prepared to defend this heart.

Until Buck Rogers rockets can strike New York from Timbuctoo, piloted aircraft and air attack will be synonymous. A good air defense can blunt the first blows of this sort of plane. While absolute air defense is impossible, an effective air defense is not only within the realm of possibility, it is absolutely essential to our national survival.

But such an air defense cannot be improvised. It must be ready. Enough of our civilian and military effort must go into air defense to make it ready.

From the experience of World War II, we can see that the aggressive Axis powers diverted all their energies into the creation of striking power. They were not prepared to defend themselves when their turn to "take it" came. Britain, on the other hand, wisely braced herself to absorb the first blows of war. Politically, our situation in the world corresponds more to that of Britain and not to that of the Axis powers. No matter how adequate our military preparations may be, they will never be adequate enough to launch a full-scale offensive in the early days of any war. Our planning must envisage the lean days which have always been associated in democratic states with the first period of a war. We must plan at least a modicum of air defense.

A more effective air defense is not a hopeless dream. The security of the United States demands that a sound air defense be created.

While it is inconceivable that we will willfully make war, we may find ourselves the initial victims of attack. Unless our air defense is made strong enough to deflect the first blows of enemy air power, we will be in no position to strike back to conquer.

ORC Uses NG Materiel and Armory

Through the cooperation of Colonel Leroy S. Mann, Commanding Officer of the 260th AAA Group of the District of Columbia National Guard, the AAA matériel in the National Guard Armory has been made available to the ORC for two evenings per month.

As a result of a conference between Colonel Mann and Major Harold C. Herrick, Commanding Officer of the 1st Washington AAA Gun Battalion (Provisional) (ORC), arrangements were made for the personnel of Major Herrick's unit to spend two evenings per month in refresher work with the 90mm guns, director and power plant and the 40mm guns issued to troops of the National Guard.

Enlisted members of the National Guard who act as instructors are being given credit for drill periods but the officers of the National Guard who make their services available will receive no official credit. However, this has in no way adversely affected the spirit of cooperation shown by the officers concerned.

Three sessions have been held to date and the Reserve Officers attending them are most enthusiastic about the opportunity afforded them as a result of the fine cooperation of Colonel Mann and his subordinate commanders.

Flak Intelligence Memories*

By Lieutenant Colonel Jesse O. Gregory, CA Res.

Foreword

In the following article I have attempted to picture a series of outstanding and interesting situations which came to my attention while serving as a flak officer at Headquarters 8th U.S. Air Force, Europe, during World War II. Some of these situations have been hand-picked because they clearly illustrate certain fundamental effects of antiaircraft defense on air operations. This hand-picking does not constitute fiction—each story is told as best I can remember it without benefit of a diary or a great bulk of historical documentation.

How To Become A Flak Expert

In 1943 the AAA School at Camp Davis, N. C., was directed by A.A. Command to furnish five captains or majors for overseas duty as flak analysts. This directive listed additional desirable qualifications for these officers. However, I have always suspected that availability constituted the prime prerequisite. In any event five officers later to be known as "the five captains" reported to the School executive officer, Colonel P. W. Cole, who in his usual brusk and official manner "gave us the poop": We were to expect secret overseas orders within 48 hours; we were to go to the station hospital for immunization, etc.; we were going to analyze flak for the 8th Air Force; were there any questions? There were!

Where is the 8th Air Force? What is flak analysis?

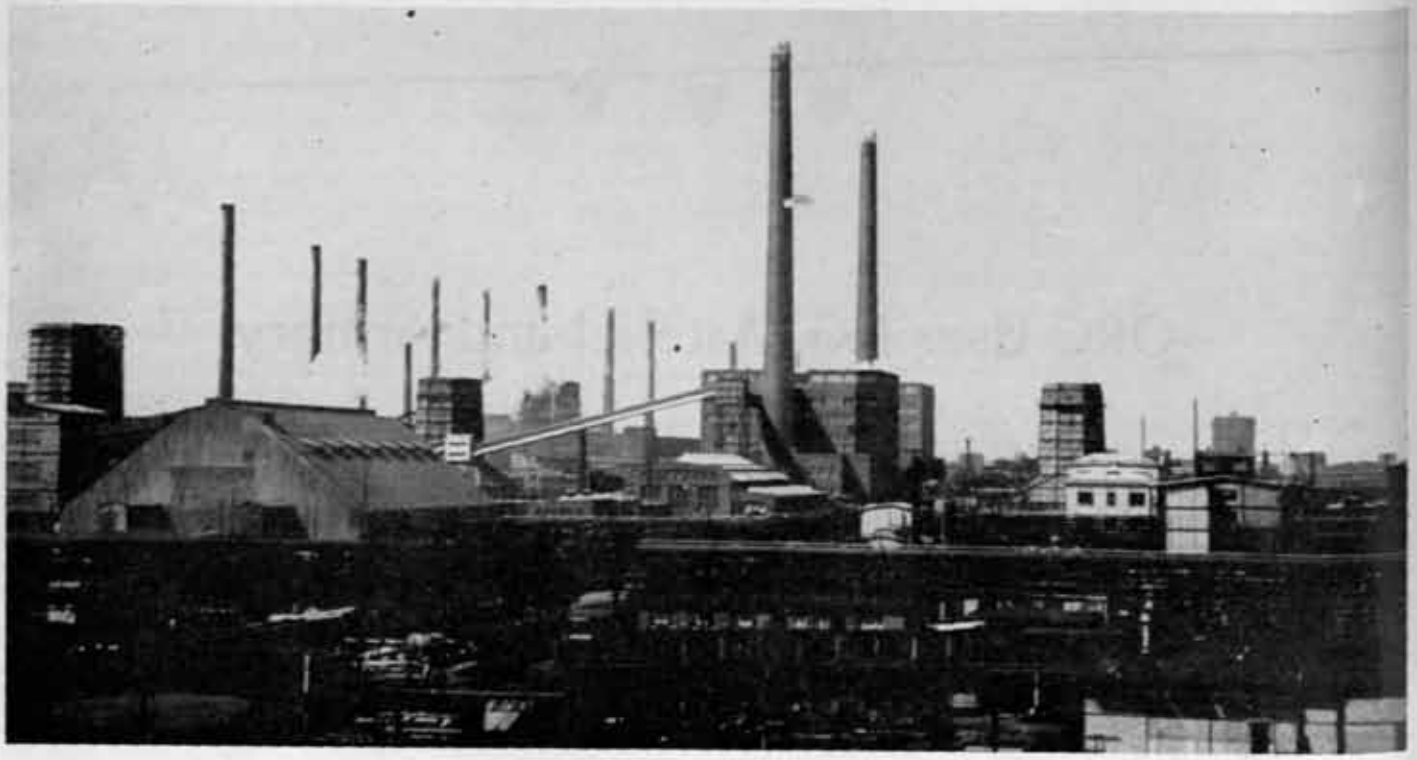
Colonel Cole answered truthfully: "I'm not sure where the 8th is." Then in a whisper: "England, I think." His answer to "what is flak analysis?" was: "Hell, I don't know, I've only been in this game 17 years." And therein lies this tale.

The five (then) captains: Harry C. Johnston, Simon L. Grimes, Jr., Jesse O. Gregory, Robert L. Marietta, and William Hill arrived in Washington ten days after our brief conversation with Colonel Cole. To our surprise, air passage was awaiting us. We left Washington 20 hours later.

Forty-eight hours later we reported to Headquarters 8th Air Force, near London, where we were greeted by Colonel William Merritt, a Coast Artilleryman who had left Camp Davis a few months before us and who was at that time Defense Officer of the 8th Air Force. His cross cannon insignia among so many wings looked mighty good to us. We were told to take two days to see London, it being a week end, and to return on Monday ready to move on to Headquarters VIII Bomber Command. There we were to meet Colonel Earl W. Thomson.

*The author wishes to express his appreciation to Colonel E. W. Thomson for the additions made to this article and for reviewing the manuscript.

Leuna—An oil target defended by over 700 heavy AAA guns. (Equivalent to almost 44 of our gun battalions.)



After a saturation bombing in one of the industrial areas of Marienburg, Germany on 10 September 1943, this photograph clearly depicts the damage to these installations.

Colonel Thomson, in normal times, is a civilian professor of physics and electrical engineering at Annapolis. He is also a Coast Artillery reserve officer with World War I and II active duty. Until a short time before our arrival he had been a member of General Claude M. Thiele's AA section, Headquarters, ETOUSA. Our air forces realizing that they were meeting much more flak resistance than had been expected solicited the aid of General Thiele's section. Colonel Thomson was eminently well qualified to deal with this problem. His tremendous enthusiasm, coupled with the able assistance of British Intelligence, British Operations Research Scientists and one or two other officers from AA section, led to the development of flak computers which resembled the Bennett-Devereux strength computers developed by the Antiaircraft Artillery School.

The five captains were given a five-day blitz course in the use of flak computers by Colonel Thomson. This was followed by one week of instruction in theater air intelligence. Theoretically this was sufficient to qualify us as flak experts because we were immediately assigned to that duty at Operational Headquarters. Captain Johnston went to the 1st Bomb Wing, Grimes to the 2nd, and Hill to the 3rd Bomb Wing. These headquarters were later redesignated First, Second and Third Air Divisions. Marietta and I stayed with Colonel Thomson at VIII Bomber Command Headquarters, which was later redesignated the Headquarters of the 8th Air Force.

Theoretically, flak computers might be developed to calculate the absolute number of aircraft which will be lost and damaged by flak on a particular mission. This is the answer the flak officer is most frequently asked to give and incidentally the one he is most likely to answer incorrectly.

The only thing that ever was claimed for flak analysis and flak computers was that they would give the *relative probability of damage* along different courses into the target.

Introduction To Heavy Bombardment Operations

When I first went to the 8th the targets being attacked were airfields in France and the Low Countries, submarine installations along the coast and occasionally an industrial target, if it was not too deep in enemy territory. The plans for the campaigns against the G.A.F., aircraft factories, ball bearings, communications, and oil were well under way and eventually were executed but not before the force was strong in both bombers and escorting fighters. For example, operations of 200 VIII Bomber Command bombers, supported by VIII Fighter Command P-47's and British Fighter Command Spitfires, were common in the

fall of 1943. Frequently Bomber Command B-26's (Mediums) were included in the same plan since they gained a great deal of incidental fighter protection when operating in the shadow of the heavier force. Gradually the 8th grew stronger and more aggressive. By invasion day, it was capable of an effort of 1800 heavies and 1200 fighters. They could fight their way to almost any target within range, but on long missions the fighter cover was too thin for comfort so that coordinated planning between the 8th and the 15th Air Force in Italy was frequently resorted to in order to split the G.A.F. fighter force. As the bombers went deeper and deeper into enemy territory, they met heavier and heavier flak defenses and consequently worked harder and harder to perfect techniques for avoiding flak fire. The techniques used were never permitted seriously to jeopardize bombing accuracy or fighter protection tactics. This meant that we could not use evasive maneuvers in the target area and only gradually did the number of bombers flying together in close formation decrease. These were severe restrictions. It is likely that had flak loss rates been somewhat higher than they were, more use of evasive tactics and smaller units would have been forced upon the 8th.

The Higher—The Fewer Losses

Altitude is a wonderful cure for troublesome flak. Unfortunately it is also a heavy contributor to inaccuracies in bombing. In an operating air force, the question of whether to fly high and avoid flak or fly at medium altitudes and get shot up is ever present. The altitude question was settled during the early operations of the 8th. The answer was found the hard way. Some B-26's had attempted a surprise attack on Ijmuiden at very low altitude and had all been lost. The experience of the B-17 groups which flew over St. Nazaire at 8,000 feet with the low squadron at 7,000 feet and returned with every ship damaged and three losses over the target pragmatically showed the tremendous effect of altitude. In April 1943 the second study from the flak intelligence section was on the effect of altitude. This showed that from 15,000 to 30,000 feet an increase in altitude of 5,000 feet halved the probabilities of damage. At undefended targets, altitudes as low as 10 thousand feet were sometimes ordered. These medium altitude missions were rare, but from the accuracy point of view they accounted for the best bombing. Three outstanding examples are worth mentioning here:

The author examining a German AA cable junction and switch box used to switch gun data lines from one director to another.

Marienburg

Some of you will probably remember a much publicized picture of the bomb pattern dropped on the aircraft assembly plant at Marienburg. (See photograph.) It was published in *Life* magazine, most of the daily papers, and in official pictorial histories. It is undoubtedly the best example of combat pattern bombing I have ever seen and I have seen several thousand strike photos. Marienburg was deep in enemy territory and our flak intelligence on it was weak. We did, however, have some evidence indicating no heavy guns in the defense. Because of the long range and the chance for surprise it was highly desirable to knock out this target with one mission. Added to these factors was the danger of hitting an American PW Camp located about 500 yards from the MPI if the bombing proved inaccurate. The operation was briefed for and flown at 12,000 feet bombing altitude. Had we been wrong about the flak I should undoubtedly have been looking for a new job the next day; on the other hand, had the altitude been 20 or 25 thousand feet the picture would undoubtedly have been less popular.

Normandy

Part of the 8th's contribution to the Normandy operation was to knock out certain bridges and marshalling yards in France. There was little flak opposition at these targets, none at most of them. Low altitude was the order of the day and the targets were quickly and efficiently destroyed.

Late in the war, the 22d and 23d of February 1945 to be exact, all allied air in the ETO broke precedent and flew in small, instead of large, formations to bomb many small marshalling yards instead of a few large ones, provided they were not defended by heavy flak. Weeks before my office had been asked by the advance planning committee to submit estimates of flak losses for just such a mission. I was confident that we could recommend flak free routes and targets but I also knew some of the groups would not stay on briefed courses. Consequently our estimates of flak losses were based primarily on a staff navigator's educated guess as to the percentage of formations that would navigate the briefed routes within 5 miles, 5 to 10 miles, and 10 miles and over. The 8th flew its part of the operation at altitudes varying from 10 to 20 thousand feet because of local weather but most of the accurate bombing was from the lower altitudes. They accounted for over fifty communications targets on each of the two days. The experiences of the several air forces participating in this two-day circus were discussed some weeks later at an ETO flak officers' conference. We all had the same story to tell—*none of our formations had been shot at while on briefed courses.* (The Germans had some 13,000 heavy guns in the area at that time.) One of our formations returned from this operation with the following near tragic tale. "We had passed up the primary target because of cloud cover and continued to fly down the railroad track. Soon another marshalling yard ap-

peared and the lead bombardier began to sight on it. Just prior to "bombs away," the whole sky lit up with accurate heavy flak bursts. We bombed and pulled away as quickly as possible but not before all aircraft had been hit, 10 of them seriously. Later we discovered that we had literally stumbled over Schweinfurt. Fortunately we all got back to base."

Flak Planning Maps

During the early part of 1943, in addition to the 1:100,000 flak overlays, a one to one million mercator map showing heavy gun areas in red and searchlight areas in blue was in use by both the VIII and the British Bomber Command for route planning. These maps were neat and readable; however the scale and amount of detail shown was unsatisfactory for planning purposes. They were also difficult to coordinate with other maps in common use and difficult to alter as new information became available. New sheets were printed to show extensive changes but this meant considerable delay. Gradually almost all of our headquarters shifted to the one to half-million scale. Flak maps at this scale were printed on a specially prepared base sheet to which only the colored blocks representing flak had to be added in order to revise the sheets. These base sheets had cities, towns, railroads, and principal highways printed in black and all canals, rivers and other water areas were light blue. It was gridded very lightly in both latitude and longitude and the lambert grid. These maps when overprinted to show flak were satisfactory for general information and briefing of crews but for planning echelons it was also necessary to devise some means of showing daily changes. We finally solved this by mounting the base maps and then pinning to it thin sheets of transparent film which we cut with a sharp pair of draftsman's dividers. The edges were colored with red chinagraph pencil.

In the early days of 1943 the 1/1,000,000 map was thumbtacked to any wall space not currently needed by operations. Mission planning was done on another map altogether. This was of course extremely inconvenient and unnecessary but, to put it bluntly, flak did not at that time belong in the high society of operational planning.

Major Marietta was responsible for one of our first really good flak operation maps. He decided that he could definitely improve the situation in our office even if we didn't have a good working arrangement in the Operations Room. The plan required the drafting of 1/5 scale overlays from our 1/100,000 flak overlays, orienting these on the planning map and cutting the circles for all the German batteries, or at least those on the outer edge of each defense. Of course daily changes in gun dispositions had to be dealt with so no portion of the new map could be considered completed for longer than 24 hours at a time. The first map, as I recall, took Marietta and Sergeant Overcash, our only enlisted assistant, some six or eight weeks to complete. New copies took much less time and effort.

Soon after the first map was completed the Operations Officer saw it and ordered that an exact duplicate be used as "The" Operations Map. From then on our office was responsible for the Operations Map, including flak. We changed it daily and kept a current tally of the guns in each defended area as well as the grand total of all guns shown on the map. Division Headquarters was developing similar techniques more or less simultaneously. We borrowed ideas from each other until finally the technique was fairly uniform. The overprinted maps continued in general use at Wing and Group headquarters, principally because there were not enough flak personnel to post the daily changes. Since all route planning was done at either Air Force or Division Headquarters this proved to be a satisfactory arrangement.

Twin 128mm guns on a seven-story flak tower in Hamburg.

Unfortunately, avoiding flak by flying around it required more than good maps and well planned routes; navigation played a most important part.

Flak Navigation

Air navigation without radio aids is far from being an exact science. A mission over unfriendly territory which cannot see the ground while en route will frequently fly several miles off its briefed course. High velocity cross winds, especially if they have been incorrectly forecast, will increase the size of navigational errors. The first problem in getting the ships to the target was where to cross the channel coast of France or the Low Countries. We had several places spotted where the Germans had no guns and used these holes so many times that the operational planners referred to them as "Thomson's Hole" or "Gregory's Hole."

The plotting of the route to the target to avoid flak was of next importance. At first we tried placing the danger areas where the guns were on the ground but we found it necessary to put the gun circles on the maps, to include maximum range at 20,000 feet.

In the latter part of the war, Radar bombing equipment did much to improve air navigation, but prior to this, many aircraft were lost and damaged because they were off course. The importance of this deficiency can be better appreciated when it is realized that at times nearly half our flak loss and damage occurred along the route and not over the target.

On one occasion our whole force flew almost the entire length of the heavily gunned Ruhr Valley because of an unexpected wind shift.

As a safety measure, most of the operations planning headquarters adopted a sort of unwritten SOP regarding gaps between defenses. At our headquarters, the following rule of thumb came into general use: Gaps less than ten miles wide will be avoided whenever possible; gaps from 10 to 20

miles wide will generally be used when a time advantage is realized but altitude and density of guns will be considered in all cases.

A very real factor which added to the already complex navigation problem was the lack of a uniform and exact procedure for reporting flak fire. The general tendency was to report locations in terms of the nearest city or easily identified landmark. Just how costly this practice can become was revealed by our experience at Dummer Lake. This lake was an excellent check point for either visual or radar navigation along a frequently used route to the Berlin area. There were some flak defended airdromes north of the lake. The big Goering steel works near Osnabrook was situated a few miles to the south and was also well defended.

Our aircraft began to report heavy flak damage and loss at Dummer Lake. Of course we immediately rechecked the photos of the area to be sure that no guns had been missed in the interpretation procedure. When this failed to disclose any new guns we requested fresh photo cover of a large area centered on the lake. Meanwhile, since heavy defenses were known to exist north and south of the lake and no other route was available, we were forced to continue using the same route. Our reconnaissance planes had phenomenally rotten luck. Sortie after sortie was sent out to photograph the lake area but invariably ran into cloud or low visibility. Something over fifty sorties were required before we finally got all the pictures we needed, but we still didn't find any Dummer Lake flak. By this time Division Operations was blaming 8th Air Force Operations and the Division flak officers were on my neck about the deplorable state of affairs. Long before the situation was cleared up to everyone's satisfaction a few of us began to suspect that aircraft reporting Dummer Lake flak might actually have flown a few miles north or south but due to the lack of other pronounced landmarks reported their position as over the lake. Some investigations indicated that this was true. In fact, some formation leaders admitted that they had deliberately altered field order courses by a few miles in order to avoid the lake which by that time had acquired a terrible reputation. We finally convinced all the flak officers, but I still meet pilots who swear by the Dummer Lake guns.

The Central Flak Agency

The central flak agency for the European Theater was a branch of the British War Office and although under British Army control, it was staffed by RAF, USAF and British Army personnel. Essentially it was a coordinating agency serving all allied forces needing flak information. One of its best information sources was the joint British-American photo interpretation center at Medmenham. Informally we at 8th Air Force had access to both of these agencies by telephone. We also exchanged visits back and forth and found that the personal contacts led to many valuable suggestions which worked to our mutual benefit.

Generally speaking, the 8th was the heaviest user of this flak intelligence. RAF missions were flown mostly at night in extremely loose formations and consequently were far less vulnerable to flak than the U. S. heavies. Flak intelligence was for them a rather minor planning factor and flak analysis was not used. The British and American Tactical Air Forces were heavy users of flak data but their range of operation was more restricted than ours and furthermore after they became established on the continent they did much of their own collection and distribution of flak data although they continued to use their reports. Our official channel to the interpretation center was through Strategic Air Force Headquarters, to this flak intelligence agency, and thence to the photo center. The worst hitch in this arrangement was that both headquarters and the central flak agency were closed at night while the photo center and our headquarters were usually busiest at that time. Fortunately the photo center was located close to our headquarters at High Wycombe and was easy to reach by telephone. Gradually we became well acquainted with several of the flak interpreters, and made a point of inviting them to our office to see how we filed, posted and used the products of their labor. They were surprised and delighted to find that we maintained a set of map overlays as carefully annotated and instantly available as theirs. Thereafter they were more than willing to assist us in any way possible.

Occasionally we had to plan missions against targets where for one reason or another we felt that a further check of our data was necessary. If this occurred during the day we could call the central flak agency direct, by special permission of Strategic Headquarters, which, I forgot to mention, did not actually maintain an operational flak office. If it occurred at night we had no alternative but to call the photo center. This practice sometimes led to minor international complications, for example: One evening Captain Slade called me from the photo center to announce that new photo cover of Blechammer, an oil target, revealed 88 new guns (previous number about 50). He was making a new overlay for the central flak agency and offered to send me a copy. I thanked him but declined the offer. About ten minutes later Major Marietta, who was on duty at the Operations conference, returned to our office to check the Blechammer overlay as it was being scheduled for attack the next day. We telephoned back to Slade and asked for the trace. It was in our office in less than an hour but meanwhile a message arrived from the 15th Air Force stating that they would attack Blechammer the next day. Of course we proceeded to cable the information on the 88 new guns to the 15th. The next morning an information copy of this cable was delivered to the officer responsible for flak at Strategic Headquarters and he called the central flak agency to find out why the cable had been sent. (Meanwhile due to a clerical error the new trace had not been delivered to the central flak agency.) Captain Slade, the hero and benefactor of the pilots and crews of the 8th and 15th Air Forces got chewed —out. This particular incident forced a much needed showdown. We frankly admitted being out of channels but our action had been so dead right that no one could logically challenge it. Afterwards, for information purposes, channels ceased to exist; however, we continued to make every reasonable effort to coordinate action between all interested and responsible parties.

I tell this story about the central flak agency to illustrate a point, not in criticism. Such a Theatre agency is absolutely necessary if flak intelligence is to be systematically handled and equally available to all air units. The central

flak agency did an excellent job frequently meeting deadlines and turning out heavy volumes of work under unfavorable conditions. It is however generally agreed by American flak officers who served in overseas Theatres that the central flak intelligence agency should be operational 24 hours a day and that it should be physically located adjacent to or actually within the agency which interprets the photos.

A Heavy Concentration of Fire

Unlike the American practice of siting no more than four heavy guns at a single position, the Germans frequently formed batteries of eight, twelve, sixteen and even more guns at a single position. The maximum number I know of was a thirty-six gun battery composed of three groups of twelve guns each. This practice became more and more pronounced as the war wore on and was also adopted by the Japanese in their homeland. It was never so popular with German field army flak as with the strategic defenses; however, eight- and twelve-gun field batteries were not uncommon in 1945.

This massing of guns was puzzling to American and British Intelligence alike. Several reasons for the large (gross) battery were advanced, none of which seemed to fit with other available intelligence. For example, some believed that German radar and director production had seriously lagged behind gun production. This theory failed to hold water because most of the multiple sites were clearly seen to be equipped with two or three radars and a similar number of directors all sited closely together usually near the geometrical center of the battery.

In Hamburg shortly after its surrender we talked at great length with General Woltz who commanded the Hamburg defenses and Colonel Ritter who commanded the Hanover flak defenses. These officers had an extremely simple explanation of the gross battery—in fact, it was so simple that we didn't believe it; however, I was impressed by their constant repetition of one phrase: "You must have a heavy concentration of fire." They denied the radar shortage; in fact, they explained that extra radars were in some instances used to track second and third targets so that the directors and guns could change targets without waiting for a radar to acquire a new target. A special data line switch box to accomplish this was standard equipment. A few battery commanders had a really excellent set-up. They formed two or more radar director teams and arranged the gun data lines so that all guns could fire from either radar director unit. In this way the whole battery could change targets time after time with only about 10 to 15 seconds slewing time from cease fire on one target to first round off on a new target. Fortunately this latter system was not widely used. The battery commander of one of the twin barrel, 128mm, flak tower batteries described it to us. Incidentally, those gun tubes had twenty-three victory stripes painted around them.

"You must have a heavy concentration of fire—your bombers are hard to shoot down—you must have a heavy concentration of fire." Those words have haunted me. At first I didn't believe it was a satisfactory explanation for putting a large number of guns in a single battery—but I believe it now! Why? Well, when range, shooting errors, and aircraft vulnerability are such that two or three thousand rounds are required to kill a target then the number of individual sighting operations is no longer of great importance. Spotting 72 four-gun units instead of, say, 16 firing positions of 18 guns each around a single city area is hardly warranted especially if you can switch all guns from target to target without losing radar acquisition and director settling time. Or, if desired, 2 or 3 targets can be engaged simultaneously by parts of the battery.

Children's Diseases

Soon after the allied armies crossed the Rhine and began their deep penetrations of Germany it became apparent that the European War was all but over. The 8th's operations began to slow down and finally ground to a virtual standstill. Actually there was so little information on just how far our troops had advanced that it was dangerous to bomb in many areas. At this time several teams of American AA officers headed by Colonel Marvin J. McKinney were making detailed area post-hostilities studies of German flak. We had worked closely with this group, as well as with Lt. Colonel R. A. Devereux who was then Flak Officer of United States Strategic Air Forces. There was an urgent requirement to evaluate our European flak experience so that any lessons learned could be applied to the Pacific war. It was also desirable to ascertain if possible the degree to which Germany and Japan had collaborated on new flak equipment. Devereux and I spent several weeks visiting the field teams, talking to POW's, examining equipment, checking 8th Air Force intelligence maps on the ground, and finally arranging a conference for all flak officers in the ETO. On these trips we usually traveled by air to our destination and jeeped back having taken the precaution of loading the jeep into a C-47 prior to our departure.

One of these trips took us through Jena, home of the famous Zeiss optical instruments works. There we talked with engineers and examined some newly assembled flak equipment. The most interesting item was a new experimental director which weighed about 250 pounds complete. It was so compact that it could be mounted on the stereoscopic height finder tripod without interfering with height finder operation. The scientist who designed this instrument wanted very much to have it field tested by our Ordnance Department and furthermore he wanted to go along with the instrument because said he, "It will develop children's diseases and only I will know how to cure them." The prospect of our using his new director against the Japs did not appear to concern him one way or another. As a matter of fact, we found little evidence of really effective cooperation between the Germans and Japs on flak matters.

An Indication of Targets?

The high security classification which surrounded future plans and our lists of targets to be bombed sometimes appeared to an experienced flak intelligence officer to be unnecessary. Of course the enemy was also very secretive about what had been bombed and how badly it had hurt his economy. Our strategic target committee and the German flak planners usually kept pretty well in phase, that is, if our target intelligence discovered something hot it was usually defended and if we started bombing a point or an industrial complex which hurt the enemy it was either de-

centralized as in the airframe business or it got additional allotments of guns. For example: The number of guns at Schweinfurt rose sharply after our first attack on the ball-bearing plants. In less than a year the number of defending guns on three large oil targets rose from 270 to over 1,000. Before VE-Day there were over 700 guns at one oil plant near Merseburg.

So far as I know the target intelligence group did not, as a rule, use changes in flak disposition as a criterion for target importance, however anyone who looks twice at an up-to-date flak map can prepare a fair sort of target priority list.

On one occasion we noted that 48 guns had been spotted within a very few days and for no apparent reason in a comparatively isolated area about 75 miles from Paris. These 48 guns were sited so that 12 were at each corner of a square whose sides were approximately a mile long.

That evening at the planning conference I described the new defense and suggested that we send about 50 to 100 aircraft after the center of the square to see what would happen. Of course no mission could be flown based on such sketchy evidence; however, the suggestion stirred up so much interest that about 10 days later my suggested MPI was number one on the priority list for targets of its kind —buzz-bombs. Actually it had been rather vaguely targeted for a long time but on a very low priority basis.

Immediately after it was rated number one priority, a morning mission was planned against it. The flak officer of the Air Division which got the job was a bit skeptical about those 48 guns. It just didn't look right to have so much artillery covering such an innocent looking landscape. Actually the target was a system of caves formerly used to age cheese but currently admirably located for buzz-bomb storage and assembly, for a railroad ran right alongside and a spur line ran to the cave entrance.

By mid-morning it was reported that the first mission, a small one, had not knocked out the target. Another larger mission from another Division was assigned the target for a late afternoon job. As soon as the first mission was back we relayed the flak experience data by telephone so that the second mission would know about what to expect. There had been some haphazard and inaccurate firing but on the whole nothing like what 48 guns should have done. With this news the second mission took off, relieved but cautious. Their caution paid dividends because this time the guns put on a good show. In fact, the damage rates were more consistent with what we expected from a hundred guns.

I think there are two explanations for this sort of thing; first, this defense had been sitting quietly for over two weeks probably not firing a shot and getting fat and lazy; secondly, they probably had explicit instructions not to fire before attack of their target was imminent for fear of giving away its location.

It has been my experience that other things being equal; i.e., weather, RCM, evasive action, etc., it is always more costly to hit a target the second time since you almost never achieve an appreciable degree of surprise. For that reason I favor sending a larger than barely adequate force on the first mission.

* * *

Services Agree On Reserve Retirement Amendments

A nondisability retirement plan which would enable Reservists and National Guardsmen to earn retirement pay in proportion to their contribution to the program has been submitted to the Senate Armed Services Committee.

The plan was recommended jointly by the armed services and their civilian components as a substitute for Title III of HR 2744, on which hearings began May 20. Details of the hearing are contained in the accompanying story.

The plan agreed upon would retain some of the House approved provisions, but virtually discards those provisions governing the accumulation of active duty credits for reserve retirement benefits.

If amended as recommended, the bill would read:

1. Reservists and National Guardsmen still would be required to perform not less than 20 years of service on extended active duty or in a reserve status, or a combination of both.

2. In order for a year of service to be considered as satisfactory, not less than 50 points would have to be accumulated, as follows, during each twelve-month period.
   (a) For each prescribed drill or period of equivalent instruction—1 point.
   (b) For membership in a reserve component—15 points.

3. Not more than 60 points may be accumulated annually in the above manner. However, Reserves also will receive full credit for each full day of duty, whether on extended active duty or in an encampment or cruise, under proper orders.

4. Any number of points less than 50 accumulated during a given year would count for pay purposes, but the year would not count for retirement purposes.

5. Past Regular service would count 360 points annually; Past Reserve service 50 points annually, regardless of the extent of participation in the Reserve.

6. Each year of Reserve service prior to enactment of the bill shall be considered a year of satisfactory service.

7. Retirement pay, upon reaching the age 60, would be determined by dividing 360 into the total number of points credited to a Reservist, and multiplying the resultant figure by 2½ per cent of the base pay and longevity of the highest rank in which he served.

8. No person who was a member of a reserve component on August 15, 1945, will be eligible for Reserve retirement benefits unless he performed active Federal service during any portion of either of the two periods beginning April 16, 1917, and ending November 11, 1918, and beginning September 9, 1940, and ending December 31, 1946.

A proposal to compensate Reserves with a lump sum bonus after 20 years service, and upon reaching 45 years of age, was considered by the conferees but was rejected.

CANADIAN-AMERICAN COOPERATION

By Colonel Robert J. Wood, CAC

"I give to you assurance that the people of the United States will not stand idly by if domination of Canadian soil is threatened. . . ."

—President Roosevelt at Kingston, Ontario, 18 August 1938.

"We too have our obligations as a good friendly neighbor, and one of these is to see that . . . enemy forces should not be able to pursue their way, either by land, sea, or air, to the United States across Canadian territory."

—Prime Minister King in reply, Woodbridge, Ontario, 20 August 1938.

✓ ✓ ✓

Cooperation between the two similar peoples of northern North America has been an accepted fact for many years. Certainly long before the enunciation of the ringing statements quoted above, lesser speakers on both sides of the border have been fond of waving one or both flags and making reference to the common ties, the lack of serious arguments, the complete understanding existing between the two countries. To support the case they cite, among other facts, the 5400-mile (including the Alaska-Canada boundary) of undefended frontier.

Such a happy circumstance has not always been so, as a brief examination of history will readily show.

Perhaps a classic example which might be mentioned at once is the action of the Continental Congress in 1774 when it invited the Canadian colonies to send delgates, but accompanied this invitation with a threat to treat Canadians as foes if they didn't accept!

Little wonder that the Canadians were inclined to say: "Who do these people think they are?" Admittedly, this is still a recurring question in some Canadian minds.

Our own histories tell us of attempted American invasion of Canada in both the Revolutionary War and the War of 1812. The first siege of Quebec, in 1776, was a badly bungled job from both sides. The American forces might have obtained some help from the French Canadians, but our military operations and the attitude of our troops were both so immature that the French Canadians were alienated despite Lafayette's presence in America and the psychological warfare effort of a French admiral who proclaimed: *"Vous êtes nés français; vous n'avez pas cessé de l'être."*

On the other hand, Governor Carleton of Canada moved so slowly that he allowed the American forces to escape from a well-laid trap at Montreal and reassemble to defeat Burgoyne at Saratoga the following year.

After the Revolution, there was a considerable influx of "Loyalists"—as English and Canadian histories call them—(to us, they were "Tory Die-Hards") into Canada. This caused a continuation of bad feeling between the Canadian colonies and the new United States. Other factors contributed to prevent the early arrival of peace and happiness along the border. The British failed to evacuate promptly interior garrisons such as those at Detroit and Niagara. The Indians attempted to play off one country against the other.

Then came the War of 1812. Again, American troops muffed operations against Canada. This time they marched in assuming that they would be accepted as "liberators," whereas they were in fact promptly opposed as invaders. About the only successes of which the U.S. can be proud —at least in this area—were the naval battles on Lake Erie.

However, the war did cut the growing infiltration into Upper Canada which was reinforcing anti-American prejudice in the Canadian colonies and paved the way for the now famous Rush-Bagot Agreement of 1817. This agreement established the boundary along the 49° parallel from the Great Lakes to the Rocky Mountains and, perhaps more important, contained the provision prohibiting naval vessels on the Great Lakes. This was subsequently expanded into the "no fortification" clause which has never been broken and which, admittedly, is a very basic reason for Canadian-American mutual understanding and friendship.

Complete sweetness and light were still to come, however. The "Fifty-Four Forty or Fight" business had to be gone through before the boundary was extended to the coast by the Oregon Treaty of 1846.

In the Fifties, American farmers became infiltrators, this time working up the Red River valley and into Saskatchewan. However, this problem was ended by the arrival of the American Civil War which turned northern U.S. thoughts and efforts elsewhere.

After the Civil War, there was some bitterness in the United States due to England's sympathy for the South, and 1866 saw the efforts of the Fenians to stir up an invasion of Canada. Happily, it fell through.

Fishing, fisheries and sealing represent another field in which Canada and the United States have had misunderstandings and disagreements which, to the people of the day, reached rather alarming proportions but which are now happily settled. On the Atlantic coast, major problems were settled by 1871 but, in the Pacific, troubles went on for a longer period, involving both the Russians and the Japanese.

Russia was principally interested in furs—sea otter, seals, foxes, and sea cows. From the time the Cossacks first reached the Pacific coast in 1697, Russian exploitation be-

came the rule rather than the exception. By 1867, when the United States purchased Alaska, sea otter and foxes had been almost wiped out, most of the sea cows were destroyed, and only the fogs of the Pribilof Islands saved the seals from extinction.

To combat Russian freebooters, Congress, in 1870, passed a law regulating the killing of seals on the islands and prohibiting "pelagic" sealing (the shooting of seals in the open sea). Canada, somewhat annoyed at the U.S. purchase of Alaska, became more annoyed at U.S. laws presumably effective on the high seas. This annoyance erupted understandably with a crescendo when, in 1886, the United States seized a Canadian vessel allegedly engaged in pelagic sealing.

The succeeding few years of puffing and blowing has been dignified by the label: "The Bering Sea Controversy." It was settled amicably by the Agreement of 1892. Canada, in return for outlawing pelagic sealing, was given a percentage of the controlled catch. In 1910, the United States took over the rookeries and industry of the Pribilof Islands and, in 1911, Russia, Japan, Great Britain (for Canada) and the United States signed the "North Pacific Sealing Convention." Russia took jurisdiction over the seal rookeries on the Komandorski (Commander) Islands. Japan and Canada were each allotted fifteen per cent of the annual catch.[1] In 1944, the Bering Sea herd, which had fallen to 130,000 in 1910, was estimated at 3,000,000. The 1947 "controlled catch" of 61,600 pelts was worth some $3,700,000.[2]

As to Pacific fishing, 60% of the world's halibut comes from North Pacific waters and 55% of the world's salmon —both are fish much in demand in the world market. Unrestricted fishing had, by the end of World War I, grown to such proportions as to cause a series of Canadian-American incidents which culminated in a demand for international conservation. The catch of halibut, for example, on the banks south of Cape Spencer, Alaska, had decreased from 60 million pounds per year to less than 25 million. After several false starts and many disappointments, a treaty was signed in 1924 setting up the Canadian-United States Fisheries Commission of four members, two from each country, to investigate conditions. By a subsequent convention, as late as 1930, the Commission was empowered to promulgate regulations for management of the halibut fisheries.

The salmon problem, which arose chiefly in the Columbia and Fraser Rivers, took longer to settle but, eventually, in 1937, the International Pacific Salmon Fisheries Commission was created by treaty and set about to restore the industry which by then had fallen from a 30-million-dollar to a 3-million-dollar annual level.

The above summary has been set forth entirely to show: *a* That the course of true love between Canada and the United States has not been without its quarrels, but *b*, That agreements have been reached with something less than the bombast accompanying current exhibitions on the larger international scene and with a maximum of understanding.

No attempt has been made to make this summary complete. Mention could be made of the establishment of the International Joint Commission (1909), the establishment of the Joint Economic and other similar committees during World War II, or even the "Gentlemen's Agreement on the Red Cedar Shingle Industry" in the Canada-United States Trade Treaty of 1935. Or, among current problems not yet solved could be mentioned the Canadian dollar shortage which, of course, is part of a world problem. The above, however, should serve our purposes without unnecessarily laboring the point.

We will consider now some instances of mutual cooperation and collaboration which arose, not out of disagreement but, quite the contrary, out of full agreement as to the mutual responsibility of Canada and the United States for the security of the northern portion of the Western Hemisphere.

Someone has pointed out that Canadians spend so much time protesting to the British that they are not Americans and protesting to the Americans that they are not British that they have precious little time left to be Canadians. This is something less than true. The Canadians, both English- and French-speaking, have a strong love for Canada and are very proud of their sovereignty. On the other hand, they realize that their lot, in any future conflict, gives them a dual responsibility—that of being a member of the British Commonwealth and that of being a partner with the United States. In the latter capacity, Canadians are probably quicker than any other people to defend Americans against outsiders but they also reserve the right to be the first to criticize at home. A Canadian writer puts it this way:

"Canadians have never been daunted by the power and size of the United States and have never felt inferior to their mighty neighbor. They have never begged or borrowed from her, and alone among the nations at the present time, they regard the United States without resentment and without envy. In fact, Canadians think about the United States much as a farmer thinks about the weather. The farmer knows he can do nothing to change or influence the seasons, but he also knows that his existence depends on his ability to estimate what they are going to do."[3]

Until World War II, Canada's defense problems were limited to questions arising from her position as part of the British Commonwealth. Canadian soldiers fought in Egypt and the Sudan in 1882, in the Boer War in 1899 and in the first World War in France. Canada's territory was not attacked in World War II but, from the outset, Canada recognized that this was a fight in which her vital interests were involved. By act of her own Parliament, on the all but unanimous vote of its members, she entered the war on 10 September 1939. Before the war was over, Canada had mobilized over a million men and women, had shipped five divisions overseas, and had suffered 95,000 casualties. This, remember, is a nation of slightly over 12 million people, about the population of New York State. She had also operated the British Commonwealth Air Training Plan which, from December 1939 to the end of the war, trained

[1] In October 1941, six weeks before Pearl Harbor, Japan abrogated the agreement. Canada and the U.S. now split Japan's share. General MacArthur has prohibited Japanese sealing and fishing in the Eastern Pacific.

[2] New York *Times*, 19 October 1947.

[3] Hugh MacLennan, "Canada for the Canadians" *Vogue* Magazine, 15 May 1947. Copyright 1947, The Condé Nast Publications, Inc.

approximately 130,000 air crew members for British and Dominion Air Forces.[4]

The Royal Canadian Navy, increasing from less than 2000 officers and men in 1939 to more than 100,000 before the end of the war, took part in the Aleutian and Mediterranean Campaigns and, by the later stages of the war, was undertaking the major portion of the close escort of Canada-U.S.-British convoy work in the North Atlantic. Army expansion, during the same period, was from less than 5000 to more than 700,000; that of the RCAF from about 3000 to some 250,000.

As the European war drew to a close, Canada volunteered to organize a force of some 75,000 to participate with American forces in the final campaigns against Japan. By July, 1945, over 150,000 personnel had volunteered for this service. Plans, which were well under way to form this force and organize and equip it along U.S. lines, were abandoned when Japan surrendered.

An unusual Canadian-American venture was the First Special Service Force, an organization of something less than 1000 Canadian and American selected volunteers, originally conceived by President Roosevelt and Prime Minister Churchill for operations in Norway. This unit, commanded by a Coast Artillery officer, Colonel (now Major General) Robert T. Frederick, was trained in amphibious, paratroop and commando tactics, and saw service in the Aleutians and later in the Meditteranean, including the battle at Anzio and the invasion of Southern France.

Prior to United States entry into the war, over 12,000 U.S. citizens joined the Canadian armed forces; subsequent to U.S. entry, some 26,000 Canadians joined the U.S. armed forces.

Also, prior to U.S. entry, the U.S. and Canada had constructed air and naval bases in Newfoundland for North Atlantic defense. (Newfoundland was the first of the "destroyer deal" bases garrisoned by U.S. troops, January, 1941.) The U.S. had transferred to Canada, aircraft, antiaircraft and seacoast guns for defense of Newfoundland and the Maritime Provinces. The U.S. and Canada had initiated surveys and preparations for a series of airfields to constitute an air route to Alaska for short-range planes (the Northwest Staging Route) and for a ferry route from the Great Lakes area, across Hudson Bay and Labrador, to Greenland and beyond (the "Crimson" Route).

The speeches by President Roosevelt and Prime Minister King which were quoted at the beginning of this article were the first announcements of Canadian-American cooperation for security of the northern portion of the Western Hemisphere. As such, they were the inspiration for subsequent cooperative action. These speeches were also the background for the joint statement by the President and the Prime Minister made at Ogdensburg, New York, 17 August 1940, which, known later as the "Ogdensburg Agreement," became the charter of the Permanent Joint Board on Defense, Canada-U.S. This Board became the clearinghouse for nearly all military contacts between the two countries. Practically all of the cooperative measures indicated above were taken as a result of its recommendations.

[4]The figures in this, and the next two paragraphs are from "Canada's Defense," a pamphlet by Canadian Dept. of National Defense, 1947.

The "Ogdensburg Agreement" was brief and to the point, It is quoted here in full from a White House press release dated 18 August 1940:

"The Prime Minister and the President have discussed the mutual problems of defense in relation to the safety of Canada and the United States.

"It has been agreed that a Permanent Joint Board on Defense shall be set up at once by the two countries.

"This Permanent Joint Board on Defense shall commence immediate studies relating to sea, land, and air problems, including personnel and material.

"It will consider in the broad sense the defense of the northern half of the Western Hemisphere.

"The Permanent Joint Board on Defense will consist of four or five members from each country, most of them from the services. It will meet shortly."

The PJBD, as it came to be called, had its first meeting on 26 August 1940. It has met regularly since that date. The originators advisedly inserted the word "permanent" in its title.[5]

Immediately after its formation, the PJBD assumed, as its principal task, the formulation of plans for the defense of North America. It is not possible to describe those plans here but as typical of the measures later recommended by the Board there may be mentioned the Alcan Highway.

The construction of the air staging route to Alaska presented a problem of supply which could be solved effectively only by the building of a road. Such a road would have the additional advantage of being a land route to Alaska from the United States in case of need. The Alcan Highway, which the PJBD recommended, was built by U.S. Army engineers and Canadian and American contractors with phenomenal speed in the remarkably short period of six months. It was opened to traffic in October 1942.

Since the end of the war, Canada has taken over maintenance of the Highway and the air staging route, purchasing the U.S. construction of airfields for $76,000,000.

Summarizing, the Permanent Joint Board on Defense was founded by President Roosevelt and Prime Minister King at Ogdensburg, New York, on 17 August 1940. During World War II, it served as the Canadian-American agency through which military activities of the two countries incident to the security of the northern half of the Western Hemisphere were coordinated.

As the period of immediate postwar demobilization, into which both Canada and the United States rushed headlong, drew to a close, it became evident to political and military observers alike that plans should be made for the future defense of the two countries. Even before Russia's intransigent attitude was revealed in the United Nations and the insidious infiltration of Communism became an accepted fact, it was apparent that such things as long-range aircraft, guided missiles, biological warfare and the atomic bomb would change the probable character of the next war.

In the past, North America has been comparatively immune from heavy attack by a hostile power due to geographical barriers created by the Atlantic and Pacific Oceans and

[5]The membership has of course varied during its composition. The original U.S. membership was: Mr. F. H. LaGuardia; Capt. (now V. Adm.) Harry Hill, USN; Maj. Gen. (now Lt. Gen., Retd.) S. D. Embick, USA; Mr. J. D. Hickerson; Cmdr. (now V. Adm.) F. P. Sherman, USN; Lt. Col. (now Gen.) J. T. McNarney, USAF.

the frozen wastes of the Arctic. Technical developments in the art of warfare occasioned by scientific progress have lessened this immunity and portend that it will diminish progressively in the future.

Again, the ability of allies in every past conflict to absorb the first major attacks and thereby give Canada and the United States a "cushion of time" in which to mobilize the industrial and manpower resources of the two countries may well be no longer with us. The capabilities of known and contemplated modern weapons, in the hands of potential enemies, would make it possible for North Ameria, whose great latent strength has proved the decisive factor in the last two wars, to be hit *first* and perhaps eliminated from the conflict. Indeed, it is not too much to draw the conclusion that any nation determined upon world aggression *must* first destroy or seriously cripple the industrial capacity and the will to fight of Canada and the United States.

After V-J Day, therefore, the PJBD returned to careful consideration of peacetime steps which might be taken to ensure integration of the military effort of the two countries in the event of aggression against the northern part of the Western Hemisphere. Based on recommendations submitted by the Board, the governments of Canada and the United States released a statement to the press on 12 February 1947. The following are pertinent extracts:

". . . In the interest of efficiency and economy, each Government has decided that its national defense establishment shall, to the extent authorized by law, continue to collaborate for peacetime joint security purposes. The collaboration will . . . be based on the following principles:

"1. Interchange of selected individuals so as to increase the familiarity of each country's defense establishment with that of the other country.

"2. General cooperation and exchange of observers in connection with exercises and with the development and tests of material of common interest.

"3. Encouragement of common designs and standards in arms, equipment, organization, methods of training and new developments. . . .

"4. Mutual and reciprocal availability of military, naval, and air facilities in each country; . . .

"5. As an underlying principle all cooperative arrangements will be without impairment of the control of either country over all activities in its territory.

"While in this, as in many matters of mutual concern, there is an identity of view and interest between the two countries, the decision of each has been taken independently in continuation of the practice developed since the establishment of the Joint Defense Board in 1940. No treaty, executive agreement or contractual obligation has been entered into. Each country shall determine the extent of its practical collaboration in respect of each and all of the foregoing principles. Either country may at any time discontinue collaboration on any or all of them. Neither country will take any action inconsistent with the Charter of the United Nations.

"The Charter remains the cornerstone of the foreign policy of each.

"An important element in the decision of each government to authorize continued collaboration was the conviction on the part of each that in this way their obligations under the Charter of the United Nations could be fulfilled more effectively. Both governments believe that this decision is a contribution to the stability of the world and to the establishment through the United Nations of an effective system of world-wide security. With this in mind, each government has sent a copy of this statement to the Secretary General of the United Nations for circulation to all its members. . . ."

As partial implementation of the policies set forth in the above statement, interchange of Canadian and U.S. officers, which had been initiated as far back as February 1946, has been continued and expanded. A long-term project, looking forward to encouragement of common designs and standards, has been undertaken, and the participation of Canadians in the development of the atomic bomb is well known. Observers from each country have taken part in tests and exercises held by the other.

In this latter category, American observers accompanied the Canadian maneuver "Musk-Ox." This non-tactical movement of ten snowmobiles was held from 14 February 1946 to 5 May 1946, and was designed to test maintenance of a mechanized force under cold weather conditions. The force proceeded from Churchill on Hudson Bay to Victoria Island, thence to Coppermine, to Port Radium on Great Bear Lake, across the ice of the lake to Fort Norman, thence to Fort Simpson, to Fort Nelson, and down to Edmonton via the Alcan Highway. Air forces participated and tested air-ground communications and cooperation and navigation and air supply.

As is well known, the United States armed forces are constantly conducting cold weather tests in Alaska. Not so well known is the Canadian testing station at Churchill, Manitoba at which the U.S. maintains a detachment. Tests at Churchill have included artillery, signal and engineering equipment, clothing, rockets and tracked and wheeled vehicles. This locality offers a severe dry Arctic climate and a longer daylight working day than Fairbanks. It is also directly connected with the U.S. by rail which facilitates travel and transportation costs.

Continued friendly relations between Canada and the continued functioning of the Permanent Joint Board on Defense were underlined by President Truman in his speech to the Canadian Parliament, 11 June 1947, when he said, in part:

"We have had a number of problems, but they have all been settled by adjustment, by compromise, and by negotiations inspired by a spirit of mutual respect and a desire for justice on both sides. This is the peaceful way, the sensible way, and the fair way to settle problems, whether between two nations that are close neighbors or among many nations widely separated.

"This way is open to all. We in Canada and the United States are justifiably proud of our joint record, but we claim no monopoly on the formula.

"Canada and the United States will gladly share the formula which rejects distrust and suspicion in favor of common sense, mutual respect, and equal justice, with their fellow members of the United Nations. One of the most effective contributions which our two countries can make to the cause of the United Nations is the patient and dili-

gent effort to apply on a global scale the principles and practices which we have tested with success on this continent.

"The Permanent Joint Board on Defense will continue to function. I wish to emphasize, in addition to the word 'permanent,' the other two parts of the title. The Board is joint, being composed of representatives of each country. Canada and the United States participate on the basis of equality, and the sovereignty of each is carefully respected. This was true during the gravest days of the war and it will continue to be true, in keeping with the nature of all our joint undertakings.

"The Board was created, and will continue to exist, for the sole purpose of assuring the most effective defense of North America. . . . The record of the Board provides another example of the truly cooperative spirit that prevails between the two countries.

"The spirit of common purpose and the impressive strength which we marshalled for action on all fronts are the surest safeguard of continental security in the future."

From a Canadian military "elder statesman," General A. L. McNaughton (Retired), senior Canadian member of the PJBD, Canadian representative on the United Nations Security Council and Atomic Energy Commission, comes the statement, made in a lecture given in New York, 1 October 1947:

"I can report to this audience that eminently satisfactory progress is being made in developing cooperation between our respective armed forces for the defense of this continent in accordance with the joint announcement issued by our governments last February.

"I think you will agree that these arrangements are of great importance, both because of the positive measures which have been established between our respective armed forces and for the mutual and reciprocal availability of military, naval and air facilities in each country which were announced. . . ."

As was pointed out earlier, Canadian-American relations have come a long way since that day in 1774 when the Continental Congress threatened to shoot if the Canadians didn't play ball. It augurs well for the future that these two democracies have put their faith in mutual understanding and mutual cooperation for the common good.

General Lutes Welcomes USMA Graduates To CAC

The following letter was recently written, by Lieutenant General LeR. Lutes, President of the United States Coast Artillery Association, to graduating Cadets of the United States Military Academy who are being commissioned in the Coast Artillery Corps:

"I desire to welcome you to the Coast Artillery Corps, one of the oldest branches of the service and one that has served our country with glory and distinction in every emergency.

"It was the Coast Artillery Corps and the Ordnance Department that developed, in prewar years, the antiaircraft weapons, matériel and techniques which so successfully, in World War II, met the best air weapons our ingenious enemies had devised to throw against them. Not until the decisive stages of the war had been passed did we encounter new enemy weapons which made apparent our need for something new. Guided missiles seem to offer the best possibility for solutions to our many new problems and we are most anxious to demonstrate once again our capacity for development in this new field.

"I look with complete assurance towards the future of the entire Service and certainly can be nothing but optimistic about the contribution the Coast Artillery Corps is destined to make.

"The guided missile is one of the most important weapons emerging from the recent conflict. Even now it exists in a bewildering variety of forms with unlimited potentialities. One of its primary purposes undoubtedly will be the destruction of enemy long-range rockets in flight. We believe this must be an AA mission requiring a special AA missile of short range and of greater velocity than any other missile.

"Launching, propulsion, guiding and control, warheads and acrodynamics are the main scientific fields pertaining to the guided missile. Consequently it behooves all antiaircraftmen to become familiar with these subjects as they apply to the weapon at hand. To accomplish this, the Coast Artillery Journal enlists the services of the foremost authorities in the United States. The attached recapitulation of Journal guided missile articles is adequate proof of the success so far enjoyed in this program.

"Although the guided missile is the weapon of the future, I do not visualize it replacing our conventional antiaircraft artillery but rather augmenting it as another one of the variety of weapons which we of the Corps shall utilize.

"As a result, the editorial policy of the Journal consists of publishing all pertinent information on conventional antiaircraft artillery, 'surface to air' guided missiles and seacoast artillery.

"As President of the United States Coast Artillery Association, I would like to appeal to you to establish your military relationship by joining the Association. There is no membership charge unless a subscription to the Coast Artillery Journal is desired. The charge for this bimonthly publication is $3.00 annually.

"Although we feel the Journal most worthwhile, please do not be deterred from joining the Association simply because you do not wish to subscribe to the Journal. Applications for membership may be forwarded to the Coast Artillery Journal, 631 Pennsylvania Avenue, N.W., Washington 4, D. C.

"In closing, I wish you a long and successful career in your chosen profession which now, more than ever before, offers unparalleled opportunities to young officers."

Sincerely yours,

LeR. Lutes
Lieutenant General, USA
President.

Trends In Guided Missiles*

By Lieutenant Colonel William L. Clay, Ord.

Perhaps the most difficult problem encountered in the guided-missile program is the development of suitable means of guidance and control. The amount of control to be employed may be varied considerably, ranging from complete control throughout the flight to merely initial control at the launching site. Several basic systems may be used:

Preset Controls

Perhaps the simplest method of control was employed in missiles such as the German V1 and V2 which were guided by autopilots set before launching. In the case of the V2, gyroscopes were used to actuate the external control fins and the control vanes in the jet stream so that the missile would follow a predetermined trajectory. Fuel cutoff was also accomplished by a gyroscope when the missile reached a velocity sufficient to carry it on a free flight path to the target.

In this system there is no control after launching, and consequently the accuracy depends on the precision with which the gyro sets the speed and angle of pitch. This system is capable of much improvement since its present accuracy is approximately four per cent of the range.

Remote Control by Human Pilot

The use of remote human control may be employed in several ways for guiding an air-to-ground missile. The simplest application is to provide an operator who can view the missile and the target simultaneously and, by using radio control, guide the missile to the target. This method is obviously limited to daytime employment under good visibility conditions.

The range of the preceding system may be extended considerably by placing a television transmitter in the missile which broadcasts to the human operator what the missile "sees." This modification is still limited to daytime operation and good visibility.

The final step in this system is to use automatic radar control in place of television.

Automatic Homing Control

Missiles which automatically seek out a target appear practical from the standpoint of engineering problems. Three types of targets capable of being attacked would be those which emitted either heat, light, or radio waves.

In general, however, all missiles with homing types of control are probably limited in range due to the uncertain element of human judgment in target selection.

Long-Range Control

The control of long-range missiles becomes extremely complicated by the equipment required both on the ground and in the missile. Several possibilities are available, but many technical and engineering problems must be overcome before they can be successfully applied. Several of the possible systems can be described briefly:

(1) Command Guidance.—This method would employ two radars—one tracking the target and the other tracking the missile—both feeding position data to a computer. The computer would calculate steering orders which would be transmitted to the missile to ensure a collision course even when the target took evasive action.

(2) Beam Rider.—The beam-rider system would employ a radar set to track the target and control equipment in the missile which would guide the missile along the radar beam. A homing device would probably be included in the missile to take control at the end of the flight.

The command and beam-riding systems would be applicable in controlling ground-to-air missiles. However, in order to achieve the fire-control accuracy required for destruction of the target, microwave tracking radar sets which operate on the optical line-of-sight principle must be employed, thereby limiting the horizontal range over which control of the missiles can be exercised.

(3) Navigational System.—Radio navigational systems must employ long wave lengths in order to send signals around the curvature of the earth, thus immediately limiting the accuracy of such a system. The use of celestial navigation may perhaps be the most practical solution to the problem of long-range control.

It is apparent that we have a long way to go before we can produce an efficient long-range guided missile.

*Extracted with permission from the article of the same title which appeared in the November-December 1947 issue of *Ordnance*.

RADAR PLANNING DEVICE

By Lieutenant Colonel Leonard M. Orman, CAC

Light waves offer a convenient analogy to radar, and terrain models can reproduce at a conveniently reduced scale, the best available information on terrain. It is logical, therefore, to bring the two together to study the effect of terrain on radar coverage.

The Radar Planning Device (usually called simply RPD) is effective because of its direct and simple approach to a complex problem. Properly used, it reduces the amount of time necessary for prediction of radar coverage and gives effective assistance in numerous applications to radar problems.

Briefly stated, the procedure is as follows:

Place a point source of light on a model, at the assumed position of the radar, substituting light waves for radar waves.

Study the lights and shadows.

The illuminated areas are those that will return signals, showing on the scope as ground clutter.

The shadows are the areas of either radar shadow or no signal return.

Further testing will show whether these shadows are shallow, or whether they would permit an airplane to avoid detection in their depths.

The over-all vertical view of the model, thus illuminated, shows the nature of the terrain's effect on radar installed at this point.

Some uses to which this device can be put are:

SITING, or locating your own radar in the most advantageous position for intercepting aircraft or surface vessels.

EVASION, when used with your own locations, tells the most likely avenue of approach of enemy craft. When this procedure is used to analyze enemy radar installations, routes which offer minimum chance of detection may be determined.

TRAINING, to present visually the effects of terrain on radar coverage.

Landfall and navigation, while not of primary interest to the artilleryman, are of interest to all craft, both airborne and surface, since radar operators may become familiar with the radar scope pictures to be expected in an area before they enter unfamiliar locales.

Method of Operation

Equipment Used

The RPD was developed and is issued by the U. S. Navy. All parts of it are simple in construction and operation and, in the absence of standard parts, may be constructed in the field.*

*After exhaustive inquiries, we have ascertained that none are available for issue, so it will be necessary to improvise in accordance with the author's explanation.—Editor.

The heart of the method is simply a strong, compact flexible tripod carrying a light source. The tripod serves to retain the light at any chosen point on the irregular surface of a terrain model. Batteries may be used to power the light in the absence of a standard electrical circuit. The light bulb is the smallest practicable light source available. The filament of the bulb represents a radar antenna, and portions of the terrain model which are directly illuminated by this filament (no matter how dimly) represent regions that will cause ground clutter or permanent echoes on the radar scope. Vertical thickness of the shadow above a given point on the model represents, to scale, the thickness of the radar shadow above the corresponding point on the ground. The filament in the bulb issued is 1/16 inch from the end of the bulb, and this factor must be kept in mind when analyzing locations. Depending upon the vertical scale of the model, different heights of radar antennas will be simulated with the end of the bulb just touching the model. If this height is too great, it will be necessary to drill a hole or lower the bulb below the surface of the model at the desired point in some fashion until the filament is the correct height, to scale, above the surface of the model. An adjustable leg is provided on the RPD to enable the bulb to be located at heights above the model surface to simulate airborne antennas.

After having determined the extent of ground clutter, it only remains necessary to probe the depth of the shadowed regions to determine the depth and extent of shadow. Evasion indicator pins are used for this purpose. These pins are merely stiff wires with sharpened ends, on which are mounted movable nickel-plated beads. Light reflected from the bead "winks out" when the bead is lowered to the edge of the shadow. This provides the third dimension in determination of radar coverage.

A terrain model is the most necessary piece of apparatus used in conjunction with the RPD. A terrain model is the sum total of all available topographic information, forming an accurate miniature of the terrain to be investigated. Terrain models are constructed from various sources including navigational charts, topographical maps, photo reconnaissance, and other intelligence. Models for use with the RPD require little man-made detail, and do not require coloring. They must be constructed of materials not subject to warping, distortion due to flexibility, or shrinkage.

Since the filament represents the radar antenna, it is necessary that the vertical scale of the model be chosen so that the distance from the end of the bulb to the filament does not represent an excessive antenna height in feet. Vertical scale of the contour model of 1=24,000 or larger has been found practical for ground and ship applications. Models to be used for airborne application are not limited in reference to scale. This filament distance limits only the vertical scale; while the horizontal scale is limited only by

the over-all dimensions of the model; consequently, vertical exaggeration is frequently necessary to facilitate accuracy in model construction and shadow determination.

Operation

After the RPD has been assembled, it should be placed on the terrain model, and the tripod legs adjusted to support the bulb solidly and at the desired point. The bulb filament must be at exactly the point occupied by the radar antenna, with respect to the vertical scale of the terrain.

With the RPD in place on the terrain model, and the light turned on, the radar coverage at a particular site can be determined visually by remembering that areas in shadow represent either regions of no radar coverage, if the airplane is below the shadow limit, or regions of detection if the airplane is above the shadow. The distinction between these two cases follows. Areas touched by the light are areas of ground clutter.

Given a definite location for the radar antenna, and consequently the RPD bulb, the radar coverage can be plotted in three dimensions by using Evasion Indicator pins.

The extent of ground clutter becomes plainly visible as the region that is lighted by the RPD. It only remains to probe the depth of the shadowed regions to complete the radar coverage picture. Place a pin in the model at the points where information is desired, lower the pin until the bead winks out and the depth of shadow is thus determined. A few minutes spent in gauging shadows in this way, and in observation of the ground clutter, will provide a good estimate of the character and effectiveness of the coverage as well as an indication of the appearance of the terrain when scanned with a radar beam.

To make the coverage study complete and graphic, the sliding beads on the pins can be pushed down to the lower limit of the radar coverage to form an envelope. In a region of ground clutter, there is virtually no radar coverage at any altitude, so the beads are pulled to the top of the pins to indicate this condition.

Most fire-control radar antennas can be tilted upward until ground clutter disappears. Under these conditions low-flying planes cannot be detected; in practice therefore most radar searching is done with the beam horizontal. Planes flying low over ground clutter are safe from detection by ordinary beam tilting equipment.

Once all pins have been adjusted, the completeness of the radar coverage at the particular site and under the conditions of antenna altitude, becomes visible. It is also possible to use map pins or tacks to replace EI pins in areas of good coverage and to outline shadows extending out over the sea.

In the absence of a map conversion scale, height can be determined by measuring, from a sea level or zero altitude point on the map, the perpendicular distance to the desired point in inches. By converting this measurement to the vertical scale of the model, the desired altitude can be found.

Multiple Radar Installations

Two or more radars can frequently be sited to give a combined coverage which is far superior to that obtainable from any one site. If more than one radar installation is located in a particular locality, and it is desired to determine the combined coverage, the basic method is employed as follows.

The RPD is first centered at the location of the first site, the pins are placed to cover the critical areas and the beads adjusted for the radar coverage of site A. The RPD is then moved to site B. Those beads which now reflect light are adjusted downward until they are again at the edge of the shadow. Beads which are buried in shadow with the RPD at site B, or which are now located in ground clutter areas are not changed. If there are more than two radars, the process is continued for the additional sites, and final results indicate the combined coverage of all the radars.

Remember—as a word of caution—reflecting beads are adjusted downward; beads in shadow are *not* changed.

PPI Simulation

PPI scope images can be simulated simply by an accurate photographic method to provide a permanent record of the results of the RPD study. PPI simulations are of great help in providing dependable reference pictures for comparison with PPI scope images. Since the simulations can be accurate scope representations it is possible for the operator to learn to recognize land forms in the distorted images produced on a PPI scope. Obviously, PPI simulations can be used for landfall determination and navigation, both airborne and surface, for briefing and for training. When making these photographs, care must be exercised that the RPD is the only light source in the room. A compass rose may be added to the positive print to obtain an effect like that of the PPI scope.

Application

Only the most evident applications of the RPD are covered here. There are undoubtedly many others which will be discovered as the device comes into increasing use. The use of the RPD should always be attended by a radar officer. It is obvious, from the information presented here, that the factors influencing the use of the RPD are many and varied. In addition, the operation should be supervised by an officer who understands the applications of the RPD. These precautions will insure reliable results that take cognizance of the potentialities and limitations of the method.

Siting

The problem involved in siting is to choose a location for the radar transmitter which provides maximum radar coverage and is relatively free from ground clutter. Frequently choice of a site must be made in advance, sometimes when the enemy is still in possession of the territory, and a choice must be accurate enough so costly mistakes will not occur. In the past, siting has often been a hit-or-miss proposition dependent upon many unknown factors. Scientific methods of determining radar coverage involved the drawing of profiles and constructing coverage diagrams from them. Applications of this method involve laborious drawing for each site to be considered and introduce involved calculations, thus limiting the number of locations that can be tested conveniently. The RPD solution offers a quick and convenient method of testing many locations.

By applying the principles and method previously de-

scribed, the RPD method of solution of a siting problem is to study the terrain in miniature, to test shadow depths and to search for locations which give minimum ground clutter.

Siting is one of the most complex radar problems encountered in the field. While it is possible to determine the ideal location after a considerable length of time spent in drawing profiles and performing calculations, speed and facility are the most urgent requirements in the field. Once a terrain model is procured for the area under consideration any number of sites may be tested quickly with the RPD.

It is obvious that the ideal radar site is one in which the lower edge of the beam skims close to the ground without returning an echo from it; this eliminates ground clutter and still allows low-flying airplanes to be picked up. In addition, the radar should be situated so areas of deep shadow, in which approaching airplanes could not be detected, are minimized.

In experienced hands, observation with the RPD of the general character of the coverage from a given site can be quickly determined, and the observer can see at once how the site should be changed to improve coverage. After a short time spent in moving the light from one possible site to another, it will become apparent that some locations are superior to others with respect to the coverage afforded. Inferior areas are eliminated at once and the possibilities narrowed down to three or four particular sites. These should be more carefully studied, using EI pins and taking into account any special considerations involved, such as the impossibility of transporting heavy radar equipment to inaccessible points.

Where more than one radar is involved, the method previously described for examination of multiple radar installations is applied.

Radar coverage at a particular site may be recorded for future reference by photographing or by use of a coverage diagram.

A coverage diagram is merely the predicted radar coverage recorded directly on a map of the region. For this purpose the areas of ground clutter are usually blackened on the map, and the shadow areas indicated by contours determined as follows: The height at which an airplane becomes visible is determined by testing with EI pins and measuring. Then contours representing equal elevations of the shadow limit above sea level are drawn.

The advantage of this type of diagram over the photographic method previously described is that it provides an estimate of the actual elevation at which targets can be spotted.

Additional Siting Considerations

Although of prime importance, the geometric aspect of coverage is not the only consideration involved in choosing a site. Tactical requirements must also be met as must special technical considerations. The ideal site or sites chosen by the RPD method or any other method can not always be used for an installation. For example, the logistics involved in transporting and maintaining complicated radar equipment at remote and inaccessible locations sometimes eliminate otherwise ideal locations. Other factors include defense against attack from the air and on the ground, general accessibility and the applicability with respect to overall strategy.

Thus a site which is finally considered for a radar installation should be further studied from existing photographs and maps to determine its accessibility, surrounding vegetation, possibility of camouflage and similar important considerations. It is for this reason that competent observers must be employed to prevent choice of impossible sites.

A further use of the RPD in connection with siting is that it enables the radar siting officer to have at his disposal means for demonstrating his needs to other personnel interested in the choice of a site. This type of presentation is of great advantage since it is sometimes impossible for men unfamiliar with the problem of radar siting to visualize the factors involved from complicated diagrams and calculations.

Training

Use of the RPD enables an instructor to make visual presentation of the reasons for the effect of terrain on radar coverage. Working with a terrain model and the point source of light an instructor can demonstrate very quickly the complex problem of radar coverage and the effect of terrain upon it. With it he can demonstrate ground clutter and shadow, strong or weak ground signals, shadow depth and similar problems of radar siting and operation which otherwise are often difficult to convey to a group. PPI simulations are useful in radar training.

Sometimes, to enable the radar operator to recognize land forms more readily, a shoreline can be drawn in dotted lines to orient fixed echo pattern, particularly to enable him to follow a shoreline through shadows.

Since Evasion, Landfall and Navigation are not of primary importance to Artillerymen they will not be covered here.

Conclusion

RPD is more than a device; it is a technique which brings down to manageable scale, all the elements involved in a real-life siting (or navigation or evasion) problem. Developed by the Navy and MIT's Radiation Laboratory it has been thoroughly tested in the field. It was used successfully to brief Radar operators before the Marianas and the Normandy landing. Army Garrison Forces on Guam used it to locate their radars before landings. RPD users are RPD converts.

SCIENTIFIC INTELLIGENCE IN MODERN WARFARE*

By Lieutenant Colonel Henry H. Rogers, *Infantry*

In the 1945 biennial report to the Secretary of War, General Marshall said, "This discovery of American Scientists can be man's greatest benefit. And it can destroy him. It is against the latter possibility that this nation must prepare or perish. The atomic bomb is not alone among the scientific advances that make the possibilities of the future so terrifying. The development of aircraft, rockets, and electronics has become equally incredible."

Since the ability to make war is shaped in a large measure by the matériel and weapons available to a nation and the application of scientific principles thereto, it is evident that scientific intelligence is one of the major yardsticks in the determination of a nation's war potential.

What is scientific intelligence? One's initial concept is usually that of a long-haired individual in thick lens glasses probing around with strange implements over some supermysterious enemy death ray or indescribable germ. That concept has brought many countries in the past to disaster and this country to the very brink. On the contrary, scientific intelligence is not mysterious, but from simple analysis can be defined logically. *Science* is the systematic study of nature. *Intelligence* is the product resulting from the systematic collection and processing of information. *Strategic Intelligence,* in turn, deals primarily with a nation's war potential; hence, in part, with the application of science, offensively and defensively, to weapons and matériel as well as sources of power. Thus we can define *Scientific Intelligence* as that factor of strategic intelligence which is the result of systematic collecting and processing of information relating to scientific progress as it affects a nation's war potential. Or, in concise terminology, scientific intelligence is the study of the scientific capabilities of all foreign nations.

The principal uses of scientific intelligence are:—first, to provide a basis for timely development of adequate defensive countermeasures in weapons and matériel; second, to provide a basis for the development of defensive tactics and strategy to minimize the effectiveness of the enemy's weapons; and third, as a basis to effect the improvement of our own weapons and equipment by incorporation of new ideas so as to reach at least an offensive parity with the enemy.

Historical Background

From earliest recorded history, when man used flake-sharpened flint to improve the offensive effect of his spearheads, to the present atomic age, science has been an integral part of warfare. Transportation, communication, development of weapons, weather forecasts, development of explosives, production of food, medicine, production of synthetic substitute materials, industry, chemicals, camouflage, and even troop morale—all have as their very backbone scientific research and development.

Prior to World War II, organized scientific intelligence did not exist, except in Germany. Consequently, nations had to withstand in war the latest developments of their enemies, either until countermeasures could be developed or until their own achievement in any field could equal that of the enemy, thereby discouraging subsequent use of the most horrible developments due to fear of effective reprisal. On 23 April 1915, at Ypres, the French and Canadians were subjected to clouds of greenish gas and suffered a large number of casualties as well as a major blow to their morale. This initial employment by the Germans of chlorine gas in warfare caught the Allies totally unprepared, despite the fact that chlorine gas had been discovered by Scheele in 1778 and all its properties and effects were well-known. On 15 September 1916, at Cambrai, the British, in turn, took the Germans completely by surprise by using the first tanks to smash barbed wire entanglements and penetrate an organized position. At long last, by the end of World War II, efficient types of gas masks had been developed, along with antitank mines, antitank weapons, and tank obstacles, to minimize the effect of these two new weapons.

During World War II, the United States and the United Kingdom handled scientific intelligence on a piecemeal basis with various organizations dealing in it as part of their mission. In this country, the Office of Scientific Research and Development (OSRD), the Office of Strategic Services (OSS) and Technical Intelligence Service (TIS) all contributed to scientific intelligence.

A major contribution to Germany's ability to fight a long war on several fronts was the existence of a separate scientific intelligence branch since 1934 in its military organization. Japan, by contrast, had a deep-seated distrust of scientists and scientific intelligence, to the extent that anything discovered concerning scientific developments of the Allies by one branch of the service was kept not only from the other branches of the service, but also from her scientists who were actually engaged in scientific projects to further the war effort. Also, most of her scientists were left working in the dark on minor technical details, with

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little or no knowledge of the relationship of the feature on which they were working to the whole. There existed no concept of integrated advanced research. As a result, Japan found herself utterly helpless to stand up under the total demands of modern scientific warfare. This comparison of the two major axis powers indicates that a nation's war potential cannot be fully exploited without proper employment of scientific intelligence.

Elements of Scientific Intelligence

In order to apply Scientific Intelligence in a study of a nation's war potential, it is essential that we understand the elements which form the basis of scientific intelligence. These are:

1. *Number and Quality of Scientists in the Country.*—How many are there in the country and where are they located? University catalogues and membership lists of scientific and technical societies, and amateur radio, rocket, and glider organizations afford fruitful sources of information. Are the scientists old men past their prime who are holding down honorary posts, or are they young, forward-looking men actively engaged in research? Pupils of great scientists, as a rule, carry the load of scientific development.

2. *Fields in Which Scientists Are Most Proficient.*—In which fields are the efforts of scientists being concentrated? In which are they lagging? Trends, rather than present state of research, are more important, since the *potential scientific capability* of a country is the main interest of scientific intelligence.

3. *Government's Relationship to Science.*—Are scientists encouraged by subsidies and grants from the government or are they left on their own, financially? What is the government's policy with respect to education of young scientists and technicians?

4. *Research Facilities.*—How extensive are facilities for research activity and where are they located? How modern is research and testing equipment in the laboratories?

5. *Military Applications.*—What applications to military uses have already been made? What military applications of scientific findings are possible, considering developmental trends mentioned in paragraph 2?

6. *Development of Natural Resources.*—To what extent has the nation developed its resources of uranium, thorium, magnesium, aluminum, oil, tin, rubber, coal, etc.? What is the status of production of these resources? Which resources are undergoing extensive geological exploration? What research development is being carried out with respect to synthetic substitutes?

7. *Industrial and Technological Development.*—Which of the scientific findings are actually being developed? What are the industrial and technological resources of the nation which can translate scientific progress into actual weapons and material for prosecution of a war?

Study of a Nation's Scientific Capabilities and Intentions

In analyzing the probable methods of waging war by any nation, we study all the above elements in three progressive phases:

In Phase I we deal with the determination from the scientific viewpoint of the POTENTIAL of a foreign nation in any type of warfare by a study of the *availability* to the nation of:

1. Top flight scientists.
2. Laboratory facilities.
3. Raw materials capable of use in scientific development.
4. Organization for scientific research and development.
5. Nation's general level of technical development.
6. Industrial plants.

In Phase II we deal with the determination of a foreign nation's INTENTIONS in any type of warfare by a study of scientific priorities or emphasis on:

1. Concentration of best scientists on a particular field of endeavor such as atomic energy, arctic conditions, high performance aircraft, biology, chemical warfare, etc.
2. Exploitation of certain raw materials essential to production in a particular scientific field.
3. Devotion to a particular field of the laboratory and research facilities of the nation.
4. Percentage of the national budget allocated to a particular field.
5. Negotiations with other nations to obtain raw materials in which the country is now deficient, or increased research in synthetic substitutes.
6. Degree of security surrounding a certain field of development.

In Phase III we are concerned with the determination from the scientific viewpoint of a foreign nation's present CAPABILITY to wage a certain type of warfare by a study of the actual *existence* of:

1. Adequate stockpiles of finished products.
2. Specially trained troop units.
3. Industrial plants of a definite type with capacity to maintain production.
4. Adequate reserves of raw material and technicians to maintain production.

The present CAPABILITY to employ any mode of warfare can be determined from a study of the existence of 1 and 2 above, but this CAPABILITY would be limited in degree and duration without the existence of 3 and 4.

In these three phases we have considered only the scientific intelligence factor, and it is evident that a nation's potential intentions, or capability cannot be determined from the study of only one intelligence factor, no matter how accurate or thorough the study may be. Only by a detailed analysis of the information concerning all the factors of strategic intelligence—topographical, political, sociological, economic, scientific, transportation and communications, and armed forces—followed by careful evaluation of the whole—can we arrive at an accurate strategic estimate of a nation's war-making capabilities and intentions.

For example, an accurate economic intelligence estimate of Germany's capabilities prior to World War II would have indicated a serious shortage of nitrates, petroleum, copper, molybdenum, iron, tungsten, and rubber, thus giving most of the economists in the world the basis for their positive predictions that Germany could not fight a prolonged major war. However, scientific intelligence would have shown

that under Professor Kessner, Germany had been concentrating on synthetic substitute development, or *ersatzstoffe,* using the Haber process for synthetic nitrates, the Bergius process for synthetic petroleum, a process using sulphur and natural gas for synthetic rubber, aluminum alloys in place of copper, and other substitutes, with the result that she did wage a long multi-front war.

Scientific Intelligence Operation

Scientific intelligence is closely interrelated with all other factors of intelligence, and the overlapping of the various factors should not, and must not, result in disagreements as to scope of responsibility, but, rather in mutual support, understanding and substantiation. Technical intelligence is concerned primarily with weapons and matériel in use or already developed for use by any nation, and during the war there was occasional disagreement over the distinction between scientific and technical intelligence over such matters as whether a new enemy rocket was merely a modification of a standard one in use, hence a responsibility of technical intelligence, or an entirely new type of weapon based on a new scientific principle, and hence a responsibility of scientific intelligence. Clear cut compartmentation of the various factors is not at all essential and leads to quibbling and wasteful duplication of effort, hence those same principles of coordination which were so effectively employed in World War II by our technical services should be applied in the future.

Scientific intelligence collection, processing, and dissemination is, in general, identical with that of any other intelligence factor with some added sources and certain emphasis on techniques.

All sources of information are the same as for any other factor of intelligence with the addition of scientific journals, Annals of Academies of Science, and doctoral theses. All of these additional sources may be easily procured in time of peace, for scientists take great pride in publishing and distributing their writings. In evaluation and interpretation, the principles and techniques are the same as for any other factor of intelligence, but trained scientists must be used to apply the principles and techniques to the information sent in, since very few intelligence officers are scientists, and active competent scientists have no time to serve as observers, but must concentrate on their special scientific research fields. Thus scientific intelligence can be accomplished only by cooperation between intelligence agencies and reliable civilian scientists. If scientific intelligence is to be properly exploited, it is essential that its dissemination to all interested branches of the service and to industry be *timely, accurate,* and *complete,* in order that its findings may be employed by the users to cope effectively with existing problems. Scientific intelligence, collected, evaluation, interpreted and locked away in high headquarters as "Top Secret," in the Japanese manner, is the same as none at all, in that effective countermeasures against new developments cannot be devised.

As for the relationship of scientific intelligence to theoretical or "pure" science itself, the abstruse academic ideas of scientists do not at once appear to be of any value in the study of warfare, but in recent decades we have seen highly abstract scientific ideas lead swiftly to the development of radar, supersonic aeronautics, rockets, guided missiles, submarine development, biological developments, medical developments of plasma, penicillin, etc., the atomic bomb, and a legion of others. The gap between "pure" science and technical application has dwindled from hundreds of years to a matter sometimes of months or weeks. Thus scientific intelligence, a newcomer, has become essential to national security because the time between the development of a theoretical idea and its military application has dwindled from hundreds of years to a matter of months or weeks, and because we are in an age of atomic power—an advance in potential power that is equalled only by man's first discovery of the use of fire for energy.

Conclusions

In the words of Von Clausewitz, "The art of war is nothing but the result of reasonable reflection on all possible situations encountered during a war." From now on, the reasonable reflections on all possible situations will be vitally a function of time. Do we as a nation dare procrastinate? It should be quite obvious that the nation as a whole, and even more so its armed forces, must give serious attention to scientific research and development, not only as conducted by ourselves, but as carried out by all the nations of the world, lest someday in the near future only a handful may be left to reflect, and then with but precious little to reflect upon.

USMA Graduates To CAC

The following named Cadets of the graduating class of 1948, United States Military Academy, have been commissioned in the Coast Artillery Corps:

Cadet L. G. Churchill
Cadet J. W. Jones
Cadet F. L. McClaffin.

Military-Industry Preparedness Announced By The Munitions Board

Advancement in the field of United States military-industry preparedness has been announced by Mr. Thomas J. Hargrave, Chairman of the Munitions Board.

A component of the preparedness program has reached a point whereupon representatives of the Armed Services are about to start contacting some 11,000 U.S. industrial plants to discuss production capacity of specific plants; what the plants can produce in the way of products for war, and how much. Other production problems will be discussed by the plant management and representatives of the Army, Navy, and Air Force.

Cumulatively, the knowledge gained from the person to person contact between U.S. Industry and the U.S. Military forces will provide the Government with an up-to-date inventory of U.S. Industry's capacity for production for the wartime requirements of the Armed Forces. The results will be kept current by means of a perpetual inventory and will provide a composite picture of where the bulk of requirements for war will be drawn from in an emergency. In addition, the results of the program ultimately will eliminate competition for the output of a single plant between procurement agencies of the Armed Forces thereby enhancing wartime procurement, eliminating much confusion and providing greater efficiency and economy in procurement.

The program is called: "Allocation of Private Industrial Capacity for Procurement Planning of the Armed Services." The operation under the plan to date has consisted of requests by the Armed Services to the Munitions Board for tentative allocation of production capacity of specific U.S. Plants.

After careful study, the Munitions Board allocates the claimed capacity to the Services or combination of Services in accordance with decisions most compatible to the interests of National Security.

The allocation of private industrial capacity for procurement of the Armed Services is part of the military aspects of industrial mobilization planning, a responsibility of the Munitions Board. Although a great stride in military-industry preparedness, it is but a part of a much greater preparedness activity contemplated by the Government. The National Security Resources Board, which is charged with over-all industrial mobilization planning, is preparing methods and procedures for the allocation of industrial capacity for the civilian economy and industry, correlating those requirements with the military requirements.

There is an estimated 86,000 industrial plants of recognizable size and productivity in the United States. It is obviously impossible to cover all these plants through survey and, in wartime, to marshall their power directly. Consequently, it is the eventual goal of the program to cover between twenty-two and twenty-five thousand plants. Coverage of that number of plants would mean that 90% of the productive capacity of the United States would have been surveyed under the program.

The assignment of production capacity in manufacturing facilities by the Munitions Board to a military department for its procurement agencies to accomplish peacetime planning for war procurement of designated quantities of specified items of material at a specified rate of production makes possible tentative schedules for the items that Industry will produce for the Armed Services in time of war.

Since planned war requirements vary with strategic plans, the allocation and production schedules will be both tentative and variable.

Now that the capacity of the first group of plants has been tentatively allocated to the Armed Services, representatives of the three military departments will approach the plants. The program on the part of industry is purely voluntary.

When contacting the management of a plant allocated to his particular Service, the military representative will show the management the product or products the Service is desirous of having that plant manufacture in the event of an emergency. The management will select the product it believes itself best capable of producing with maximum speed and volume in an emergency. It will provide the Service representative with data concerning its production ability and potential production problems will be discussed.

Other information vital to efficient war production will be gathered as part of the program.

In announcing the launching of the important plant survey, Mr. Hargrave stated: "It is important to realize that this particular program is part of the United States long-range preparedness planning against any future emergency. And, although it is projected on the long-range basis, its value to our national security in an emergency, near or distant, is immeasurable.

"If only partially completed by the time an emergency occurs, the work already completed will be of inestimable assistance in gearing that part of our industry to emergency war production.

"Time, in modern warfare, is one of its most important elements. It is absolutely necessary that our Nation's industry be converted from peacetime production to war production quickly, and this program, whether completed or partially completed, will save time in expediting the efforts of our industry in the production of the munitions required by our Fighting Forces during a war."

The purpose of the program for the allocation of private industrial capacity for procurement planning by the Armed Services is the development of a comprehensive system for predetermination of sources of supply. Its objectives are to expedite transition of industry from production of goods for peacetime consumption to meeting the requirements of the Armed Services of the United States.

Specific objectives of the program are as follows:

A. To determine where necessary end items, based on mobilization requirements, can be obtained with particular

emphasis on those items likely to be most critical in a future war.

B. To assist in orderly distribution of the initial increment of the wartime manufacturing load by means of allocating production capacity for the production of designated products at a specified rate of production.

C. To acquaint industry with part of the task it will be expected to perform, and encourage its cooperation in planning for mobilization of industry.

D. To eliminate competition between the procurement agencies of the Armed Forces for the output of a single plant.

E. To provide a current record of competent producers together with estimates of their capacities to meet prospective demands.

F. To determine what items of supply cannot be provided by conversion of privately owned manufacturing capacity and thereby establish a basis for calculation of requirements for construction of new facilities.

G. To minimize the need for construction of new facilities during war, by fostering thorough utilization of existing facilities.

H. To foster production cost estimation in advance by industry in order to expedite negotiation of contracts for desired material.

I. To have in being a system which readily can be adapted to clearance of important contracts by a central control agency.

The military representative approaching a specific plant, the capacity of which has been allocated to his Service, is known as an "Armed Services Procurement Planning Officer." He is assigned mobilization planning cognizance by his Service to coordinate the planning for the war load in specified manufacturing plant or plants.

The Armed Services Procurement Planning Officer is created to facilitate mobilization planning with plant officials. He prevents unnecessary plant visits, surveys, and communications, and coordinates planning requirements of the armed forces in the facility or facilities over which he has planning jurisdiction. He is in effect an administrative representative of the National Military Establishment for the plants under his jurisdiction.

The allocation of industrial capacity program provides no limit as to size of facilities. Small and large firms, especially in the cases of military items similar to commercial types and where conversion problems are minor will be considered. The program recognizes that there must be adequate reservation for the normal peacetime capacity of a given industry for civilian needs and the requirements of other war programs during wartime.

In summarizing the allocation of Private Industrial Capacity for Procurement Planning of the Armed Services program, Mr. Hargrave said: "Ultimately, the results of this effort will provide the United States Military Establishment with an accurate, comprehensive knowledge of its sources of supply in war, and the best possible planning basis for planning wartime military procurement in peacetime. It will provide individual manufacturers with a knowledge of their probable production role in the event of war—a knowledge which will enable them to prepare by having sufficient time in which to anticipate, study and overcome probable and potential production problems.

"For the Nation at large, it means a device which will enable us to achieve full war production in a period much shorter than has heretofore ever been realized—a time-saving device which could mean the difference between victory and defeat."

ABOUT OUR AUTHORS

Brigadier General Ralph C. Tobin assumed command of the 44th AAA Brigade shortly after its activation and remained in command until its deactivation approximately three and one-half years later. (Page 2.)

Colonel Andrew W. Clement was in charge of the fire control and radar development section of the Coast Artillery Board during a major part of the war. At present he is associated with the Bell Telephone Laboratories. (Page 8.)

Lieutenant Colonel William R. Kintner is a frequent contributor to the JOURNAL. He is just about to complete a two-year course at Georgetown University in Political Science and International Relationships. He then will join the faculty of the Command and General Staff College at Fort Leavenworth. (Page 13.)

Lieutenant Colonel Jesse O. Gregory was a flak officer with Eighth Air Force during the war and was one of the early pioneers in the field of flak analysis. He is now in the Research and Evaluation Division of the Air University at Maxwell Field, Alabama. (Page 18.)

Colonel Robert J. Wood is currently attending the National War College. In July he will become Aide to the Secretary of Defense in accordance with an announcement made recently by Mr. Forrestal. (Page 25.)

Lieutenant Colonel William L. Clay was Liaison Officer for the Army Ordnance Department with the Bell Telephone Laboratories at the time this article was written. He is now in the Rocket Branch, Research and Development Division, Office, Chief of Ordnance. (Page 30.)

Lieutenant Colonel Orman is another steady contributor. He is an instructor in the Department of Electronics and Electricity at the United States Military Academy. (Page 31.)

Lieutenant Colonel Henry H. Rogers is an instructor in the Command and General Staff College at Fort Leavenworth. (Page 34.)

PROPOSED REVISION OF FIELD MANUAL 4-104

In accordance with plans published in the last issue of the JOURNAL we are reproducing below recommendations compiled by members of the IX ADC covering the revision of Field Manual 4-104.

This particular manual is now under revision at Fort Bliss and will be renumbered FM 44-4. These recommendations have no official sanction nor concurrence but they are published with the hope that they will be thought-provoking and will invite comments.

The original manuscript contained numbered paragraphs corresponding to those in the field manual but these have been deleted since we have rearranged the material to make the article more correlated and because it contains material not covered in the field manual.—Editor.

Gun Densities. For a target approaching from any direction, 24 guns must each be capable of delivering a minimum of four rounds beyond the IBRL, in order to inflict a fair percentage of damage on enemy attackers. A greater density is required for a strong defense. With guns 1,000 yards from an objective, the following allocation of battalions is required:

Objective's Diameter	*No. of Gun Battalions Needed*
Up to 1,000 yards	1½
1,000-2,000 yards	2
2,000-3,000 yards	3
Over 3,000 yards	4 and up.

The above allotment of battalions will result in an average distance between batteries of about 2,000 yards. It is obvious that this distance will often be made smaller or larger because of flak analysis, radar coverage, terrain conditions, mutual radar interference, etc. (This gun coverage has been computed on the basis of a circle about each gun battery of 9,000 yards radius.)

LOCATION OF GUN BATTERIES ABOUT A DEFENDED AREA

A. Main Principles for an Individual Isolated Defense. General: The guiding principle of AA battery location is to place them in a manner to inflict the greatest damage on the attacking aircraft, during the bombing run. The location of gun batteries in an individual isolated defense is the result of study involving the following factors:

(a) Number of gun batteries available.
(b) Expected speed and altitude of the bombing attacks, which in turn determines the IBRL.
(c) Size and shape of the defended area.

1. Batteries will be located on the perimeter of an area and approximately 1,000 yards outside the area. When the attacks are expected to be in excess of 24,000 feet and 300 mph, the guns should be moved out to a maximum of 5,000 yards from the IBRL.

2. For a circular objective, batteries are placed an equal distance apart. Irregularly shaped objectives require a variation in the distance between batteries for a balanced defensive strength. For a sharp turn in the outline of an objective, a battery is placed opposite the turn, and adjacent batteries are placed closer than the average distance between batteries. Along a straight line outlining the objective, batteries are placed farther apart than the average spacing.

B. Flak Analysis.

Since the majority of important objectives are not isolated, it is essential that a careful flak analysis of the defense be considered to include:

(a) Adjacent defenses.
(b) Probable direction of attack.
(c) Direction of prevailing winds, which influence direction of attack.

With a careful flak analysis, individual defenses, not isolated, will seldom be balanced within their own defenses.

C. The most important single factor in locating a particular gun battery is the selection of an effective radar site, which will often result in a violation of the main principles. When time permits a radar reconnaissance should be made. Any gap in the defense should be compensated for by a thickening of batteries at the edges of the gap.

D. Advantages of Placing Guns Close to Objective:

1. For a small objective, such as a bridge, all batteries may engage target beyond the IBRL. (For a large objective, it may be assumed that the bombs will not be dropped at the IBRL but will be dropped somewhere between the IBRL and FBRL. This will ordinarily permit the engagement of from five to seven batteries, with batteries not more than 2000 yards apart, prior to the release of the bombs.)
2. To increase effectiveness against low flying targets by insuring against critical zone being within dead area of a battery.
3. To increase effectiveness against dive bombers.
4. To facilitate control, communications, supply and administration.

SELECTIONS OF POSITIONS

AAOR: The most important consideration in selecting a site for an AAOR is communications facilities. A secondary consideration is protection. For a small objective, the AAOR should not be within the area. For a large objective, such as a city, the communications dictate the position within the areas. In such a case an alternate AAOR should be selected.

Radar Sites: If the spare radar is to be used to supplement the AAAIS radar net, its position will be selected by the senior unit commander after receiving a recommenda-

tion from the senior unit radar officer. The site should be high and should have a clutter-free search in all directions. The battalion radar officer should visit the radar site at each battery and check the radar qualities.

Gun Battery: All around fire, uncluttered radar search, unobstructed field of view, and accessibility are primary considerations in locating the gun battery. The guns should be located at least 100 yards from the fire control instruments. Advantage should be taken of the parallax allowed by the director. The guns will be laid out in the form of a triangle 40 yards on a side with the fourth gun in the middle of the triangle. (A "Y" with 25 yards between guns.)

Command Post: The battery CP should be set up with or adjacent to the computer.

Machine Guns: The machine guns assigned to each battery are employed to provide defense of the gun site against low-flying aircraft and a close-in defense against a ground attack. It is generally preferable to site the guns in a square about the battery, each gun at a distance of about 100 yards from the nearest piece of major battery equipment (radar, 90mm gun, etc.). However, the terrain may indicate a revision of this plan. Whenever possible, the machine guns are sited on elevations which give them an unobstructed field of fire in all directions.

Bivouac Area, Maintenance Section and Motor Park: The bivouac area, maintenance section and motor park are located in protected places, convenient to the road net, and at such a distance from the battery position that they will not reveal the gun positions.

In selecting positions, every effort will be made to locate batteries so they are: (1) tactically located for the AA defense mission, (2) not under direct enemy observation, and (3) not defiladed beyond the limit which will permit ground fire on assigned areas.

Search and Fire Sectors: Normal and contingent sectors of search and fire may be assigned to the batteries. The normal sector of each battery will be determined by the best possible compromise between (a) the sector 45 degrees each side of a line from the center of the objective through the gun position, and (b) the clearest and best sector of radar search from that position. The overlapping fields of fire should be based on the actual radar coverage of the batteries. The contingent sector of each battery comprises the normal sectors of the other three batteries. (With modern type gun-laying radars, the assignment of sectors is thought to be somewhat anachronistic and actually limits a battery commander's fire direction only in that, if two or more targets appear on the radar screen, he should give most careful attention to the threat contained in that target which is located in his normal sector.)

Rules for Engagement

a. *Need for AA-fighter cooperation:* Any area defended by AA guns is capable of being defended also by fighter aircraft. It may be said as a general rule that the optimum target for AA guns is a compact bomber formation flying a rectilinear course, and for fighters, it is individual bombers. This indicates the need of an SOP to govern the activities of the two separate arms, in order to achieve effective cooperation.

b. *Tactics:* With excellent early warning, identification, communications, and coordination between friendly fighters and antiaircraft artillery, an elaborate set of rules for engagement is not necessary, and the following rules may be employed:

AS A GENERAL RULE, DURING DAYLIGHT HOURS WHEN VISIBILITY IS GOOD, FIGHTER AIRCRAFT WILL BE MORE EFFECTIVE AGAINST ENEMY BOMBERS THAN AAA.

AS A GENERAL RULE, FOR PERIODS OF DARKNESS OR POOR VISIBILITY DURING DAYLIGHT HOURS, AAA WILL BE MORE EFFECTIVE AGAINST ENEMY BOMBERS THAN NIGHT FIGHTER AIRCRAFT.

During daylight hours with CLEAR weather, fighter aircraft *WILL* engage an enemy raid and AA FIRE WILL BE RESTRICTED if ALL of the following conditions are satisfied:

1. The altitude of the enemy aircraft is above the effective altitude of automatic weapons. (Fire from AA automatic weapons should never be restricted except when it will be ineffective, such as against armored pilotless aircraft, or when it will endanger friendly aircraft in vicinity of an airdrome.)
2. The enemy bombers are not accompanied by a fighter escort.
3. The number of fighters available to engage an enemy raid exceeds the approximate number of enemy bombers.

If the above conditions do not prevail, fighter aircraft will be withdrawn by the ground controller short of the gun defended area (GDA) and regrouped at an altitude which will permit them to resume the attack immediately beyond the GDA, and AAA will engage the enemy aircraft within the range of its guns.

For periods of darkness or poor visibility during daylight hours, night fighters will engage enemy aircraft and AA fire will be restricted if ALL of the following conditions prevail:

1. The altitude of the enemy aircraft is above the effective altitude of AA automatic weapons.
2. The number of night fighters that can be controlled by a ground intercept controller is equal to or greater than the number of enemy aircraft.
3. Airborne radar contact has been made on all enemy aircraft outside the GDA.

If the three above conditions do not prevail, the night fighters will be withdrawn by the ground controller short of the GDA, and AAA will engage enemy aircraft within range of its guns. (Since a ground intercept controller cannot control more than two or possibly three night fighters, any raid of four or more aircraft will always be engaged by AAA).

Fire Direction:

a. General: Except in situations of emergency, fire direction for AA guns is exercised by the battery commander of the gun battery. The degree to which the battery commander can accomplish efficient and intelligent fire di-

rection is dependent upon the rules for engagement and the efficiency of the warning service. AAOO will assume fire direction of subordinate units only in extreme emergencies. However, the AAOO does at all times exercise a negative fire direction in that he issues such restrictions (or release from restrictions) to fire as are necessary for the employment of the elements of the defense to the best advantage and to insure safe passage of friendly aircraft through the defended area. In addition, the AAOO alerts units of the defense and increases or decreases the extent of AAAIS surveillance according to the situation.

Amphibious Operations

AA Gun Role:

In the initial landing stages and establishment of a beachhead, fighter aircraft afford the main protection, assisted by self-propelled AW as soon as it can be landed.

AA guns are brought in as soon as the beachhead has been established and protection is required against bombardment aircraft. The actual time when this will occur is a command decision which must be made before the operation begins, and is based on an estimate of enemy strength and intentions, and the time required to establish an area for unloading supplies. The specific primary AAA gun mission is the protection of inshore landing craft, landing areas, supply dumps, fighter strips, and other critical points within the beachhead area, against attacks by medium and heavy bombardment aircraft. AA guns may, and often will have an additional mission of defense against enemy armored counterattacks, of reinforcing field artillery fire, and of reinforcing naval fire against seaborne targets.

Preparations:

a. Preparations of AA gun units for participation in amphibious operations include:

(1) Training of drivers and other personnel in the technique of driving in sand, water and other unusual surfaces.
(2) Waterproofing of all vehicles and exposed fire control equipment.
(3) Combat loading of vehicles and guns, etc., in landing craft (LCT or LST).
(4) Map reconnaissance of landing area to choose tentative gun positions.
(5) Training of battery reconnaissance parties which will go ashore in an earlier wave.

b. It is usually necessary because of shortage of shipping space, to send only the minimum combat cadre of a gun battery with the first gun units arriving at the beachhead. The other battery elements will rejoin their parent units after the critical period of beachhead defense has passed.

Early Warning:

It is anticipated that, during the first stages of an amphibious operation, all early warning will come from a floating operations room. All gun batteries will receive early warning directly from this source, until an AAOR is set up onshore. The AAAIS will be put in operation as quickly as possible to augment early warning information.

Rules of fire:

The constant presence of fighter cover over the assault areas and beachhead renders close liaison between AAA and the Air Force of supreme importance.

Pilotless Aircraft

Employment of Guns:

a. General: The tactical considerations indicate that the defense against pilotless aircraft (PAC) is not a close-in, all-around defense, but is determined in width by the arc of enemy capabilities. A gun belt is placed at a distance from the edge of the vital area (VA) of 10,000 yards. This distance is, to some extent, arbitrary, and may be decreased or increased, as dictated by the closeness of the enemy front lines, and the efficiency of the early warning system. Within this gun belt, batteries are deployed at intervals of 800-1200 yards, so that each gun battalion covers a front of approximately 3000-4500 yards. This affords a practical limitation upon the distance of the gun belt from the VA in that the length of the arc to be covered increases as the distance between the arc and the VA increases. The interbattery interval of 800-1200 yards insures that at least 3 batteries can fire simultaneously on one target.

Additional Gun Belts:

If enough gun battalions are available, a second gun belt may be constituted in front of the first belt, and at a distance of 15,000 yards from it. The 15,000-yard distance between belts is postulated to prevent confusion on the radar screens of close-in batteries caused by shell bursts at the target of batteries in the belt immediately in front of them. The amount of concentrated metal in the air surrounding a PAC when AA shells are bursting causes great confusion on the PPI screen; and may even pull a radar, which is locked in "automatic track," off its target. Hence, successive gun belts must be separated by a distance sufficient to keep the sky clear of bursts by one belt while the succeeding belt is observing the target on its PPI screen, selecting it for engagement, locking on it in automatic track, tracking it until director rates are smooth, and firing at it at effective range. It should be noted that the use of electronic fuses, which detonate only when they are close to the target, do not cause the same amount of confusion on the PPI screen, and if such fuzes are being used, the distance between belts may be reduced accordingly. Flak interference is the primary factor to be considered in determining the distance between gun belts, but it is stressed that the closer the belts are to each other, the easier become the communications, administration and supply problems.

Normal fire control when the target is visible will be by visual means with radar range. For unseen targets, fire control will be by radar. Fire will be held until PAC comes within most accurate range of the guns. A maximum fuze will be prescribed. (Allowances may be made to permit individual batteries to fire in advance for spotting purposes.) A maximum number of rounds to be fired at one PAC will be prescribed.

Special rules of fire may be required, especially if there is a ceiling to the restricted area. A limited ceiling will restrict the use of electronic fuzes.

PAC which are obviously not headed for the VA will not be engaged.

Volley fire may be utilized with time fuzed ammunition to insure proper fuze setting.

Early warning radars should be located at least 25,000-35,000 yards from the VA, for a 5-minute warning.

If the defending arc of guns is very long, it may be divided into two sectors, each of which is assigned an AAOR.

Visual observers should be stationed from 10,000 to 15,000 yards beyond the outer gun belt to assist in early warning and to visually recognize targets reported by early warning or gun laying radars.

Communications are primarily by wire with radio as a standby. They are:

(1) Two lines from each EW radar to AAOR.
(2) Two lines from AAOR to each gun site. One line is an information hot loop over which AAOR transmits location of targets. Because of the great distances and many units involved, this line must be power-amplified. There is also a radio broadcast of this information, to which the gun sites can listen if the line goes out. The second line is used by the batteries to report to AAOR all items of an operational nature.
(3) A radio (SCR 543) at each AAAIS OP for broadcasting flashes to AAOR. Gun sites monitor this broadcast with their 593s.

Because of the continuous alert period, additional personnel are required for all operations sections (guns, range, communications, supply, etc.) of all units.

Statistical Section:

A large statistical section is required to permit the AA commander to make accurate analyses of methods of attack, plan adequate defenses and to constantly check on the operations of the gun battalions.

The statistical section will keep a record of:

a. Number and direction of flight of all PAC.
b. Number of PAC engaged by AA and results.
c. Number of PAC landed in VA.
d. Damage to VA and AA equipment and casualties.
e. Expenditure of ammunition and current status of supply.
f. Each battery that fired on each PAC, with time and results of engagement, damage and casualties, and ammunition expended.

A statistical section radar with a PPI presentation should be kept constantly in operation from a position where it can scan all possible PAC approaches for the purpose of recording information on all PAC attacks.

Hysteria Need Not Follow Atom-Bomb Explosion

If an atom bomb should fall on an American city, the population would be faced with the greatest emergency in its history. But, it is by no means true that the entire population would be wiped out, nor is it true that nothing could be done to help the survivors, according to Army Medical Corps officers who are conducting continuous study of the problem.

There is no known method of protecting those in the immediate neighborhood of an atomic bomb when it explodes. Nevertheless, since the Los Alamos experiment opened the Atomic Age, a great deal has been learned about mitigating the secondary effects of ionizing radiation and about protecting survivors who have received less than a lethal dose.

Many lives may be saved by widespread knowledge among physicians of therapeutic measures, and many more by a general understanding of preventive measures which can be taken by the general population.

The real difference between ordinary high explosives and atom bombs, it was pointed out, is the enormous amount of radiant energy produced by the latter—energy covering the whole range of wave lengths from heat waves to million-volt gamma waves.

Following the bombing of Hiroshima and Nagasaki, much was learned of what symptoms to expect, overt and latent, immediate and delayed. All the results will not be known for years.

There is a parallel in our experience with heavy bombing of cities from the air in World War II. This type of warfare was an innovation, and at first physicians had virtually no information concerning the effect of shock waves of that magnitude on the human body. Scores of people in the neighborhood of bursting bombs died, although they had apparently suffered no injuries. The knowledge of what could be done to save those people was acquired the hard way because medical science had not foreseen the problem.

The threat of the atom bomb is, at least, now recognized and we have assembled a growing store of knowledge which can ultimately be mastered, Army Medical officers have concluded.

OBSERVING THE RUSSIANS AT WAR*

Digested from an article by Lieutenant General Sir F. Noel Mason-MacFarlane in "The Journal of the Royal Artillery" (Great Britain) October 1947.

While these notes of the author were intended primarily as additional comments on an article in the same publication by Lieutenant Colonel H. G. de Watteville, in April 1947, entitled "Russian Artillery—1941-1945" (digested in the January 1948 issue of the MILITARY REVIEW), *they are also a valuable firsthand account of the military operations of the Soviet forces during the early part of World War II.—The Editor,* Military Review.

On 26 June (1941) I reached Moscow as head of the British Military Mission and remained in the USSR till the following May. My task was not made any easier by the fact that during the first year of the Russo-German campaign the Soviet authorities took a particularly poor view of our contribution to the war effort. No credit was given for our lone stand against the Axis. Neither the Battle of Britain, nor the extent to which we were containing the *Luftwaffe* in the West was really appreciated in Moscow. Our bomber offensive had not yet made its full weight felt. The second front, which was the one thing for which the Red army clamored, was still three years away. Lend-Lease was only in its infancy.

For these, and other reasons, it was hardly surprising that the Red army authorities, with their backs to the wall, were not as forthcoming as might have been hoped. Nevertheless, I spent an absorbingly interesting twelve months in the Soviet Union; and this year of firsthand experience has among other things, enabled me to recognize the futility of much that has been written about the Red army and the USSR.

Russian Artillery

To start with, I doubt if it is correct to say that the Russian artillery was a complete failure in the War of 1914-17. During my years in Hungary and Austria in the early 30's I met many officers of the old Imperial Austrian army who had fought on the Eastern front against the Russian army. Without exception they had been impressed by the performance of the Russian artillery in the early phases of the war. As time went on the Russian artillery, in the same way as the rest of the army, became less and less effective; but at the beginning of the war it undoubtedly gave good service at any rate in the central and southern sectors of the front.

The efficiency of the artillery of the Red army in the recent war owed much to the outstanding ability of General Voronov. Only once did I have an opportunity of a long talk with him but he left an indelible impression on my memory. Built on large and powerful lines, his personality was as marked as his stature. His technical knowledge was obviously of a high order. He was sound, very quick on the uptake and brimful of energy.

There is no doubt that the Germans allowed their artillery rearmament to lag behind their provision of dive bombers and tanks. At the beginning of the war the number of guns in a division was below standard European practice; and the rearmament of their field artillery with the 105mm had not been completed. At the maneuvers in East Prussia, which I attended in September 1938, the bulk of the field and medium artillery was of 1914-18 vintage.

Trench Mortars

The Germans undoubtedly placed much reliance on the trench mortar as a supporting weapon for infantry; several Russian officers told me that the heavy trench mortar concentrations which were brought against them in the early days of the war were devastating. On the other hand, I had an opportunity recently of discussing the early phases of the Russian campaign with a German General who had, at that time, commanded an infantry division; he told me that, as far as his division was concerned, he had had relatively little support from *Stukas;* he had made considerable use of his trench mortars, but it was his divisional artillery which had normally dealt with Russian resistance whenever this threatened to crystallize. He had been most impressed by the rapidity and accuracy with which his guns put down their concentrations. He was emphatic that he owed much of his initial success to his artillery.

Too little attention has been paid to the Soviet-Japanese clashes in Manchuria in 1938. The experience of modern warfare gained by the Red army, especially as regards the handling of tanks and their support, was considerable.

Finnish War

I am also reasonably certain that the Soviet-Finnish war of 1939-40 was of far greater value to the Red army than is generally realized. The fact that the Red army took several months to overcome Finnish resistance led to many false deductions in foreign countries. It must be remembered that this campaign was fought on the narrow Karelian Isthmus in deep snow and under almost arctic conditions between the months of November and March. In wintertime in those latitudes movement off roads and tracks is almost impossible. Skis are of little use where there is no opportunity to maneuver. The Mannerheim Line was a strong prepared position, and there was no way round it short of a wide sweep round the north of Lake Ladoga which presented great difficulties in winter conditions; it took frontal punches involving very heavy concentrations of artillery fire to pierce it. These naturally took some time to mount, and in the meanwhile the Red army gained much invaluable experience regarding winter clothing and equipment and the technique of winter fighting which stood them in good stead in their subsequent task against the Germans.

It is probably correct to say that it was not until the big Russian counteroffensive around Stalingrad that the Russians were able to produce a *decisive* weight of artillery support. But, in the course of a visit to a Red army division which was taking part in a successful small-scale counteroffensive northeast of Smolensk in August, 1941, I saw some of the country captured by the division; and the evidence of

*Reprinted courtesy *Military Review.*

craters showed that supporting barrage fire by field artillery had been heavy and accurate.

Transport Important

It goes without saying that the successes achieved by the Red army artillery in the later stages of the war could never have been achieved without adequate transport; I have always considered that of all the Lend-Lease provided for the USSR by the United Kingdom and the United States, the most valuable item was probably the vast number of trucks supplied by America. General Dean, who was head of the United States Military Mission in Moscow from 1943 to 1945, confirms this strongly in his very readable and informative book.

I am unable to throw any light on the ultimate organization of the Red Army artillery. Up to the time when I left the USSR in May, 1942, there were few Corps Headquarters, and an Army Headquarters normally handled five or more divisions direct. The absence of integral corps artillery probably explains the formation of artillery divisions.

Press reports undoubtedly made frequent reference to Red army artillery firing over open sights. In the Soviet press, however, both in reporting their own operations and in detailing lists of equipment captured from the enemy, it was seldom that any differentiation was made between guns and antitank guns. A large number of these reports probably referred to antitank guns, although there is no doubt that on frequent occasions they were very boldly handled.

I hardly think it correct to say that Red army artillery technique was not very highly developed. There may have been an absence of frills, but frills can be overdone. During both my visits to the front I was shown good maps with a 1,000 meter grid, and the artillery appeared capable of bringing down rapid concentrations effectively. I did not see any survey work in progress, but the fighting maps were clear, and target information, both from resection and from shooting and also from air and photographs, was comprehensive.

Division Artillery

In the course of my visit to a division a few miles northwest of Vyasma I saw a good deal of the battery position area, and visited several batteries in action. There was little in the layout of the divisional artillery which was in any way abnormal. The guns were nearly all in shallow pits with only a limited amount of ammunition on the positions. Most communications were duplicated—line and radio—and in all cases which I was able to check, no code was used. All positions were heavily camouflaged with nets and foliage from nearby scrub. A representative of the Red Army Air Force was attached to divisional headquarters and all requests for air cooperation passed through him to the squadrons supporting the division. I was told that the time from a request for air assistance being initiated by a unit in the line to the arrival of the bombs on the target or the aircraft on its task was normally well under one hour.

My winter visit to the Fifth Army took place in February, 1942, when the leading divisions had just come up against a strong German position at Gzhatsk in their advance westward from Mozshaisk. Conditions were practically arctic, and deep snow made it impossible to move guns far from the main Moscow-Minsk road except on the few negotiable tracks. Large numbers of men were employed on keeping roads and tracks clear of snow, but there was a complete absence of snowplows although these were always to be seen in considerable numbers in Moscow. On the main Moscow-Minsk road I found the batteries of more than one division in action in positions close to, and on both sides of the road. They covered several kilometers of the road which was more or less in the line of fire. In the case of the mediums the guns were in action actually on the verge of the road, one behind the other. The whole area presented a wonderful target but, at that time, the Red Army Air Force had complete superiority over the *Luftwaffe* in this sector. Camouflage everywhere was white, and the parapets of gun pits were packed deep in snow which gives considerable protection against shell splinters.

Tank Defense

In dealing with German tank attacks the Red army definitely tried to canalize penetration as much as possible and to cover the "canals" with both antitank and field guns. Considerable use was also made of specially trained personnel who ambushed attacking tanks with bombs. It was claimed that large numbers of enemy tanks were effectively dealt with in this way. I saw very few instances of the Red army using antitank mines, but my visits to the front were confined to sectors where they were on the offensive. The Germans employed these mines in large numbers, and their non-metal types, buried in the snow and proof against normal mine detectors, were very troublesome.

Seasonal Armies?

I doubt the correctness of de Watteville's deduction that the Red army artillery, in common with the other arms, was organized into two distinct seasonal armies for summer and winter work. I saw nothing to confirm this theory and I do not believe that there was adequate manpower or equipment for the purpose. The manpower resources of the USSR were, admittedly, vast, but for a variety of reasons the use made of man (and woman) power was far less economical than in our country or the United States. Clothing and paint undoubtedly changed with the season: but I am fairly certain that the men with white cloaks and equipment, skis and sledges and airscrew sleighs in the winter were the same as those who fought in different colors and camouflage in the summer. There was certainly no change in the width of tracks on track vehicles. Standard Russian tracks are very much broader than ours, as they have not only the snow of winter but the appalling mud and slush of the spring and autumn to overcome. In heavy going our Matildas and Valentines and carriers made a poor showing with their narrow tracks and low power-weight ratio in comparison with the Red army's tanks. Soviet tank design was based on the admirable formula—twenty horsepower for every ton weight of tank.

Rockets

The only rocket projectile which I saw while in Russia was the type used by aircraft. This was already in production in the autumn of 1941. It was designed not only for the attack of ground targets, and especially armor and motor-

transport, but was fitted with a time fuse for use in aerial combat. The rockets were fired electrically from slides attached to the undersurface of the wings of the aircraft. I saw these rockets fitted to both *Yak* and *Mig* fighters, and I also saw them at a later date fitted to Hurricanes which were left behind with the Soviet Air Force by the RAF wing which operated for a short time in the autumn of 1941 at Vavenga near Murmansk. Either four rockets with warheads weighing about twenty pounds each or two with warheads of about forty pounds could be attached to each wing. Fired from an altitude of about 1,000 feet or less from an aircraft diving on its target, these projectiles were very accurate. I was told that against tanks very low altitude attacks at very short range were frequently successful. For use in air combat the fuses were preset to give an echelon of bursts over a predetermined range from the aircraft—e.g. an echelon of four or eight bursts between 200 and 400 meters. I understand that rockets of the same type were subsequently introduced for antiaircraft work and it was, presumably, on these that the design of the rocket projectile for ground use was based.

I never had an opportunity of seeing any Red army self-propelled guns, but at one time or another I came across most of their artillery weapons from antitank guns up to medium ordnance. All that I saw appeared to be of conventional design and, as was the case with most Soviet equipment, they were straightforward, robust and workmanlike jobs with a minimum of trimmings.

German Failure

My personal opinion is that the principal causes of the German failure were as follows:—(1) The commencement early in November 1941 of a quite exceptionally severe winter more than a month before winter conditions usually set in. (2) The fact that the Germans fixed, or were forced by Mussolini's Balkan adventure to fix, their D-day too late. (3) The fact that the Soviet high command risked withdrawing more troops from their Far Eastern Army and produced a greater number of efficient reserves than the Germans thought possible. (4) The toughness of the Red army troops and the rapidity with which they profited by their war experience. (5) The inadequate preparations for warfare under almost arctic conditions made by the Germans, especially as regards winter clothing. The fur caps, sheepskin coats, quilted trousers and, above all, the loose felt boots of the Red army gave them an immense advantage over their enemies. I was frequently told that the Germans lost 50 per cent or more of their fighting value whenever the temperature fell below —20 degrees Centigrade.

Russian Manpower

The ultimate issue of the whole Soviet-German conflict was, to a great extent, decided by the holdup of the German advance in November 1941, and the German failure to secure Moscow and most of their pre-winter objectives. In the latter phases of the campaign, when Soviet manpower, determination and armament production, together with Lend-Lease, proved too much for the Germans with their colossal front and extended lines of communication, Hitler's refusal to sanction withdrawals, even of a minor tactical nature, contributed considerably towards defeat. This was stressed very strongly by the German divisional commander to whom I have previously referred.

I very much doubt if the German high command really failed to make a proper appreciation of Russian manpower or of the immense area and vast distances covered by the operations. They probably underestimated the extent to which the Red army had recovered from the effects of the great purge of 1937, and the good use which the Soviet authorities had made of their experiences in the Finnish war. There appears to be little doubt that the German high command and the German Embassy in Moscow were opposed to attacking the USSR in 1941, but the ultimate decision, as always, was Hitler's.

There is a widespread tendency to fail to realize that so much of the manpower of the USSR is not of genuine Russian stock. I have a vivid recollection of watching a Red army motorized formation passing through Moscow from east to west in the spring of 1942. Without exception the personnel were of pronounced Asiatic type.

The extent to which the Soviet war industries had been established east of the Urals, and their productive capacity came as an undoubted surprise to the Germans and, in fact, to the whole world. The transfer to the east of machinery and munition workers from the areas threatened, and in many cases overrun, by the German advance was equally unexpected. As a result of the rapidity of the Red army withdrawal it was quite impossible to evacuate all the plant and staff involved. In many cases the works were abandoned and destroyed. But, wherever possible, trainloads of equipment and skilled workers pulled out on their eastward journey well ahead of the arrival of the Germans.

The manpower resources of the Soviet government were, naturally, immense. In this respect they had a great advantage over the Germans. But it would be wrong to assume that these resources were more or less inexhaustible. For a variety of reasons, mostly connected with the economic structure of the USSR, the Soviet authorities found themselves, in the later stages of the war, faced by considerable manpower problems although often in a different and less acute form than those of other belligerents.

Antiaircraft Defenses

Little definite information came my way regarding the general air defense scheme and the antiaircraft layout for Moscow, except that the ground defenses were organized in four sectors. I was told that the tasks of night fighters and guns were coordinated but I was given no details. Night fighters were up during every raid, but not infrequently got out of their zones.

The Red army staff were uncommunicative on the subject of radar, but as far as warning was concerned the results, however achieved, were good; the sirens practically always gave from ten to fifteen minutes notice of a raid coming in. No information was given me regarding radar stations, but on one occasion, flying low and off the normal route in bad weather a short distance east of Moscow, my aircraft passed over a station which bore a very strong resemblance, as regards its aerials and layout, to the larger direction finder stations in this country. There was a wide observer network around Moscow, and an interesting feature of this system was the inclusion of personnel from

antiaircraft batteries of the Moscow defenses in observer posts some distance from the gun areas in the sectors involved.

Antiaircraft

The Russian antiaircraft batteries which I visited were mobile heavies in well protected positions in the inner ring of batteries in the northern sector of the Moscow defenses. I forget the exact caliber of the guns but it was about 80-mm. They were not the latest type of Red army heavy antiaircraft; for one thing they lacked automatic fuse setters. There was nothing abnormal about the layout of the battery positions, and synchronization of lights and guns appeared efficient. The predictor appeared to be of Sperry type.

Night raids were dealt with by very heavy barrage fire. This was ordered and controlled by sector headquarters. In the first few raids every antiaircraft weapon, whether heavy or light, seemed to be in action and the expenditure of ammunition must have been very great. Judged by their pyrotechnic results and by the relatively small damage done by the *Luftwaffe*, the deterrent effect of the barrages must have been considerable.

Normally all searchlights in at least one sector started sweeping just before or just after the sirens commenced. I frequently counted well over a hundred in action. Individual lights appeared to sweep an arc of about 15 degrees.

The Moscow defenses included a considerable number of streamlined barrage balloons of sausage type, with sharply pointed snouts, and they were normally up at night at heights up to, apparently, about 5,000 feet.

The gun and light defenses of Moscow were organized in two rings, the outer ring being well outside the industrial zone on the outskirts of the city and the inner ring fairly close around the city itself. A few heavy batteries were sited in the city area, and a great many light antiaircraft guns were mounted on the roofs of big buildings.

Considerable use was made of camouflage in Moscow, particular attention being paid to the prominent western elevation of the main Kremlin building and to covering over complete sections of the waterways which formed easily discernible landmarks.

In various raids the *Luftwaffe* dropped large numbers of their normal type of small incendiaries. The speed with which these were extinguished was very striking. The fire-fighting organization in Moscow, and especially the roof watching, was extremely efficient. There is no doubt that a highly disciplined population is a great asset in the all-important task of organizing defense against incendiary raids.

Winter Warfare

Perhaps a few notes on fighting in more or less arctic conditions may be of interest. I would say that there is little doubt that no army knows as much about this subject as the Red army.

Clothing is of paramount importance. The primary essential is that everything should be a loose fit. In the Red army the headgear is a fur cap with large ear flaps which tie under the chin. A thick, rough sheepskin coat, just short of knee length with a big collar, is worn over the field service blouse and warm underclothing and shirt. The trousers are made of quilted material—much the same as worn in China—and are tucked into long felt boots which come almost up to the knee. Warmth around the knees, provided by the quilted trousers, is of great importance. The felt boots are of extremely loose fit and the Soviet soldier, in place of socks, wears a long bandage, about four inches wide, of flannel or similar material which he winds in a figure of eight around his feet and ankles. These boots are extraordinarily hard wearing and so long as the snow is dry and the ground hard they last extremely well. A pair of these boots properly looked after will last for more than one winter even though the sole, like the rest of the boot, is only thick felt. The non-skid quality of these boots on ice is also of great value. During most of the Russian winter, conditions are very cold and very dry, but in late autumn and early spring when the snow is apt to melt, the Red army soldier has his ordinary boots with him for use as required. A scarf to wind round the lower part of the face including the nose is absolutely necessary. In really low temperatures only the eyes can be left uncovered. Gloves are a most important item. The outer pair has no separate finger compartments; the inner pair allows free movement to the thumbs and forefingers.

Fighting in three feet of snow and at very low temperatures requires a technique of its own. Off the roads and tracks sleighs and sledges must take the place of wheels, and movement dismounted, except on ski, is extremely difficult. It is impossible to carry on indefinitely in the open: rest and sleep are out of the question except in buildings and dugouts or other forms of cover which can be heated. Dugouts are difficult to produce as the ground is far too hard to permit digging. One alternative is to construct igloos of snow, lined, floored and covered with evergreen foliage. Another is to soften the ground by burning a large fire to permit digging. Both in an igloo and in a dugout the warmth which can be generated by a small wood-burning stove and by the inmates packed like sardines is astonishing.

Winter Tactics

Tactics in midwinter are largely effected by the possibilities of obtaining warmth and rest. So long as men are moving and fighting they can keep warm, but when they are exhausted they must have rest; and rest without warmth is impossible. Troops in the line, therefore, have to be relieved frequently to let them get back and rest.

One of the main problems in winter fighting is keeping motor vehicles and tanks running. It is impossible, even with anti-freeze in the radiator, to allow a vehicle to stop, especially in a wind, without running the engine and moving it at frequent intervals.

I was somewhat surprised at the amount of information I was asked to acquire on every kind of subject connected with fighting in very low temperatures. The Red Army were never very keen on providing information about themselves and having to approach them for information on anything that was not of immediate importance never helped matters. Considering the opportunities for studying arctic warfare provided by conditions in Canada, I was not surprised that Red army officers often asked me what the difference was between winter in Russia and in the north of Canada.

Chairman, Munitions Board Makes Report To Senate Committee

Reproduced below is a copy of a letter from Mr. Thomas J. Hargrave, Chairman, Munitions Board, National Military Establishment, to Chairman Chan Gurney of the Armed Services Committee of the Senate covering the activities of the Munitions Board.

Dear Senator Gurney:

I understand that you have requested a written statement concerning the present activities of the Munitions Board created by the National Security Act of 1947 as the successor to the Army and Navy Munitions Board. As you know, this Board is a part of the National Military Establishment and as such reports directly to the Secretary of Defense, the Honorable James V. Forrestal. It is responsible primarily for planning the military aspects of industrial mobilization, coordinating appropriate activities within the National Military Establishment with regard to industrial matters, and stockpiling strategic and critical materials. Its functions necessitate close and intimate working relationships with all elements of the National Military Establishment, the National Security Resources Board and other departments of the Government.

Current activities of the Board are largely concerned with planning for any emergency which might occur within the next two years, although many of our projects, such as our stockpiling activities, have more long-range objectives. In view of this, our plans are predicated on the use of types of material and equipment in existence today. As new developments are tried and accepted, our military industrial mobilization plans will be modified accordingly.

The Board now has an Executive Committee, a Secretariat and seven main Sections or Divisions. The Executive Committee, of which I am also Chairman, provides the executive leadership for the Staff of the Board, while the Secretariat provides administrative services for the Staff and also acts as liaison with other agencies where necessary.

A Survey Section, which functions as the working staff for a recently organized Committee on Facilities and Services, also performs special military studies relating to the coordination of activities of the National Military Establishment for the Secretary of Defense. The Committee on Facilities and Services is composed of senior representatives from each of the three Military Departments, with myself as Chairman and a Deputy Chairman, Lt. General LeRoy Lutes, also Deputy Chairman of the Executive Committee to the Munitions Board. This Committee is engaged in making detailed studies and recommendations to the Secretary of Defense on various activities of the three Departments, with a view to eliminating duplication and overlapping in facilities and services and providing more economical service where practicable.

The stockpiling and other activities of the Board related to strategic materials are handled by our Materials Division. Strategic concepts of the Joint Chiefs of Staff, when translated into material requirements and thence into raw and semifinished material requirements, form the basis for our planning. This Divisions collates all such military requirements and works with the National Security Resources Board to insure that they can be met or that necessary adjustments are made by the Departments. The Division is further charged with administration of the Stockpiling Act, Public Law 520, 79th Congress, with which I am sure you are familiar. Our stockpiling program as you know was projected over a five-year period, however at the moment we are behind in our schedule and have an unbalanced stockpile. The completion of this program depends largely on Congressional appropriations, availability of materials and prices. May I emphasize, as I have on previous occasions, that money spent on the stockpile is not, in my opinion, an expense. It is like investing our income and at the same time providing for national security. It is a savings account designed to save money and lives.

Our Facilities Division is engaged in studies related to the maintenance, development and utilization of plants, tools and other facilities to produce munitions of war. We must guarantee the preservation and availability of those facilities which we already have and, where necessary, provide plans for further expansions. A highly important aspect of the Division's activities is their plan for the orderly placement of contracts by the Armed Services during an emergency. This program is known as the "Allocation of Industrial Facilities." Considerable progress has been made in this direction and is being met with enthusiastic support from industry. As an indication of the magnitude of this task, approximately 5,000 plants have already been studied and tentatively allocated. The Board is also processing applications from the Armed Services for capacity in 11,000 additional plants. It must be recognized that this is essentially a cooperative venture in which both industry and the National Military Establishment share equal responsibility. If, however, an emergency should develop, much time will be saved in the placement of manufacturing loads on industry. This will provide for more orderly transition from peacetime to a wartime basis.

The Facilities Division is also following the day-to-day activities of the Federal Government with respect to the disposal of surplus industrial facilities and machine tools within the United States. Wherever it appears that industrial productive capacity will not otherwise be safeguarded for our future use, we are endeavoring to guarantee such protection through the application of a National Security Clause to all disposal actions.

Our Manpower and Utilities Division is studying the military aspects of mobilization of manpower and utilities for emergency use. Since the National Military Establishment will be one of the prime users of our resources, we have felt that the requirements of the three Departments should be correlated and coordinated within the National Military Establishment. This Division is also studying the military aspects of economic controls in time of war to in-

sure that the needs of the Military Establishment are properly considered. While primary responsibility for the development of economic control plans rests with the National Security Resources Board, it is nevertheless essential that the Military Establishment develop its views with respect to such studies and aid the National Security Resources Board therein wherever possible.

It is my personal hope that legislation necessary to implement an economic control program will be prepared and enacted prior to an emergency. I believe, further, that top personnel to operate such control agencies should be selected in advance, at least tenatively, and given a chance to study their proposed jobs.

One of the primary responsibilities of the Munitions Board is to coordinate appropriate activities within the National Military Establishment with regard to industrial matters, including procurement, production, and distribution plans of the Departments. Our Procurement Division handles this aspect of our work. I am charged with responsibility for recommending to the Secretary of Defense assignments of procurement responsibility among the several military services. Considerable progress has been made in this direction, more than 80% of the dollar value of all purchases by the National Military Establishment, both in peace and in war, has now been assigned to single, joint or collaborative purchase agencies. The procurement activities of the three Departments are many and varied and cannot always be consolidated without loss of efficiency. There are, however, many areas in which consolidation appears to be either necessary or desirable and there are many other areas in which the development of uniform procedures and standards will prove beneficial to all concerned. To mention a few, development of joint specifications, uniform standards and cataloging systems, uniform inspection policies and procedures, contract forms, and auditing procedures. We have accomplished much in this field but much remains to be done.

The work of collating military requirements for end products has been charged to our Military Requirements Division. The needs of the various services must be brought together into an integrated procurement and manufacturing program and this program compared with probable resources. Needless to say, the work of this Division brings it into close contact with the National Security Resources Board. We are working towards the development of a master mobilization procurement program which will constitute the very foundation of industrial mobilization planning and which will be readily available in an emergency for immediate implementation. The Board is keenly aware of the compelling necessity of keeping this comprehensive list of our estimated needs current at all times and ready for immediate use. At the present time, we are concentrating largely on coordinating methods and procedures used by the three Departments in the calculation of their requirements, so as to insure comparable data from each Department.

The Military Requirements Division is also responsible for determining industrial priorities necessary to implement strategic priorities fixed by the Joint Chiefs of Staff. This is considered to be a most essential element of our activities and one that will be required in the early stages of any emergency. Our work in this respect has just begun, however we hope to bring it to a conclusion at the earliest practicable date.

There is a strong military interest in the conduct of our foreign trade in peacetime as well as in war. Because of this, we have established a Foreign Trade Section which is charged with responsibility for developing our interest in this field. From a military standpoint, the controls over our trade with other nations should provide adequate protection against diminishing our critical resources. Also, we seek adequate protection against increasing the war potential of possible enemies. The Board followed closely the drafting of a charter for the International Trade Organization at the recent Havana conference. We now have a representative at Bogota who will advise us concerning developments of military interest at that conference. In addition, we are following the progress of the European Recovery Program legislation.

Our Foreign Trade Section has established close working relationship with the Department of State and with other interested Departments of the Government and acts as a clearinghouse between the three Departments and such agencies on all matters related to foreign trade or economic foreign policy in which the National Military Establishment has an interest. In connection with this work, we now have representation on the Executive Committee on Foreign Economic Policy, the National Munitions Control Board, the Advisory Committee and the Review Committee established by the Secretary of Commerce, the Committee for Unclassified Technological Information, and the Committees on Trade Agreements and Reciprocity Information.

The planning of the Munitions Board is aimed at industrial preparedness. It is our purpose to avoid rather than invite war by being prepared. Industrial planning is admittedly only one element of a strong America. Other important elements must also be present. A unified and strong Military Establishment, coordination of research and development and a Central Intelligence Agency, together with the force of healthy industry and sound industrial mobilization planning, will in my opinion, comprise a combination of power for peace.

Sincerely yours,

T. J. HARGRAVE,
Chairman.

44th AAA Brigade (Continued from page 7)

temporary headquarters, the advance party had a busy time. First priority was given to getting the Brigade Headquarters and Battery from Corsica to Marseille. With this task in motion, the next job was the selection of thirty additional Staff Officers—these to come from AAA groups then in the Staging Area of Marseille. The Battery was also to be augmented by some two hundred men but their selection was left to the various Chiefs of Section. The paper work involved gave Major George Otto, S-1, as well as his assistants Captain George K. Anderson and Chief Warrant Officer Raymond J. Henneberry quite a headache.

The initial troop list was as follows:

Headquarters, 44th AAA Brigade
Headquarters Battery, 44th AAA Brigade
1st Special Service Force
899th AAA AW Battalion (SM)
442d Regt. Combat Team (Includes 100th Inf Bn)
Units of the First Airborne Task Force as follows:
Hq and Hq Battery 421st FA Group
601st FA Battalion
602d FA Battalion
937th FA Battalion
68th AAA Gun Battalion
Co B, 378th Engr Battalion
676th Medical Collecting Company
390th Medical Collecting Company
2d Platoon, 514th Medical Collecting Company
552d Inf AT Company
6828th Signal Detachment
3359th QM Truck Company
3d Ordnance MM Company
132d Ordnance Bomb Disposal Squad
548th APU
79th Finance Disbursing Section
1st Bn, 40th Engr Regimental Combat Det
65th Inf Regiment
Hq & Hq Co Reserve Command (14th Armored Div)
19th Armored Inf Battalion
68th Armored Inf Battalion

In addition we were closely supported by a Naval Flank Force and two squadrons of American planes flown by French pilots. The Naval Flank Force, commanded by Contre Admiral Jaujard, flying his flag from the Cruiser Montcalm, normally consisted of two cruisers and six destroyers, the cruisers being French and the destroyers American. Occasionally, when missions assigned by the Brigade required it, an additional cruiser was available

With preliminary administrative details out of the way, the size and nature of the Task Force established, the General and S-3, pending arrival of the Brigade Headquarters, settled down to a study of the tactical situation. It was self-evident that the Alps running from the Swiss border to the sea constituted the natural defense line of the Ports of Marseille and Toulon and for practical purposes channelized fighting to four main avenues of approach.

The M.L.R. originally established by First Airborne Task Force was already organized to meet this situation but the General felt that in the event of a determined enemy effort to break through—possible but seemingly not probable—the positions were "Thin."

With this in mind preliminary plans, later implemented and approved, were drawn up to organize the sector in depth from the M.L.R. west to the Var River. In the event of trouble these plans called for the use of Delta Base and French Garrison Troops.

The selection of positions, their fortification and plans for demolition eventually kept the S-3 section and the First Battalion of our 40th Combat Engineers busy for some weeks.

With the coming of the Bulge these perfected plans gave us a feeling of great comfort. At that time a diversionary attack along the Coastal Plain would have added much to the woes of SHAEF. It was always our opinion that only lack of enemy initiative prevented at least a "scare attack" during the break-through in Northern France.

With two divisions, the 34th German and the Fascist Littorio, Von Leib, the German Commander, could have given us a bad time. He didn't, and our successful containment of these two divisions later brought a letter from General Mark W. Clark in which he said he felt we had "done more than a little bit to help in the Italian situation."

The Brigade Headquarters and Battery after a stormy crossing, considerably delayed by high winds and many sunken ships in the harbor, finally disembarked at Marseille on the 6th of November and the Relief of the FABTF was completed at 1800A hours 21st November 1944.

With headquarters established in the Hotel Ruhl, Nice, the Brigade got under way and in twenty-four hours was functioning without a hitch though it had absorbed thirty new Staff Officers, two hundred additional battery personnel, Medical Collecting—including a hospital train—Signal, Ordnance, Quartermaster, Finance, Bomb Disposal and Armored Troops along with seven or eight hundred pack mules and the only Pack Artillery Battalion on the Western Front.

The speed with which the Staff developed an appreciation of the principles of Air, Land, Sea and Psychological Warfare was gratifying and assured the success of the Command.

The final disposition of the infantry elements of the Task Force on the M.L.R.—actually a series of strong points covering the passes—was as follows: the 442d Regimental Combat Team, less three Companies used as a mobile reserve, held the southern and most active sector with its right (East) flank resting on the Mediterranean and supported by the 552d Infantry Anti-Tank Company. Then came in succession from right to left the 65th (Puerto Rican) Infantry, the 899th AAA AW Battalion (converted to infantry) and finally on the extreme left (North) flank eight F.F.I. (French Forces of the Interior) battalions. These latter troops were composed entirely of former members of the French Resistance. At this time the French were making an effort to incorporate them into the regular French Army. They were a tough, casehardened lot with many of the characteristics of the Foreign Legion. Assigned the quietest part of the line, which was also the wildest and most mountainous, they suffered considerable hardship due to a serious shortage of food, clothing and equipment. Once they learned that trying to hijack jeeps from American

soldiers did not pay off, they settled down and became excellent mountain troops.

With French, Japanese-American and Puerto Ricans, the Command had all the aspects of an International Brigade and with the 65th some of the language difficulties, never serious but occasionally amusing—the Puerto Ricans for instance, regularly and cheerfully stated, on their daily reports to headquarters: Combat Efficiency—nil! It was while commanding this outfit that Colonel George Ford, CAC, was killed leading a raid against a strongly held position.

While on the subject of troops comprising the Task Force a word of praise is very much in order for the outstanding performance of the 899th AAA Battalion of the Pennsylvania National Guard. Being among the first troops assigned to the Task Force they shipped early from Corsica and within seventy-two hours after arrival at Marseille were re-equipped as infantry and in battle positions in the Alps. Their adjustment to their new "Branch" was incredibly speedy. In nothing flat it seemed they were veteran infantrymen and mountain infantry at that—which speaks well for the precise and disciplined training of the AAA.

As for the 442d R.C.T. nothing need be said—their efficiency and valor are known and talked of wherever soldiers meet.

The elements of the 14th Armored Division were only with us a short time, but long enough to smell powder and clasp to their breasts a considerable number of Combat Infantry Badges. The First Special Service Force was relieved at about the same time.

Generally speaking the fighting was confined to getting aggressive patrols or raiding parties into enemy territory and keeping them out of ours. In this we were most successful, with prisoners—German—being almost automatically provided by our patrols on S-2 demand. A total of eighty-nine were taken, for intelligence purposes, against a total loss of two Americans. The inability of the enemy to get information kept them jittery. On one occasion they staged an eighty-man—commando trained—raid against a twelve-man outpost of the 442d R.C.T. A bitter fight developed with the Germans finally bolting leaving thirty dead and fifteen prisoners. We suffered no casualties and lost no prisoners to the enemy. Similar isolated actions were almost a daily occurrence and were typical of the fighting throughout the sector.

One exception to this routine was the "Naval Engagement" of Menton Bay when an outpost of the 100th Battalion 442d R.C.T. engaged and captured a one-man submarine—in a rowboat.

Being Hawaiian and therefore natural fishermen they kept a weather eye peeled for such sport as the Mediterranean had to offer. On this occasion someone yelled "Fish" but before the cook could get his skillet hot, the cry was changed to "Submarine." Nothing daunted, two or three of these amphibious-minded young soldiers grabbed tommy-guns and put to sea in a rickety rowboat. The "one-man crew" of this whale-like looking and dangerous craft, which had developed some mechanical difficulty, decided to return to his base but had mistaken Menton for San Remo—and so quietly retired from the War.

The capture intact of this submarine plus four M.A.S. boats brought wails of anguish from our friends on the Naval Patrols, but also brought the General a charming and amusing cable from Admiral Sir John Cunningham, Commanding the Mediterranean Naval Forces, congratulating him on our "Naval Engagements" and "wishing his Navy could capture as many boats as our battalions."

The Brigade artillery was also busy and on its toes. Its emplacement presented a tough problem, but despite roads coiling down the slopes of the passes like "squeezed out toothpaste," hardly jeepable, they inched their guns into fine positions and inflicted heavy damage on the enemy. Among the artillery units was the only Pack battalion on the Western Front. With four hundred fifty mules, and about as many men, they were capable of getting into practically any position and of going from Pack to firing in a trifle over two minutes. These mules, plus two or three hundred others used by the infantry to pack in supplies, were vital to operations and maintenance in this mountainous country. It seemed a bit strange to hear the term Mulehead instead of Railhead and still stranger to Captain Thomas E. Hickey, Brigade S-4, who found the nomenclature and requirements of mules a bit trying.

Under the supervision of Colonel Thomas J. Shryock, Jr., C.O. of the 421st F.A. Group and Brigade Artillery Officer, our Gunners did a fine job, not only in their own line, but also in assisting in the Fire correction of many of the bombardment missions assigned to the Naval Flank Force. Skilled observers located high in the Alps and connected by Shore to Ship radio, gave invaluable aid to the now truly welcome "ships afloat."

Because of the almost unavoidable problem of "Mask" in such mountainous country, our Naval Task Force was of tremendous importance in the destruction of important enemy installations such as the one-man Sub Base in the small but efficient port of San Remo. These strange little craft were quite capable of sinking a cruiser and were the cause of considerable concern to Mediterranean Naval Command. Our Naval support however soon took care of this situation by destroying their Base of operations.

Our Air Support consisting of P39s and P47s using 500 pound bombs, was always a joy. Aided by accurate intelligence data, secured from Italian partisans and our own agents, they inflicted some terrific punishment upon the enemy. Their most notable feat was the simultaneous bombing and destruction of the Headquarters, Mess and Personal Quarters of General Von Leib. Unfortunately, the General was absent from his Command but later reports from reliable agents indicated that some twelve to fifteen members of his staff were killed in this one raid. The same Headquarters was located and destroyed on two other occasions. We also located and destroyed the Gestapo Headquarters for Northern Italy and the Headquarters of the Commando School in the same area.

Excellent Air Support also compelled the enemy to make practically all of his road and rail movements by night which, in view of the nature of the terrain considerably handicapped his freedom of movement.

The S-3 having his hands full with the ground troops left the almost daily briefing of our Air Force to Captain Haven Putnam, Assistant S-3. The latter's good judgment based on the excellent information received from the S-2 aided

materially in the splendid results obtained. The total "Bag" for Air Support was:

160 motor vehicles
30 railway cars
10 railway locomotives
1 ammunition train
3 JU-88s
5 gun batteries
6 ammunition and supply dumps
5 medium sized war plants (Italian)
4 bridges

In addition to the above, over fifty troop barracks and installations were seriously damaged and five troop trains were strafed with excellent results. Twenty-three enemy Command Posts and Headquarters were critically damaged.

While all of these activities were going on with our various combat units, Headquarters and its Special troops were kept on the hop too. The Brigade Communications Section and the 6828th Signal Detachment were confronted with many problems as a result of the mountainous and winter-bound terrain. Patrols between our Northern (Left) Flank and the elements on the (south) Right Flank of the First French Army were almost impossible because of the heavy snows. We were accordingly compelled to carry out hourly contact by radio. The installation of the necessary stations and their maintenance through desolate country was quite a problem but was nicely handled by C.W.O. Bernard L. Neville and Lieutenants James E. Johns and Charles Warner, the Brigade Wire Officers. To assure adequate and secret communications with Headquarters Sixth Army Group, we had one of the famous Sigabas which incidentally had to be under armed guard twenty-four hours a day with means of instantaneous destruction available at all times.

In the meantime having discovered that Nice, with all of its civilian responsibilities and worries, was no place for a Combat Headquarters, not to mention the fact that it was slowly but surely shattering the nerves of our chief politico Captain Joseph Welch, Brigade S-5, permission was requested from Sixth Army Group to move the rear Boundary of the Combat Zone about eight miles forward (East). When this was approved, we hastily presented Nice to Brigadier General John Ratay, Commanding Delta Base who had always had his eagle eye on it anyway, as a proposed rest center for enlisted personnel.

It was a "good deal" for we were more or less relieved of our civilian problems, retained a fine hotel in the town for the exclusive relaxation of our own troops and set up new Headquarters in the beautiful Hotel Bristol in Beaulieu Sur Mer.

Here we found not only excellent headquarters facilities but very comfortable quarters for all headquarters personnel, both enlisted and commissioned. The hotel was completely staffed and furnished, including the proverbial red carpet, and afforded excellent means for the necessary social contacts with the Prefect of the Department, the reigning Prince of Monaco and many other Dignitaries.

Of all the many and varied activities of such a Command, the doings of S-2 and his Cloak and Dagger boys was of outstanding interest, certainly to the General, who admitted he had always been a push-over for spy stories. The nature of the terrain with its wooded and mountainous passes as well as the Mediterranean Coast made the Italian border an ideal position for the attempted passage of enemy agents, as well as our own, with the result that we had attached or under our control for "coordination of activity" twelve special Intelligence Agencies, French, British and American. Thus S-2 and his assistants Captain James C. Galloway and Lieutenant George A. Warren, Jr., had their work cut out for them. Assisted by Captain Geoffrey M. T. Jones O.S.S., and Lieutenant Heines of Sixth Army Group C.I.C., an intelligence operation plan was soon in effect.

S-2 activities through these various agencies covered such things as normal C.I.C. and O.S.S. operations, propaganda in Italy for Mediterranean Theatre, exfiltration of escaped Allied prisoners of War still behind enemy lines, espionage in Italy for the Mediterranean Theatre and ourselves, British assistance to Italian Partisans in Northern Italy and last but by no means least, preventing passage through our lines of enemy agents.

While our people passed into Italy almost at will supplying us with much valuable combat as well as other information, no enemy agent, to the best of our knowledge and belief, effected a successful crossing of our lines either by land or sea.

Ten enemy agents were captured; one of these, a rather celebrated German operator known to our people as "Fritz," was apprehended while trying to slip around our Flank via the Mediterranean. He was one the Japanese Americans missed, but he was safely bagged by a shore patrol of Algerian troops, loaned to the Brigade by the French for this purpose. Though instructed to take all such prisoners alive, these doughty warriors killed Fritz's two companions, sank his boat and lost his radio. The Sergeant (Arab) in command of the Patrol was confined for a week by his French officer for disobedience of orders. However Fritz was quite a prize and the General gave the Sergeant a Brigade Commendation, complete with seal and ribbon, and jollied the French into giving him a week's furlough after his sojourn in the Clink.

As a result of superior espionage, the Brigade averted a considerable disaster—the destruction of the beautiful little city of Menton. Nestling in the hills bordering the Mediterranean this famous resort town was directly on our M.L.R. and accordingly largely evacuated.

On the 28th of February reliable information was obtained from Italian partisan agents indicating that an armored train composed of twelve carriages mounting twelve 155mm quick firing guns and two accessory carriers mounting electric guns of six tubes and 22,000 rounds of ammunition were concealed in a railroad tunnel in the vicinity of San Remo. Destroyed bridges made it impossible for this train to rejoin the main German front in Italy so Von Leib, considering the train as lost, decided to have a last fling with it, no doubt in retaliation for all the damage and personal discomfort inflicted on him by our shelling, bombing and Naval bombardment.

Firing was to start on Menton at twilight on the evening of March 1st.

With detailed information of Von Leib's plans in our

hands, including pinpoint map references as to location of his Fire Control Station and searchlight generators, the Brigade went into action on the morning of the 28th of February with everything it had, Artillery, Navy and Air Force.

As we could not destroy the train itself, being in a tunnel, the only alternative was to endeavor to blow up the railroad tracks and if possible, cave in the forward mouth of the tunnel. Unfortunately the granite of the Alps was impervious to six inch shells and five hundred pound bombs so help was asked from the Sixth Army Group Tactical Air Force. Though they themselves were busy at this time with events to the North, Colonel Doyle, then with Group Tac Air, promptly came to our assistance with medium bombers, B26s, and one thousand pound bombs. After two "missions" it was impossible for Von Leib to carry out his plans. Though the train was not destroyed, its effectiveness was, as it bottled up in its tunnel.

The excellent work of S-2, his agents and agencies had again proved valuable and we were all glad that, not being an E. Phillips Oppenheim addict like the General, his enthusiasm was never dampened by the fact that his "Spies" never turned out to be beautiful blondes.

Intelligence was definitely the General's military hobby and he rode it hard. No achievement of the Brigade pleased him so much as the implication contained in a remark of Von Leib, when captured by 5th Army, to the effect that he had never known the "strength, disposition, or intent" of the forces opposing him in the Alpes Maritime.

And so things went. Too much happened to crowd into this brief account. The story of Monaco alone with its gambling, Black Market, rumored secret agents and charming Prince would take too much space.

As one Correspondent described it, the fighting here on a seemingly forgotten front resolved itself into a Walt Disney-like warfare of color and contrast. Along the Coastal section we had red hills, umbrella pines, orange trees, picture book villas "mad with Mimosa in flower," and among the pines, mine fields, where men had their feet blown off every day. Inland, snow-capped mountains towering a mile high with deep shadow-shrouded valleys through which other men were shooting their way, frequently to death, while peasants were harvesting their olives on the terraced slopes below. Altogether a fantastic mixture of peace and war unequalled on any other front in Europe.

Early in March we were informed that the entire Franco-Italian border from Switzerland to the Sea would pass to the command of General C. A. Doyen, Commandant of the newly created French "Alpine Front Command."

Being desirous of creating a bit of historical background for the Brigade, the General at his conference with General Doyen, concerning the relief, arranged things in such a way that we too passed to the French for seventy-two hours thus becoming a part of that famous and elite French "Army of the Alps" which traces its history back to Napoleon's passage of those mountains.

The relief by the 1st French Division under command of General Garbay was completed at 1800 hours on the 21st of March 1945 and we moved on to Germany and the Seventh Army.

Before going into the next phases of the Brigade's E.T.O. operations a word should be recorded in appreciation of the efficient and friendly assistance rendered us by our French Military-Civilian Mission. Major Jaques Weygand, son of General Weygand headed the Military Section while Viscomte Chauncey de Pew de Bresson headed up the Civilian end. Their combined knowledge of the over-all situation both political and military as it affected the citizens of France and Monaco was invaluable and did much to smooth the path of the Command by bringing to it the friendly cooperation of all concerned.

In commenting on the Brigade's performance of duty in its Alps assignment General Jacob L. Devers said, in part, in a letter to the General:

"In spite of the fact that it was an unfamiliar role for an antiaircraft brigade headquarters, the 44th Brigade performed in an outstanding fashion. During the period that this mission was in effect, the Headquarters commanded infantry, field artillery, tank destroyer, antiaircraft artillery, and tank units.

"It is a pleasure for me, as Commanding General of the Sixth Army Group, to commend you and the other officers and men of the 44th Antiaircraft Brigade for a job well done."

With orders in hand from Sixth Army Group to report to C.G. Seventh Army for the purpose of organizing and Commanding a Security Command, the General and appropriate Staff Officers pushed off on the 23d of March followed closely by the Brigade Convoy. Having reported as directed, Seventh Army issued orders on the 3d of April 1945 designating the C.G. 44th Brigade as Commanding General Seventh Army Security Command and detailing certain troops for the purposes of that Command.

Among the troops detailed were several of our Alpine Units—the 421st F.A. Group and 601st and 602d Field Artillery Battalions and the 65th Infantry. Eight or ten AAA Battalions were also attached. Here we picked up again our own Op. Detachment commanded by Major Clifton S. Brown. Having had no need for them in the Alps they had been loaned, as had our Radar Officer, to the Seventh Army. They reverted to us here by reason of the fact that once again we were to have a bit of AAA to think about, to wit: the antiaircraft protection of the Rhine River bridges in the Army area. However we quickly passed this one to the 5th AAA Group Commanded by Colonel now Brigadier General John C. Henagan of fond African memory and got down to the real job of trying to assure the security of the 9000 square miles in the Army area.

It was never a happy job. Corps set up their own Security Commands and while theoretically under control of the Army Security Commander, time and speed of movement prevented proper coordination. From our point of view these Commands were primarily useful in giving a job to AAA brigade or group commanders whose anti-air missions were practically finished. Generally speaking they expected the Army Security Command to take over whatever they were "securing," first, whenever it became of interest at very high "levels" and could cause real trouble or second when it passed behind their Corps (rear) boundaries. This latter was in accordance with plan but the inability of Seventh Army to furnish sufficient troops and trucks

made the speedy relief expected impossible.

In four weeks we raced across Germany through Kaiserslautern, Herrnsheinn, Kitzingen, Heubach and Starnberg. This latter town was notable for two things, the German surrender and the liberation—by us, of Wilhelm Frick's really choice cellar, which was to stand us in good stead in our next Command with Third Army.

With the War over, Seventh Army released us with unflattering speed and we next reported to XVth Corps in Salzburg, only to be informed that there was no assignment for us and that as a matter of fact it was not clear why we had been attached.

So with no job in hand, and undaunted by this chilly reception, we decided to relax and promptly removed ourselves from Austria to the charming German village of Schellenberg in the heart of the German Alps. Here with two hotels of picture-book variety and a trout stream we spent three or four delightful weeks with little to do but clean up and get records in shape.

The General busied himself preparing recommendations for awards to Brigade personnel for exceptional performance of duty. These netted the members of Brigade Headquarters and Headquarters Battery a total of sixty-one decorations, including 5 Legions of Merit, 42 Bronze Stars and 14 Croix de Guerre (French) of varying degrees.

There were many other awards to officers and men of units which had served with the Brigade, among these being a D.S.M. to Colonel Charles W. Pence original Commander of the 442d R.C.T. and Legions of Merit to Colonel V. R. Miller his successor, Colonel Thomas J. Shryock, Jr., and Colonel Norman Hartman—the latter for service in Corsica.

In the meantime the General was also trying to "Angle" a training assignment (AAA) back on the Riviera, but redeployment killed that one. However our friends had not forgotten us and late in May orders were received relieving us from the XVth Corps Seventh Army and attaching us first to XIIth and shortly thereafter to XXth Corps Third Army for occupational duty.

Here as with Sixth Army Group, the Staffs of Third Army, XIIth and XXth Corps gave one the feeling that they were there to help, not hinder and that theirs were the laps into which we could drop our troubles if any—a happy feeling which explains much of the pride and do or die spirit among the units serving with them.

New Headquarters were located at Adldorf, in a lovely old Schloss, but just as we had settled down, orders were received directing the General to report to the Commanding General Third Army. Accompanied by S-3 he proceeded to Bad-Toltz. Upon arrival there they were received by the Chief of Staff, Major General H. R. Gay, who had been a brief but very welcome visitor while the Brigade was in the Alps. The General was informed that orders were being issued relieving us from XIIth Corps, attaching us to XXth Corps, and directing us to proceed without delay to Berchtesgaden, relieve the 101st Airborne Division commanded by Major General Maxwell B. Taylor, and take over the Kreises (Counties) of Berchtesgaden, Laufen and Traunstein. Before leaving Headquarters the General and S-3 were received by General Patton who told the General that he wanted a "damn fine show" as no doubt everyone at the coming Berlin Conference would want to see the sights of that fabulous playground of Nazi Officialdom—as usual he was right.

After some delay apparently resulting from uncertainty as to the future disposition of the 101st Airborne Division, the Brigade took over around the end of June 1945.

Aside from the 6th Armored Group, eight C.I.C. Teams and the 22d C.M.L. (S.G.) all troops were AAA including the 24th, 112th and 207th Groups, the latter being originally the headquarters and headquarters battery of the 207th C.A.(AA), the General's old Regimental Command.

Eleven battalions were attached. Once again these AAA troops took on their new and somewhat unusual duties, primarily police functions, in a manner reflecting great credit upon their early training and discipline.

General Louis A. Craig Commanding XXth Corps, after an inspection of our Command wrote, "the outstanding impression of this visit was the tone observed throughout the area. In spite of slackness observed in other areas since VJ Day I was tremendously impressed with its absence in this, despite the large numbers of visiting troops." The visiting troops averaged between seven and eight thousand a day and from the point of view of proper uniform enforcement presented a mean problem, particularly in view of General Patton's well known ideas on that subject.

Headquarters were set up in the magnificent establishment built by Field Marshall Keitel as headquarters for the German General Staff. Of all the fur-lined foxholes this was tops. Beautifully landscaped, provided with tennis courts and a swimming pool, it was located in the shadow of snow-capped Mt. Watzmann, and was just a stone's throw from the Koenigssee and Obersalzberg where Hitler built "Berghof," his home, and his famous tea house on an Alpine peak towering 6500 ft. above sea level. We were truly in the center of the "Community of the Fuehrer"! But the Mighty had come to a low estate and the Brigade spent some five months rounding up and throwing once haughty Nazis into detention camps.

Our mission, like that of all Forces of Occupation, was one of many phases: Security of the Area, support of Military Government, apprehension of Enemy Nationals wanted for war crimes, arrest of Nazi party officials, assuring the welfare of displaced persons, elimination of Black Markets, prevention of the formation of subversive cliques in P. W. and D. P. Camps and in our case acting as hosts for the Third Army.

The chief activity of the Brigade naturally centered around C.I.C. operation. Patrols, Fixed (Road Blocks) Foot, Motorized, and on occasion Air were promptly organized, drawing a tight cordon around the area. Headquarters for the C.I.C. Teams and the several battalions were established in the principal towns. An AAA Group was assigned to Command in each Kreise. The Chief Military Government Headquarters was established in the town of Berchtesgaden and certain battalions were temporarily organized as Military Police.

Our chief difficulty in organization arose from the redeployment of units and individual soldiers, of whom some eight to ten thousand were processed on "points" by the S-1 Section, for C.B.S. or home. Here too we lost our Executive Officer and the General's two aides, Lieutenants

Edward A. Fillman and Beauvais Duffy. Lieutenant Robert A. Little was appointed Aide and the S-3 shifted to the Executive Officer's job. Here also Lieutenant Colonel Eric Rundquist and Major Jack C. Clark joined us.

The C.I.C. Teams under the coordination of the S-2 got under way with dispatch but as has been said before space forbids a full account of their doings. However a few excerpts from weekly Intelligence Summaries will give some idea of what was going on in Bavaria during the early days of the occupation. The following are quotes:

"Communism in Bad Reichenhall, Germany. There are daily evidences that active recruiting of members for the Communist Party of Germany is about to begin. In Bad Reichenhall Johan Valentiner is now rather widely known as the leader of the Communist Party in that town.

"It is persistently rumored that the Communists are attempting to recruit Nazis who have been turned out of public office by American Military Government rules and are at the same time attempting to put into office, by suggestions to M.G., non-Nazi Communists. There has as yet been no open or public Communist gathering, but one is imminent. The Communists are apparently smart enough to take advantage of the opportunity which is presented to them. There is no opposition expressed by the Allies against their open propagandizing of the German peoples." This in September 1945!

"Mayer, Dr. Hans Georg—Arrested 17 August 1945. SS Sturmbannfuhrer of the Allgemeine SS, former Regierungsrat of the Polizeiamt in the cities of Litzmannstadt and Pabianice in Poland, in charge of the Jewish Ghetto where 8000 people were jammed in under terrible conditions, later being done away with in gas chambers; served as SS Sturmbannfuhrer of the Reichskommisar fur Norwegen, Dr. Terboven; had a forged discharge paper on his person; forcibly resisted arrest."

Of all the hundreds of arrests effected, the most unusual perhaps was the apprehension of three of Hitler's personal servants—cook, valet and chauffeur, and Eva Braun's hairdresser. Hitler had personally ordered them flown from Berlin to Berchtesgaden two weeks before Berlin fell. After giving much valuable information all four were released—with the cook going to the General's personal Mess. As Keitel's butler was already installed there, housekeeping arrangements were well under control for the deluge of distinguished guests about to descend upon the Brigade. It was an altogether delightful deluge, with no social worries as all facilities were available for formal entertaining.

In addition to our own palatial headquarters including Keitel's home we had the Hotel Berchtesgaden Hof, formerly the official hotel in the area for members of the Nazi Party. This was used by us for the quartering of guests.

The rest center for troops of the Command was located in five hotels on the world-famous Koenigssee. Here everything was done to assure the comfort of the men even to the morning delivery of the *"Stars and Stripes"* to the guests' rooms—the early lack of which constituted the only grouse received from the thousands of soldiers passing through the center. Major Malcolm D. Gordon, Brigade Real Estate Officer, was one of the busiest on the Special Staff as he was charged with the over-all control and maintenance of all Brigade Real Estate.

Among the first Official guests to arrive at Headquarters was General of the Army George C. Marshall.

Accompanied by a few Staff Officers, among whom was Colonel Frank McCarthy, secretary of the General Staff, General Marshall settled down for a few days rest. He was quartered in the Hof in what had been Himmler's suite.

For us the highlight of his visit was a small dinner for eight given in his honor by the Brigade Commander. The General seemed a bit amused when he learned that the dinner had been served by Keitel's butler and prepared by Hitler's cook.

During his brief stay all official business was routed through Brigade and S-3 felt he had truly arrived—and was more or less running the War in Japan!

Later in a letter to the Brigade Commander General Marshall said, "I should like to commend particularly Colonel Scovill" (S-3) "Captain Forster" (Headquarters Commandant) "and Lieutenants Butler and Van Anglim" (who between them ran the Hof).

The roster of guests included then Secretary of the Navy Mr. James Forrestal, Assistant Secretary of War Mr. John J. McCloy, Admiral Ernest King, Chief, Naval Operations, General of the Army H. H. Arnold, General Brehon Somervell; also Lieutenant General Cannon, Commander of the 9th Air Force, accompanied by Mr. John W. Snyder now Secretary of the Treasury, Mr. W. Stuart Symington presently Secretary for Air and Mr. Leslie Biffle, Secretary of the Senate. Others included Major Generals W. E. Kepner and J. H. Hilldring; General of the Army Eisenhower and General Mark W. Clark also spent part of a day with us. It was while here in Berchtesgaden also that General C. A. Doyen, Commandant of the Alpine Front Command, came from his headquarters in Grenoble to present French Decorations to personnel of the Brigade.

During a small dinner in honor of General Doyen, the Brigade Commander remarked that he disliked the term "Eagle's Nest" as a designation for Hitler's Tea House, it being his opinion that there was nothing courageous and eagle-like about Hitler. General Doyen replied, "Why not call it 'Hitler's Lair'?" The next day it became the Lair.

In October 1945 orders were received to proceed to Camp Atlanta and home.

A pleasing climax to the Brigade's service with Third Army came in the form of a letter to the C.G. from Gen. Patton in which he said, "As you know I had only one opportunity of visiting Berchtesgaden but I was well assured by the efficient manner in which it was being conducted that visits of inspection were not necessary."

With our Relief effected, Headquarters and the Battery proceeded to Camp Atlanta, thence to Camp Lucky Strike, Le Havre, the Naval Transport West Point, Newport News and Camp Patrick Henry where, again under the helpful eye of Colonel Fountain, the Brigade was deactivated and scattered to the thirty-odd states called Home.

Having been together as a "Team" for over three and a half years, having fought a bit and laughed a lot the parting was sad but the spirit of the Brigade has been kept alive by much correspondence, many personal reunions and lasting friendships. The diligence, spirit, loyalty and enthusiasm of all concerned will be a happy and lifelong memory for all of us.

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 Baker, California.

Items pertaining to Antiaircraft Artillery should be sent to the Antiaircraft Test Section, Army Ground Forces Board No. 4, Fort Bliss, Texas.

Any recommendations made or views expressed herein are those of Army Ground Forces Board No. 1 and are not to be construed as representing the opinion of all War Department or Army Ground Forces Agencies.

Under Orders to Join—LIEUTENANT COLONELS WILLIAM B. HAWTHORNE and RICHARD R. MOORMAN

16-inch Gun Firing Tests. The Seacoast Service Test Section recently has completed tests involving the firing of seven subcaliber and three service practices by a 16-inch gun battery. These firings were in conjunction with service tests of newly designed electronic fire control equipment for major caliber batteries.

The troops for these tests were furnished by the Artillery Detachment of the Seacoast Branch, The Artillery School. This detachment is charged with providing firing personnel for 90mm, 155mm, 6-inch, and 16-inch gun matériel. Personnel shortages were such that it was necessary to press into service, personnel from the Mine Detachment of the School, thus forming a composite gun battery. The service practices were conducted following a one month's intensive training period, which included the subcaliber practices.

All participants showed a great deal of interest in the training and firing. The fact that the three service practices were fired without an error chargeable to personnel, is indicative of the high state of training achieved by the battery. Besides furnishing all of the test data required by the Seacoast Service Test Section, these firings provided a convincing demonstration of the accuracy and fire power of major caliber land-based artillery.

Offset Firing Tests. Initial offset firing tests were conducted in conjunction with the subcaliber firings with the 16-inch gun battery. The study on devising a system of offset firing has been underway since May 1946. Most of the problems have been solved and a tentative system devised.

Using one AN/MPG-1 type radar to furnish position finding and spotting data for a point three degrees to the right of the target boat, and a second AN/MPG-1 radar to furnish photographic records of the deviations, two subcaliber practices were fired. The first of these practices was fired on a crossing course and the second on an outgoing course. Results of the test showed that further coordination would be necessary to provide satisfactory data for precise analysis. However, the firings did provide a demonstration of the advantages of offset firing. It is believed that this is the first time in coast artillery history that firing has been conducted on a direct outgoing course, since safety requirements would preclude firing at a target on such a course. As mentioned above, by the offset system, the firing was conducted at a point in the water three degrees to the right of the outgoing target boat. Offset firing also will provide better training on high-speed maneuvering courses.

Further tests envisage the use of only one AN/MPG-1 radar to provide position finding, spotting, and record data. At the conclusion of these tests, the two systems will be evaluated and the complete offset firing system formulated.

Coast Artillery Journal

Fifty-seventh Year of Publication

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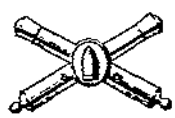

The purpose of the Association shall be to promote the efficiency of the Coast Artillery Corps by maintaining its standards and traditions, by disseminating professional knowledge, by inspiring greater effort towards the improvement of matériel and methods of training and by fostering mutual understanding,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

News and Comment

This Issue's Cover

The cover shows the 44th AAA Brigade border guard between Germany and Austria. This particular post was manned by Battery "A" of the 441st AAA Battalion.

No News On Journal Merger

At the time the last issue went to press we were under the impression that we would be able to publish additional information in this issue concerning the *Infantry Journal's* proposal for a merger of the Journals and Associations of the Ground Combat Arms.

However, no decision has been reached by the Infantry Association with reference to General Lutes' letter requesting clarification of the proposal so there is nothing further to report at this time.

As soon as a reply has been received and studied by the Executive Council, full details will be published in the JOURNAL.

As previously mentioned however, no positive action will be taken by our Executive Council until the entire matter has been put to a vote of all Association members and any future decisions will be based on the expressed wishes of the voting membership.

Appointment of Civil Defense Planning Director Announced

The appointment of Mr. Russell J. Hopley of Omaha, Nebraska, President of the Northwestern Bell Telephone Company and one of the top executives of the Bell Telephone System, as Director of a unit for civil defense planning in the National Military Establishment has been announced by Secretary of Defense James Forrestal.

Under Mr. Hopley's direction, a planning group responsible to the Secretary of Defense will begin studies to serve as the basis of a national program of civil defense, including plans for the structure of a permanent civil defense agency and the preparation of legislation to establish such an agency. Mr. Hopley has taken a temporary leave of absence from his business to serve in this capacity until the development of such plans is completed.

Mr. Hopley has his offices in the National Defense Building (Pentagon). He was born in Blue Island, Illinois, and lived for a number of years at Fort Madison, Iowa. His entire business career has been in the field of communications. He began working for the Iowa Telephone Company, now the Northwestern Bell Telephone Company, at Fort Madison, Iowa, in 1915. He became vice president in charge of operations in 1937, and has been President of the company since 1942.

Mr. Hopley served as General Chairman of a group that developed the Omaha Improvement and Development Program, which has received international recognition.

Changing the Name of the Journal

A ballot for the proposed amendment to the Association Constitution appears on this page.

This ballot covers the matter of changing the name of the JOURNAL to the "Antiaircraft Journal" and is introduced as a result of the application signed by the members whose names appear in the ballot.

The motivating factor behind this application is contained in the following paragraph extracted therefrom:

> "This application is submitted in the interests of the Coast Artillery Corps. The name 'Coast Artillery Journal' is inappropriate because the JOURNAL is devoted almost entirely to Antiaircraft Artillery. It is believed that the present name is a serious handicap to our official publication since it does not indicate the true scope of its activities to the general public."

There has long been a sentiment among officers of the Corps that the names of the JOURNAL and the Corps should be changed to identify them more closely with their respective functions and this is the first concrete step in that direction.

In the event it appears that the proposed merger of all the Combat Arms Journals and Associations will materialize this amendment will not be implemented even though it is approved.

The redesignation of the Corps will require Congressional action assuming that the Department of the Army favorably considers any proposal to that end which may be submitted.

"Competitive Tours" For Regular Army Commissions

The Army has announced plans to invite an estimated 2,000 former officers to return to active duty this summer to compete for Regular Army commissions.

Open to men between the ages of 21 and 27 in all the Army branches except the Medical and Dental Corps, the program will result in selection of all qualified competitors following closely supervised and observed "competitive tours" of duty. Those selected after tours of from one year to eighteen months will be offered commissions as lieutenants in the Regular Army. Successful candidates will be given credit for Regular Army promotion purposes for the time spent in the competitive tours.

Duration of the tour itself will be one year, with an extension to eighteen months where the individual's commander considers such an extension desirable.

Although the tours are officially labeled "competitive," the competition involved is actually against a set standard rather than against the other officers taking tours at the same time. The number of vacancies available, it was pointed out, will permit the appointment of all who meet the standards.

The opening of the competitive tour program was expected to be of special interest to 1948 ROTC graduates, who will have their first opportunity to compete for Regular Army commissions as a result of the plan. These newly commissioned reservists were ineligible for the 1946 and 1947 Regular Army integration programs because they lacked World War II service as officers.

BALLOT

For the amendment of the Constitution of the United States Coast Artillery Association.

ARTICLE IX

It is moved that the first sentence which reads: "The COAST ARTILLERY JOURNAL shall be the official publication of this Association" be changed to read as follows: "The Antiaircraft Journal shall be the official publication of this Association."

YES _____ NO _____

In accordance with Section 1, Article XVI, the following members signed the application for amendment.

Col. W. C. Foote	Col. F. T. Folk
Col. W. D. Evans	Lt. Col. J. G. Bain
Col. C. R. Jones	Lt. Col. R. S. Spangler
Col. A. H. Campbell	Lt. Col. W. H. Brucker
Col. M. G. Armstrong	Lt. Col. M. L. Ogden
Col. H. F. Meyers	Lt. Col. C. F. Durgin
Col. H. C. Reuter	Lt. Col. J. M. Williams
Col. W. J. Wolfe	Lt. Col. J. D. Shearouse
Col. D. D. Martin	Maj. C. J. Odenweller, Jr.
Col. T. J. Dayharsh	Maj. H. W. Berendt
Col. A. G. Franklin, Jr.	Maj. J. Y. Brightman
Col. P. McC. Smith	Maj. H. C. Herrick, Jr.
Col. C. F. Tischbein	

(A proxy will be designated by members only when they desire to delegate their authority to vote.)

Proxy to _____

Signature of Member _____

_____
(Rank and Organization)

_____
(Address)

_____

Brigadier General Klein Commands New Illinois ORC Brigade

Recently promoted to the rank of General Officer of the Illinois National Guard, Brigadier General Julius Klein assumed command on March 8th and activated the 109th AAA Brigade Headquarters and Headquarters Battery. A veteran of World War I, General Klein entered World War II with the 33rd Division, Illinois National Guard in 1941 and saw 35 months overseas service and combat in the South Pacific and Philippines. After service as Commander of 8,000 Coast Artillery, Infantry and Quartermaster troops in the operation of ports in the South Pacific, he subsequently commanded all service troops on Cebu during the Philippine liberation. As a Colonel, General Klein also served under General MacArthur and later as Special Assistant to the Secretary of War, Robert P. Patterson. He was released from active duty in November of 1946 and upon the reorganization of the Illinois Guard some two weeks later, General then "Colonel" Klein was appointed to command the 623rd Quartermaster Group and attached service troops. During his tenure the Group activated nine new Guard Units which are well advanced toward attaining their full T/O Strength. In addition to his position in the Guard, General Klein is also the National Commander of the Jewish War Veterans of the United States.

GENERAL KLEIN TAKES OATH

Brigadier General Julius Klein, newly assigned commander of Illinois' 109th AAA Brigade, being administered Oath of Office by Lt. Colonel Frank X. Meyers, Executive Officer, 202d AAA Group.

* * *

Summer Camp For ORC

Preparations for training of Organized Reserve Corps units this summer are now being made by the Army Field Forces, Gen. Jacob L. Devers has announced.

Subject to limitation of funds, troops and facilities, these units will be trained according to four general priorities.

First, units that reached Class A status by April 30, 1948. (Many such Class A units cannot justifiably be transferred to training areas; among those are various small and highly specialized detachments which do not need unit training, or for which local training will suffice at this time, and various affiliated units which get the bulk of their training through their daily work.) Units authorized a full complement of officers and enlisted personnel are Class A units.

The second priority will be given to headquarters of divisions, brigades and regiments or equivalents, with preference to units that will be in a Class B status. (Units with full complement of officers and at least an enlisted cadre are termed Class B units.) Service units that can be profitably trained at camps operated by technical services without the need of additional Regular Army troops, and service units that can function in support of ORC field training, or with any other military activities, with preference given to units in the Class B category.

Headquarters and headquarters of battalions, and similar groups, will be entitled to the third priority with preference given units in Class B status.

The final priority will be given to other types of ORC units.

In many cases it will be possible for organizations to accomplish as much training in their immediate areas as in a specified training area, especially when the unit has only cadre strength or less.

One suggested method is for a training period of 15 days or less to be broken into appropriate shorter periods of not less than 48 hours and be conducted in a series. This plan is conceived in an effort to promote a feeling of unity within organizations in addition to furthering the planning of future training. It also will permit the use, as instructors, of local qualified reservists.

The responsibility for preparation of the program rests with Army commanders but they will make maximum use of ORC unit commanders and their staffs in planning. Such use of ORC personnel should be on an inactive basis only, it was explained, consistent with local conditions.

The forthcoming training will be conducted in order that a staff training echelon may be accomplished and to emphasize the use of unit commanders in planning and supervising instruction. An objective also is to give individuals the opportunity to acquire the maximum proficiency in the use of individual weapons and to expand unit members' knowledge of new technical skills, terms, organizations, doctrines, techniques and developments.

Whenever possible, these reserve corps units must conduct and supervise their own training and accomplish this through the extensive use of their officers and enlisted personnel, it was brought out.

General Devers added, if it becomes necessary, reservists will be called upon for periods of active duty of 30 to 90 days to assist in opening or closing training installations. They also may be required to complete a tour of duty with organizations which furnish tactical and logistical support to the entire ORC summer training program, he concluded.

* * *

☞ **Don't Forget To Vote — See Page 57.**

Active Duty For ORC Officers in Higher Headquarters

One phase of the training program for the Organized Reserve Corps is the placing of reserve officers on active duty in the various staff sections of the Office, Chief, Army Field Forces, Fort Monroe, Virginia, for periods ranging from fifteen to ninety days.

Since the inception of this program in March 1947, a total of 93 reserve officers ranging in grade from first lieutenant to colonel have served tours of active duty, Ten of the 93 officers have served on two 90-day tours.

Of the 93 officers, 20 are from the First Army area, 31 from Second Army, 7 from Third Army, 13 from Fourth Army, 20 from Fifth Army and two from the Sixth Army area.

The value of placing reserve officers on active duty with higher headquarters of the Army is that they receive important training in the methods by which such headquarters function and are able to participate in the actual planning for training of the civilian components of which they are a part. The reserve officer so serving learns firsthand of the problems encountered and the difficulties which must be solved in implementing a widespread and effective training program for the citizen soldier. This information he is able to pass on to his own reserve unit when his period of active duty is terminated.

General Jacob L. Devers, Chief, Army Field Forces, formally called the group of reserve officers currently on duty at his headquarters together recently to express his appreciation for their work.

He pointed out that the services of reserve officers at higher headquarters such as Army Field Forces served several useful purposes. First, and of extreme importance, was the training of the individual reserve officer to perform staff duties more efficiently. Second, due to acute shortage of officers, it enables the headquarters to fill staff positions which would be left vacant if reserve officers on active duty were not available to fill them. This enhances the efficiency of the organization. Third, it enables the reserve officer to personally become cognizant of the problems which must be solved in implementing training, and fourth, it provides a means of returning to reserve officers not on active duty valuable information about procedures, planning and functions of the Office, Chief, Army Field Forces.

✦ ✦ ✦

Active Duty For 20,000 Members of Enlisted Reserve Corps

The Army recently announced the opening of nine-month to one-year tours of duty within the United States for approximately 20,000 members of the Enlisted Reserve Corps. The reservists, who will be chosen from the best qualified volunteers, will be used as recruit instructors and experts in other military skills.

Men who are accepted for the tours will be called to duty in the grades and military occupational specialties which they hold in the Enlisted Reserve Corps and will be eligible for promotion. At any time during their tours, and within twenty days after returning to inactive status, they will be eligible for enlistment in the Regular Army in the same grade as that held in the Enlisted Reserve Corps.

Physical and mental standards in effect for members of the Regular Army apply for reservists seeking tours.

Though assignment to a given post throughout the tour cannot be guaranteed, the individual will be assured of spending his entire time in the Army area in which he volunteered for duty.

✦ ✦ ✦

Commanding General of 102d AAA Brigade Federally Recognized

As commander of the 102d AAA Brigade of the New York National Guard, William M. Hamilton was recently accorded Federal recognition as a Brigadier General.

General Hamilton, who was born in Glasgow, Scotland, began his long association with the New York National Guard April 20, 1918, when he enlisted as a private in the 7th Infantry Regiment. At the time he accepted a commission as second lieutenant of Infantry in the New York National Guard in February 1925 he held the rank of first sergeant.

General Hamilton was called into service for World War II in February 1941, with the rank of major.

Before going overseas in April 1943 as Executive Officer of the 44th Antiaircraft Artillery Brigade, he held assignments as a battalion executive officer and later as Executive Officer of the 207th Coast Artillery Antiaircraft Regiment at Camp Stewart, Georgia, and at Newport, Rhode Island, where the unit took over the antiaircraft defense of the Torpedo Station and other naval installations in Rhode Island and Connecticut.

During his twenty-eight months overseas, he served as Executive Officer of the 44th AAA Brigade in Oran, Casablanca, Tunis, Corsica, Sardinia, Elba, Italy, France, Germany and Austria.

General Hamilton, who attended Columbia University and New York University, is a graduate of the Coast Artillery School, Fort Monroe, Virginia.

Additional National Guard Units

The following National Guard Coast Artillery Corps units have been Federally recognized since the last issue of the JOURNAL:

California:
- Battery "C," 271st AAA AW Battalion, Fort Funston.
- Battery "A," 719th AAA Gun Battalion, Richmond.
- Battery "B," 951st AAA AW Battalion, Richmond.

District of Columbia:
- Medical Detachment, 260th AAA Gun Battalion, Washington.
- Battery "D," 260th AAA Gun Battalion, Washington.
- Battery "D," 340th AAA AW Battalion, Washington.
- Battery "D," 380th AAA AW Battalion, Washington.

Florida:
- Battery "A," 692d AAA AW Battalion, Palatka.
- 984th Coast Artillery Battery, Crestview.

Illinois:
- Headquarters & Headquarters Battery, 109th AAA Brigade, Chicago.

Massachusetts:
- Medical Detachment, 324th AAA Gun Battalion, New Bedford.
- Battery "A," 324th AAA Gun Battalion, New Bedford.
- Battery "A," 704th AAA Gun Battalion, Boston.
- Battery "B," 704th AAA Gun Battalion, Boston.
- Battery "D," 704th AAA Gun Battalion, Bingham.
- Medical Detachment, 747th AAA AW Battalion, Fall River.
- Battery "A," 747th AAA AW Battalion, Fall River.
- Battery "B," 747th AAA AW Battalion, Fall River.
- Battery "C," 747th AAA AW Battalion, Fall River.
- Battery "D," 747th AAA AW Battalion, Fall River.
- Headquarters & Headquarters Battery, 772d AAA Gun Battalion, Boston.
- Battery "A," 772d AAA Gun Battalion, Chelsea.

New Jersey:
- Battery "A," 122d AAA Gun Battalion, Sea Girt.
- Battery "D," 309th AAA AW Battalion, Jersey City.
- Battery "D," 311th AAA AW Battalion, Newark.

New York:
- Battery "B," 7th AAA AW Battalion, Albany.
- Battery "B," 336th AAA Gun Battalion, Utica.
- Headquarters & Headquarters Battery, 715th AAA Gun Battalion, Brooklyn.
- Battery "D," 715th AAA Gun Battalion, Brooklyn.
- Medical Detachment, 715th AAA Gun Battalion, Brooklyn.

Pennsylvania:
- Battery "C," 689th AAA AW Battalion, Pittsburgh.
- Battery "A," 708th AAA Gun Battalion, Pittsburgh.

National Guard Field Training

Approximately 252,000 men in some 4,800 Federally recognized Army and Air units of the National Guard will participate in field training this year, according to Maj. Gen. Kenneth F. Cramer, Chief of the National Guard Bureau.

Last year approximately 50,000 men took part in the first field training held since the Guard was inducted into Federal Service in 1940.

A compilation of reports from The Adjutants General of the several States reveals that an estimated 234,000 men in some 4,500 Army units will move to Army or State field installations for 15 days during the period June 1 to September 15, 1948.

All Army units Federally recognized before camp starting date and suitably equipped and uniformed will be eligible to attend training camp this year. Previous requirements called for Federal recognition prior to April 1, 1948, and for at least 90 days before the starting date of the field training period. The new rule will give a substantially greater number of Army units the benefits of the field program.

Travel to and from camps will be conducted as troop movements and will provide opportunity to train the troops in all phases of mass motor or rail transport. Some States have indicated they plan to move part of their ground troops by plane.

Army units which have not done so will complete the first year's armory training in camp. Other units will continue individual, unit and organizational training in accordance with the program established by the Army Field Forces. Where practicable, all units of a division will train at the same site and nondivisional units will normally train at the same time and site as divisional units. Some divisions are shared by two or more States. Field training of Army units will be under the direct supervision of numbered Army commanders.

Officers of the Officers Reserve Corps may attend field training with National Guard units at their own request and with the approval of the State Adjutant General and the Army Area Commander.

Ceilometers For Armed Forces

Ninety ceilometers, electronic air safety devices which automatically measure and record the altitudes and densities of clouds, are being produced for the Army and Navy, General Electric's Lighting and Rectifier Divisions have announced.

The ceilometer, already in use by weather bureaus, the Armed Forces, and several civilian air fields, operates equally well by night or day.

A super-high-intensity quartz mercury lamp, smaller than a cigarette, mounted at the focal point of a searchlight mirror, sends skyward a beam of light.

Clouds overhead reflect the beam back to earth, and a detector unit, which includes a photoelectric tube pickup and which is tuned to the same frequency as the light source, automatically analyzes the reflections, and transmits to a recording device a record of cloud heights.

The detector, placed about 1000 feet from the projector, scans the searchlight beam by swinging slowly from a horizontal to vertical position and back again five times an hour.

Ceilometers make possible an accurate and rapid check of cloud ceilings at all times, expediting landing and take-off instructions, according to the engineers. Data recorded by the instrument is especially vital to safe flying at airports handling heavy traffic, they said.

R.O.T.C. Summer Camps

Under the direction of the various Army commanders, Senior Division R.O.T.C. camps for all Ground-type units will be established and training will commence on 21 June 1948. The duration of this training will be six weeks.

Artillery students (CAC and FA are now combined in ROTC) will attend one of the following camps in the numbers estimated:

Fort Benning, Georgia	200 students
Fort Bragg, North Carolina	640 students
Fort Sill, Oklahoma	300 students
Fort Riley, Kansas	200 students
Fort Lewis, Washington	210 students

Conditions may dictate that students will be ordered to attend camps in an Army area other than that in which their university or college is located. The following deviations from the normal procedure are noted:

First Army Area—
All Artillery students to Fort Bragg, North Carolina.
Second Army Area—
All Artillery students, except those from Purdue University, to Fort Bragg, North Carolina. Students from Purdue to Fort Riley, Kansas.
Third Army Area—No exceptions.
Fourth Army Area—
Artillery students to Fort Benning, Georgia.
Fifth Army Area—
Artillery Students to Fort Sill, Oklahoma.
Sixth Army Area—No exceptions.

Commissions For ROTC Graduates

The Department of the Army has announced that it is offering Reserve Officers' Training Corps graduates of the college class of 1948 an opportunity to obtain Regular Army commissions as second lieutenants.

It is estimated that over 2,000 Army ROTC students graduating from colleges and universities in June will be eligible. They must agree to a two-year tour of duty starting in July, of which one year will be a competitive tour. Applicants must either be graduated from college as well as from the ROTC course or have completed not less than two years of college or its equivalent.

The Army pointed out that more than 600 vacancies in the grade of Regular second lieutenant are to be filled from the July group.

All ROTC applicants will first have the opportunity to attend a basic course at the service school of their arm or service for three months.

Army's "Canned" Guns Inspected, Found Ready For Emergency Use

The Army has been using a "can opener" in recent months to open some of its "canned" guns and other items to determine whether their storage in metal containers has preserved them effectively, the Ordnance Department announced recently. Spot checks, according to the announcement, have shown the guns to be in excellent condition and ready, almost without exception, for immediate use.

The "can opener" used in some instances is a bayonet, the opening operation thus simulating field conditions existing if guns are shipped in original containers to front lines. More conventional devices, such as cutting torches and chisels, have been used in other cases.

The Ordnance Department's inspections are the first of their kind to be reported by the Army although both the Navy and the Air Force have "canned" and "cocooned" ships, planes and other equipment.

Based on an idea originated more than 25 years ago at Rock Island Arsenal by a young Ordnance officer, the canning process was perfected and put to use after the past war for preservation of some of the tanks and weapons that were to be retained.

Though the first cost of "canning" is higher than for other methods of storage, the huge, recurring expense of periodic overhaul and regreasing is eliminated, and the need for surveillance, which must be extensive under ordinary methods of storage, is greatly reduced. Other advantages of canning are: some containers may be shipped unopened to using services; and no tedious, time-consuming degreasing is necessary to ready the canned weapon for action.

Among the pieces examined by Ordance were 90mm guns, 75mm howitzers, and 60mm mortars, as well as telescopes, periscopes, recoil mechanisms, gun directors, generating units and other equipment. Only slight specks of rust and corrosion were found on any of these although they had been in their cans about two years.

On the basis of inspections made to date, Ordnance Department experts conclude that the canning process is technically successful in maintaining the high quality and usefulness of Ordnance matériel preserved by this process.

United States-Canadian Agreement Concluded on Canadian-Alaska Communications

The Governments of Canada and the United States have announced that an agreement has been concluded concerning the future operation of certain of the telephone and telegraph lines constructed during the war between Edmonton, Alberta, Canada, and the Alaska-Canadian border.

These lines provide direct communication between Canada, the United States and the interior of Alaska. They are available for transmission of telephone and telegraph messages of private industry and individuals and are handling a steadily increasing volume of commercial traffic. They were built during the war under the technical supervision of the United States Army Signal Corps and at the conclusion of hostilities sold to and are now operated by the Canadian Government.

These facilities parallel the highway from Edmonton, Alberta, to the Alaskan-Canadian border, which is approximately seventeen hundred (1700) miles from Edmonton. At the boundary the Canadian portion of the lines connects with the Alaska communication system which provides telephone and telegraph service for the territory of Alaska.

Under the present agreement the Canadian Government makes available certain channels on the lines within its boundaries for use by the United States on a retail basis. These several telephone and teletype channels are leased in accordance with standard commercial rates.

NG and ORC FEDERAL APPOINTMENTS

The Department of the Army has sponsored legislation designed to amend the national defense act so as to provide that personnel of the National Guard and the Organized Reserve Corps shall have a common Federal appointment or enlistment as reserves of the Army of the United States and to equalize disability benefits applicable to such personnel.

The national defense act was enacted in 1920, and since then it has been amended many times before and during the war years; in fact, many sections were amended after VJ-Day. Many of the amendments were made because of laws enacted by the Congress and applied to pay, emoluments, appointments, and enlistment of persons in the National Guard and Organized Reserves.

Accordingly the chairmen of the Armed Services Committees have introduced identical departmental bills—(S. 2622 and H. R. 6494)—to accomplish this purpose.

Section 2 of the NDA will have a new section inserted designating the National Guard of the United States and the Organized Reserve Corps as reserve components of the AUS. All officers and enlisted members thereof will be reserve officers and reserve enlisted members, respectively, of the AUS. All officers appointed in commissioned grades shall be commissioned in the AUS.

The National Guard of the United States includes all Federally recognized members of the National Guard of the several States, etc., who, in addition to their status as such, will hold appointments or enlistments as reserve officers, reserve warrant officers, or reserve enlisted members of the AUS.

The Organized Reserve Corps includes all reserve officers, reserve warrant officers, and reserve enlisted members of the AUS other than those who are members of the National Guard of the United States.

All officers and warrant officers now holding appointments in the National Guard of the U. S. and in the Officers' Reserve Corps shall be deemed to hold such appointments, as such, of the AUS.

All laws now or hereafter enacted providing pay allowances, emoluments, pensions, compensation, retirement pay, leave, hospital benefits, or other rights, privileges, and benefits applicable to officers of the ORC and members of the ERC and to their dependents and beneficiaries are made applicable to the reserve officers, warrant officers, and reserve enlisted members of the AUS.

If enacted the proposed legislation will provide for a common Federal appointment and enlistment as reserves of the Army and will permit the transfer of persons between the National Guard and reserves without the necessity of securing a discharge from one and reappointment or reenlistment in the other of these components.

While at present there is no law specifying the internal organization of the Air Force, the new legislation will apply to the Air Force and its reserve components in the same manner that it would so apply had it been enacted prior to the enactment of the national security act of 1947.

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☞ **Don't Miss The Ballot On Page 57.**

Signal Corps "Miniaturizing" Its Signal Equipment

The pack-horse aspect of Signal Corps soldiering is passing into history, thanks to the ingenuity of science and the persistence of Army research.

Today vest-pocket type signal equipment, candy-bar sized batteries and all manner of portable radar, radio and radiosonde outfits lend a degree of streamlining to communications which was unknown even as late as the end of World War II.

"Miniaturization" is the official description of this Signal Corps program which is designed to fit the task of communications into an Army geared for speed and mobility and in which much of the signal equipment used in the late war is becoming obsolete.

Two main purposes are served in the constant search for smaller, lighter and more efficient signal equipment, said Colonel E. R. Petzing, Chief of the Engineering and Technical Division of the Signal Corps.

First, he said, the defense needs of the nation require signal equipment which is lighter in weight and can be handled with greater facility and with less personnel. It must also be more durable to withstand the rigors of swift mobility and the wide climatic range to which it may be subjected.

Second, and considered more important in the broader aspects of Army planning, is a means of providing greater protection to soldiers under battle conditions, a factor which was not always present in days when signal equipment was cumbersome and conspicuous, he added.

"Today we strive constantly to compress the size of equipment and even now we are not prepared to say that because, for example, a sending and receiving radio set the size of a package of cigarettes has been constructed, we have reached the floor of miniaturization," Colonel Petzing said.

"The miniaturization program of the Signal Corps embraces the whole field of communications, conditioned on comparable and, wherever possible, increased efficiency.

"Some of the achievements are: A radar set which once required five two-and-a-half-ton trucks to transport, reduced to the size of a standard office desk and easily transported in a single truck; midget storage batteries weighing only five and a half ounces able to produce enough electrical energy when used, four to pack, to operate a transmitter up to 100,000 feet above the earth's surface; a complete telephone switchboard weighing only 2½ pounds which can replace the Army's standard 60-pound instrument; radio tubes a fraction of an inch in length, and many other units of signal equipment.

"Miniaturization," Colonel Petzing explained, "is not the sole objective of Army research. Global operations in World War II were complex and abundant and posed many serious problems. The difficulties of weight and bulk were augmented by those of climate of both extremes and such factors as fungus growth which in tropical and subtropical areas contributed much to rapid deterioration. All these have since gone under the probing light of scientific research and one by one they are being solved.

"Signal Corps research," Colonel Petzing said, "is, in effect, the long-range view in constant operation, and change is the dominant factor to be considered."

First USAF Four-Jet Fighter Completes Test Flight

The United States Air Force's newest long-range fighter, and the first ever powered by four jet engines, the Curtis XP-87, has successfully completed its first test flight at Muroc, California, Air Force Base, remaining aloft for about an hour.

Designed to operate in the 600-mile-an-hour speed class, the XP-87 was built by the Airplane Division of Curtiss-Wright Corporation at Columbus, Ohio.

The XP-87, which has a gross weight almost as much as the Boeing B-17 Flying Fortress of World War II, is one of the largest fighter planes ever produced. It has a wing span of approximately 60 feet and an over-all length of approximately 65 feet. Designed for a range of approximately 1500 miles, the XP-87 has a service ceiling in excess of 35,000 feet.

Capable of operating under the most extreme weather conditions, the new fighter is powered by four Westinghouse 24C jet engines, arranged in pairs in a single nacelle on each wing.

Unusual in fighter planes is the side-by-side seating arrangement in the cockpit of the XP-87. The two-man crew is thus able to function with maximum efficiency. A bubble canopy affords forward and rear visibility to both pilots.

Underground Explosion Tests Planned By Army

June 1 has been set by the Army as the tentative date for the first of a series of explosive tests using T.N.T. charges up to 320,000 pounds, according to Lieutenant General R. A. Wheeler, Chief of Engineers.

The tests are designed to show the destructive effects of such charges on underground structures and to establish design criteria for future structures and tunnels able to resist enemy bombing.

Approximately five months will be required for completion of the tests, which will be conducted in central Utah and western Colorado. The initial tests in June will be at the Dugway Proving Grounds near Salt Lake City. Subsequent tests will be there and also near Castle Dale, Utah, and Grand Junction, Colorado.

The tests will be made in four types of soil: dry sand, wet sand, dry clay and wet clay. There will also be tests in four types of rock: granite, sandstone, limestone and shale. These ground conditions are typical of those found in different parts of the United States. All soil tests and the limestone tests will be conducted at the Dugway Proving Grounds, the sandstone and shale tests near Castle Dale, and the granite tests near Grand Junction.

General Wheeler emphasized that no atomic bombs will be used in these tests.

The explosions will be of different sizes, all with definite scale relationship. The smallest charge will be the 1/10 scale, or 320 pounds of T.N.T.; the next will be the 2/10 scale, or 2,560 pounds of T.N.T.; the third charge will be the 5/10 scale, or 40,000 pounds of T.N.T., and the fourth and final charge will be the full scale, or 320,000 pounds of T.N.T. The test structures to be built in the soil, and the tunnels constructed in the rock, will correspond in scale to the size of the explosive charges.

The so-called "granddaddy" of the explosions, the 320,000-pound charge, will be applied only to dry sand, dry clay, granite, and sandstone formations. The 40,000-pound charge will be used on all types except the wet sand. The smaller charges will be applied to all the testing sites.

The initial explosion tests in June will be of the 1/10 scale charges. It is expected that it will be late in the fall before full-scale 320,000-pound explosions are detonated.

The tests will provide the Corps of Engineers with technical knowledge, based on actual experiments, of the type of underground facilities able to withstand modern bombs and guided missiles. If the necessity for such facilities should ever arise, the Engineers will then be prepared to supply them, having obtained from these tests such basic data as how deep the tunnels should be and the design of underground structures best suited for protection.

The tests are aimed primarily at determining the requirements for Command Posts, Air Defense Control Centers and other vital military installations.

Increased Uses of Turbojet

The useful range of the turbojet can be expanded by augmenting the thrust in a number of different ways so that it fulfills more military requirements, according to Edward Woll of the General Electric Company's Aircraft Gas Turbine Engineering Division.

These plans for augmentation serve as a means of gaining more thrust for little additional weight and complication, without resorting to extra large engines or additional engines for most airplane applications, Mr. Woll said.

The most practical augmentation process, he said, is the reheat cycle. In this method, additional fuel is burned in the hot air after it has expanded through the turbine, yielding a much higher temperature than could be withstood by the stressed turbine blades. Final expansion then takes place at the discharge end of the exhaust pipes, where the gas is ejected at a much higher velocity than without reheat, increasing the thrust accordingly.

Results show that at 600 mph, and with "tailpipe burning," the net thrust is almost equal to the output of two turbojet engines operating in the normal manner, Mr. Woll stated. However, full advantage of the reheat cycle cannot be realized unless adequate space is provided for the tailpipe burner, since a burner of adequate size is essential to obtain stable and efficient combustion over a wide range of fuel flows at all altitudes.

Augmentation is necessary because jet-propelled airplanes require longer take-off runs than a propeller-driven plane, the G-E engineer said. Operation out of small emergency landing fields or airports located at high altitudes or in equatorial regions, and the frequent needs for a plane carrying a heavy pay load require an augmented thrust for a successful take-off.

"The additional thrust is obtained at the expense of high specific liquid consumptions, but with only a slight increase in the weight of the whole propulsion unit. Until more progress is made in the field of high temperature metallurgy and more effective means are found to protect parts that are exposed to high temperatures, thrust augmentation will be used," Mr. Woll concluded.

Coast Artillery Newsletters

138TH AAA GROUP*

YOKOHAMA, JAPAN APO 503

COLONEL GEORGE E. YOUNG, *Commanding*

The officers and men of the 138th AAA Group united in extending a hearty welcome to Colonel George E. Young who assumed command on 15 March 1948. Prior to his arrival in Japan, Colonel Young was associated with the Ohio ORC Instruction Group at Fort Hayes, Columbus, Ohio. Lieutenant Colonel Arthur L. Fuller, Jr., who has commanded the Group since July 1947, is leaving for a new assignment in Headquarters, Eighth Army.

Although security guard is still the primary mission of this command, increased efforts are being made to bring all AAA troops to a high state of training. All Battalions are maintaining one battery on intensified MOS training and in the 76th AAA AW Battalion (SP), sufficient replacements have been received to permit full time training in two batteries. A program has been established through coordination with the Eighth Army Replacement Training Center to permit small arms qualification and record firing by all units in the group. This program began on 29 March 1948 and will continue until such time as all men have completed rifle and carbine firing. Increments of one hundred and fifty men from the various organizations within the Group will be sent to the RTC periodically, where they will receive small arms instruction and fire a record course for qualification. Due to the shortage of personnel, all other training in the battalion conducting the firing will be held to a minimum.

On 22 February 1948, Battery B, 753d AAA Gun Battalion (SM), after completing five weeks of intensified training, convoyed to the AAA Firing Range at Iioka, Honshu, Japan for the purpose of conducting calibration firing of the 120mm AAA guns. This firing was preliminary to a record practice conducted during April. Firing records were compiled by a records section composed of men from the 162d AAA Operations Detachment.

Several parades and reviews were held during this period. The first was held in honor of Major General W. F. Marquat, Antiaircraft Officer, GHQ, on 13 February 1948. The combined foot and vehicular review was the final phase of an inspection of all units in the group by General Marquat. The inspecting officer commended the entire command on its splendid showing and excellent state of training.

A ceremony was held at the 933d AAA AW Battalion (SM) on 6 March 1948, at which time the new battalion colors were presented to the battalion commander by Lieutenant Colonel Fuller. The battalion is proud to be the first unit within the Group to receive its colors and promises to live up to the new motto of "All As Companions."

Colonel Riley E. McGarraugh, newly arrived Executive Officer, Antiaircraft Section, GHQ, accompanied by a representative from the G-3 Section GHQ, visited all AAA units in Yokohama and those at Johnson Air Force Base during this period. Colonel McGarraugh was impressed with the state of training, housekeeping and the appearance of the materiel in the various units.

On 9 March 1948, Battery A, 76th AAA AW Battalion (SP), in the course of its intensified training, convoyed to the firing point at Chigasaki Beach where familiarization firing of cal .50 machine guns was conducted. Following this firing, the battery moved to Koturi Airfield, a distance of approximately 110 miles, where a field problem was conducted. The AAAIS section from the battalion accompanied Battery A and set up a warning net around the airfield. Aircraft from the 314th Composite Wing added greatly to the reality of the problem by flying a number of simulated strafing and low level bombing missions against the airfield. Battery A returned to its battalion area on 13 March 1948.

Officers' schools, prescribed by Department of the Army Training Circular No. 5, 1947, have been completed and certificates of proficiency have been awarded to 128 officers who successfully completed the courses prescribed. During the same period schools in gunnery, AAAIS—AAOR and Fire Control were held at battalion level for officers and enlisted men. This instruction was conducted by Department of the Army Technical Instruction Teams. In addition to the above, the Group continues to send men to the specialist schools conducted by Eighth Army insofar as the rigid screening for entrance and the requirements for security guard permit. Continued progress is being made in enrollments for USAFI and AEP courses.

The following officers departed from the 138th AAA Group during this period:

For return to the ZI: Captain Freeman M. Gause, Captain Wade C. Walls, Captain Francis W. Potter, First Lieutenant Gordon A. Robbins and First Lieutenant Jack G. Harkins.

For reassignment within Japan: Major Martin J. Lechwar, Captain George E. Hayward, First Lieutenant Cecil Johns.

The following officer arrivals and assignments occurred during this period:

Captain (Chap) Lewis M. Durden, 933d AAA Auto Wpns Bn (SM).

*Since this newsletter was received prior to our notification of intention to discontinue publishing newsletters from Regular Army units and since it gives a most vivid description of AAA activities in Japan, we feel justified in printing it.—THE EDITOR.

341ST AAA BRIGADE (ORC)

SEATTLE, WASHINGTON

COLONEL DANIEL C. NUTTING, *Commanding*

During the week end May 1-2, 1948, the following assigned and instructor personnel of the 341st AAA Brigade were placed on active duty at the Presidio of San Francisco for the purpose of participating in a command post exercise arranged and supervised by the Sixth Army staff:

Colonel Daniel C. Nutting, Brigade Commander.
Colonel Alexander Young, Brigade Executive.
Lieutenant Colonel John W. Pomeroy, Brigade S-3.
Major Bruce D. Olsen, Brigade S-2.
Major Lawrence N. Arant, Brigade S-1.
Captain Matthew G. Tomasavich, Brigade S-4.
Captain Walter T. Ride, Regular Army Instructor.
M/Sergeant Harold H. Olberding, Enlisted Instructor.

The command post exercise involved pre-mobilization planning for the period M-60 to M-90 on the part of the following units:

91st Infantry Division (ORC), San Francisco.
13th Armored Division (ORC), Los Angeles.
49th Infantry Division (CNG), San Francisco.
112th AAA Brigade (CNG), San Francisco.
341st AAA Brigade (ORC), Seattle.
600th Composite Group (ORC), San Francisco.

Sixth Army headquarters had, prior to arrival of the visiting staffs, established headquarters facilities for each unit, complete with desks, telephones, office supplies and clerical assistance. After a short briefing session on the evening of 30 April, the Army staff passed out a number of "check sheets" to each unit, representing requests for information which would normally be received under the situation as assumed. Promptly at 0800 on the morning of 1 May, the visiting staffs began consideration of the matters indicated, and from that point on until the conclusion of the exercise at 1400 hours on 2 May the flow of questions, answers, recommendations was continuous between the visiting staffs and Army headquarters.

The realism with which the problem was played was such that on a number of occasions it almost required a second look at the legend "FOR STAFF EXERCISE PURPOSES ONLY," which had been overprinted on all papers used, to be sure that a hypothetical situation was actually involved.

Upon the conclusion of the exercise, a short critique was held, and the comments of the visiting unit commanders were received. Without exception, it was stated that the problem had been of very great value inasmuch as the situations presented and the questions and answers resulting were such as to be of actual value to the units in their training and in the preparation of their detailed mobilization plans.

Prior to departure, each visiting commander was requested to submit his recommendations affecting the mobilization procedure, and it was stated that these recommendations would be carefully considered by Sixth Army with a view to possible effects upon the actual mobilization situation, if and when it should arise.

As a result of the problem, the 341st AAA Brigade now plans to revise its training program in such a way that each unit will meet on its own night, with the Brigade headquarters meeting first. In this way, preparation and revision of the plans of attached units may proceed with a minimum of delay since action requested can be taken by the Brigade headquarters and the results furnished to the units at their next subsequent meetings. It is planned that after the revision of mobilization plans is completed, the system will be applied to a continuing tactical problem of the type already being used by Brigade.

An intensified recruiting program is being initiated by all AAA Units under jurisdiction of the 341st Brigade, with a view to actually securing the necessary enlisted personnel to provide fully organized units, each with a full cadre and each prepared for rapid and efficient mobilization if and when required.

315TH COAST ARTILLERY (HD), (ORC)

BROOKLYN, N. Y.

LIEUTENANT COLONEL LEONARD S. ALLEN, *Commanding*

The 315th CA (HD) was redesignated in April from a Type II, Harbor Defense to a Type I, organization. The former Commanding Officer, Colonel Rowland K. Bennett, is now on the staff of the 305th AAA Brigade and has been succeeded by Lieutenant Colonel Leonard S. Allen.

The 315th is scheduled to participate in a two-week tour of field training along with three other similar Harbor Defenses and two National Guard Harbor Defense Units at Fort Hancock, New Jersey during the period 1-15 August 1948. In the coming months, plans will be made for a training program for the Summer Camp tour which will include those subjects necessary to improve the military efficiency of the unit.

The organization has been fortunate in obtaining outstanding speakers to address its monthly meetings and help keep it up to date on the latest trends and developments in the Military Establishment. It is hoped that in the Fall, the 315th will be able to advance from its Class "C" status to a Class "B."

51ST AAA BRIGADE

PENNSYLVANIA NATIONAL GUARD

MAJOR GENERAL CHARLES C. CURTIS, *Commanding*

Pennsylvania's National Guard will consist of 42,000 men on the attainment of full strength, including the 28th Infantry Division. The major portion of Pennsylvania's troops are non-divisional, and attached to the 51st AAA Brigade, which, when completely organized at full strength, will consist of 20,208 officers and men.

The Governor of the State of Pennsylvania has chosen the Commanding General of the 51st AAA Brigade to command this great mass of troops. Of the eleven battalions composing the 51st AAA Brigade, all of the 77 units have already been organized except 17 units in various battalions serving under three AAA Groups. The next largest component is the X Corps Artillery, consisting of six battalions, of which two are organized, two are activated and very near to receiving Federal recognition.

Among other organizations are the 104th Mechanized Cavalry which is now 40% of its strength consisting of 46 officers and 604 men. A Quartermaster Battalion, consisting of a headquarters and five truck companies has also been formed. A Combat Engineer Battalion of colored troops has been started in both Philadelphia and Pittsburgh. The 164th Military Police Battalion, with headquarters in York has just been started. It is anticipated that during the Spring months the 83d Medical Group will be formed, consisting of two battalions, one in the eastern and one in the western part of the State.

Armory space for practically all of the above troops has been provided and will be sufficient until a construction program can be initiated. Many additional units will become part of the 51st AAA Brigade in the near future including one tank battalion, three tank destroyer battalions, one chemical battalion, one engineer battalion, two military police battalions, one quartermaster battalion, three signal battalions, and one ordnance battalion. This will make a total of 37 battalions commanded by Major General Charles C. Curtis.

While recruitment has been much slower than anticipated and desired, there is much satisfaction in the fact that Pennsylvania's Antiaircraft troops are at present three times their prewar strength. The total strength of the Pennsylvania National Guard today is approximately the same as its prewar strength. But it has been attained in a much shorter period of time than during the days following World War I.

The 51st AAA Brigade will train at Camp Pendleton, Virginia, during August 14th to 28th. At the same time the troops attached to the Brigade will train at Indiantown Gap.

197TH ANTIAIRCRAFT ARTILLERY GROUP

NEW HAMPSHIRE NATIONAL GUARD

COLONEL ALBERT S. BAKER, *Commanding*

Three of the eight Federally recognized antiaircraft artillery units of the New Hampshire National Guard, all of which are assigned to the 197th AAA Group, have now entered the six-year training program. These include the Headquarters and Headquarters Battery, 197th AAA Group; Battery D, 210th AAA AW Battalion; and Battery C, 744th AAA Gun Battalion. At the end of April, the remaining five units required only four officers and fifty-three enlisted men to become eligible to enter the long-term training program. Special efforts are expected to qualify most of these units in the near future.

Federal inspections of Headquarters and Headquarters Battery and Battery C, 744th AAA Gun Battalion, on 4 and 5 May respectively, completed the Federal armory inspection program for the 1948 fiscal year. Preliminary inspections of both units were conducted by the Group Commander prior to the Federal inspections which were coincidental with official state inspections.

Initial distribution of funds returned to New Hampshire from the World War II units of the New Hampshire National Guard was made in April. Under the New Hampshire plan, all Antiaircraft Artillery units of the new National Guard were considered to be the historical successors of the prewar 197th Coast Artillery Regiment (AA). Distribution was made on the basis of aggregate TO and E strength and funds were reserved for units not yet organized, substantially those not having armory facilities.

In April, Colonel Baker represented the 197th AAA Group, and its assigned units at a conference on summer field training for Antiaircraft Artillery units of the National Guard sponsored by the Artillery Section, Headquarters First Army, at Governors Island.

It has been announced that the 197th AAA Group plans to employ composite gun and automatic weapons batteries for training purposes at the 1948 field training camp, to be held at Camp Edwards, Massachusetts, 31 July to 14 August, in order to make the best use of equipment and take best advantage of varying stages of training. Full use will be made of instruction teams being sent from the Antiaircraft Artillery and Guided Missiles Section of the Artillery School at Fort Bliss under a coordinated training schedule now being developed under the direction of the Commanding General, First Service Command.

All units of the 197th AAA Group contributed to a statewide observance of Army Day held in Concord and featured by a display of the modern equipment now being issued to National Guard units.

On 8 May all units of the 197th AAA Group participated in the State's official observance of the 50th anniversary of the entrance of the First New Hampshire Voluntary Infantry Regiment into Federal service for the War With Spain in Concord. The Antiaircraft Artillery units entered an impressive quota of mobile weapons including 90mm guns and 40mm guns while machine guns were mounted in trucks for the occasion. It was the first official parade of the new National Guard units of New Hampshire as a composite force. Units also paraded under arms in their local communities on Memorial Day.

102D ANTIAIRCRAFT ARTILLERY BRIGADE

New York National Guard

Brigadier General William H. Hamilton, *Commanding*

Brigade Headquarters and Headquarters Battery have been extremely busy lately with preparations for summer camp. Recruiting has been stepped up, and it is noticeable that pending Congressional action on the draft and UMT is bringing recruits into the National Guard.

The 212th AAA Group has centered its activities around preparations for the annual Federal inspection and the New York Army Day Parade. Recruiting continues to improve under the added impetus of the monthly recruiting contests. These contests, paying cash prizes totalling fifty dollars to the three top recruiters, have resulted in the enlistment of over fifty men in the period covered by this newsletter.

The 223rd AAA Group has shifted a couple of its battalions from one armory to another, and the new unit to enter the armory of the Group Headquarters was treated to a grand dinner. All units participated in the New York Army Day Parade.

Handbills describing the advantages of the National Guard are being distributed several nights a week to likely looking prospects at the exits of the subway stations in the vicinity of the armory. Recruits are being brought in by every method available.

The 369th AAA Group participated in the New York Army Day Parade, with its band providing stirring military airs along the route of march. All of its units are concentrating on their basic training, and an ever active recruiting campaign.

Okinawa, APO 331

Colonel Shuey E. Wolfe, *Commanding*

Climaxing a sixteen week Unit Training Program, a practice antiaircraft firing was conducted on Okinawa by the two training Batteries of the 87th AAA Group during the months of March and April. Inclement weather together with several unavoidable cancellations of towing missions threatened to neutralize the effectiveness of the shoot, however, some very good firing was accomplished before the practice was completed. Battery C, 511th AAA AW Battalion (PS), commanded by Captain James F. McGovern, was credited with 50 actual hits on the sleeve and flag targets that were recovered. Captain Ray C. Pulaski, who commanded the Radio Controlled Airplane Target Detachment for the firing, was able to maneuver his OQ-3 Target planes sufficiently to prevent "C" Battery from destroying them, with three exceptions. Three Target planes were brought down with direct 40mm hits.

Battery A, 532d AAA Gun Battalion (PS), commanded by Captain William E. Smith, put on a fine show with the heavys and was credited with one PQ Target plane shot down and a possible hit on a second one which was lost.

The value of the Department of the Army Gun and Automatic Weapons Instruction Teams was borne out in the results of the firing, and the Philippine Scout personnel manning the equipment completed the shoot with the same enthusiasm displayed during their training period. Both Battalions are looking forward to the preliminary and record firing practice tentatively scheduled for this Fall.

Among the new arrivals with AAA during the past two months is First Lieutenant (Chaplain) Robert E. Lynch. Chaplain Lynch came to us after a fourteen months tour of duty in Manila and confesses that he finds his work on Okinawa very interesting. Prior to his entry into the service three years ago, Chaplain Lynch was an assistant at the St. Andrews Church, Manhattan, New York City.

Other new arrivals include: Captain Byron C. Ray, who has been on duty with the Air Forces on Okinawa; Captain Herbert T. Landers, Jr., previously with the Far East Command in Japan; and Captain William E. Barkman, who has just completed a tour of duty in the Southern Ryukyus.

* * *

This newsletter was received prior to our notification of intention to discontinue publishing newsletters for other than Reserve and N.G. units, so it is published in fairness to those concerned.—Editor.

COAST ARTILLERY ORDERS

WD and AGF Special Orders covering the period 1 March 1948 through May 1948. Promotions and Demotions are not included.

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BOOK REVIEWS

Who Started the War? We Still Don't Know

PRESIDENT ROOSEVELT AND THE COMING OF WAR 1941: A Study in Appearance and Realities. By Charles A. Beard. Yale University Press. 614 Pages; $5.00.

For some years now, Mr. Charles A. Beard has been acutely unhappy about the tendency of our leaders to moralize and meddle on a world scale. He sees growing dangers to the Republic in an attempt to "exert power over the affairs and relations of other countries" far from our base on the American continent. The tendency of President Roosevelt to conceal his real foreign policy from the people and to circumvent Congress by executive action filled Mr. Beard with concern for the survival of our democratic institutions. In an earlier book, *American Foreign Policy in the Making, 1932-1940*, and a blurb he contributed to the jacket of George Morgenstern's *Pearl Harbor: The Story of the Secret War*, he revealed growing scepticism about the integrity of the Roosevelt administration in the field of foreign affairs.

In the presidential election of 1940, both Mr. Roosevelt and Mr. Willkie made promises to keep America out of the war unless attacked. Without regard for the logic or practicality of keeping the United States out of war by our action and policies alone, Mr. Beard feels that the President should either have made good on this campaign promise—or the moment he changed his mind as to the practicality of his peace policy, that he should have asked Congress to perform its constitutional function of declaring war. When he heard the news of the Japanese "surprise" raid on Pearl Harbor, Mr. Beard was convinced that there was more behind the event than the official explanation indicated. He began collecting news items and material on the Pearl Harbor crisis. He has been at it ever since, and this book is the result of his study of the evidence in the case.

Until the end of the war, the official explanation of the Pearl Harbor affair was to be found in the Roberts report and in the semi-official book *How War Came: An American White Paper* by Forrest Davis and Ernest K. Lindley. According to Mr. Beard these accounts held that the Roosevelt administration foresaw the rapidly developing crisis between the United States and the Axis in 1941, and while trying hard to maintain peace, had given full warnings to the commanders of the Hawaiian garrison. Admiral Kimmel and General Short were held to be the chief culprits of the Pearl Harbor surprise. No failures occurred in Washington; everbody did his full duty. The administration was still hoping for "peace" on 7 December, 1941, but the Japanese treacherously broke this peace under the cover of continuing negotiations and attacked our fleet base in the Pacific.

Armed with the immense documentation of the joint congressional committee investigating the Pearl Harbor attack, Mr. Beard tears into the official version like an angry professor criticizing the paper of a lazy and perverse student. Using his great skill at interpreting historical evidence, employing his sarcasm liberally at evidences of loose or turgid language in the testimony of officials, quoting public statements of the President at a certain time with parallel quotations of top secret military or naval documents, he makes an apparently crushing case against the administration. That is to say, he makes a crushing case against the President (and to a lesser extent against Secretary of War Stimson) in a kind of foreign relations vacuum. It is only when the reader asks the question at various stages of Mr. Beard's account "What was the exact state of the Axis military menace to the United States at the time he is writing about?" that the ivory-tower character of his indictment is revealed. The lack of correlation between Mr. Beard's academic recital of the words public officials employed and the political military situation of the United States in 1941 strikes me as the greatest single weakness of the book.

Certainly in the autumn of a distinguished historical career, Mr. Beard is not indulging in criticism of the Roosevelt administration for party reasons. He is vitally aroused over the theory of the limitless power of the executive to conduct foreign affairs and initiate war "at will, unhampered by popular objections and legislative control." If some commentators assume that the operation of a democratic government of balanced powers takes too much time to insure security in the rocket and atomic age, he argues that the totalitarian countries at least made no pretense that limitless powers could be exercised over foreign affairs and war, "while domestic affairs and domestic economy are left free and the authority of the government over them is constitutionally limited."

He feels that Secretary Stimson's explanation of the powers of the President in foreign and military affairs, submitted in writing to the joint Congressional Committee, cannot be reconciled with the provisions of the Constitution. After criticizing others (Stimson, Hull, Welles, and the majority members of the Congressional Committee), for imprecise and turgid language, Mr. Beard gets the following off his chest about Mr. Stimson's constitutional views: "Beyond that, in the boundless realm of power politics, it is scarcely possible for a soaring imagination to go. . . ." He tops that on another page with a sentence about the United Nations which is really a gem. "Neither the operations of the organization [the U.N.]," he writes, "nor the procedures under the prolix and redundant asseverations of peace and human rights incorporated in its charter have

indicated discernible alterations in the warlike, revolutionary, and ambitious propensities of politicians, governments, and nations." Turgid language is not apparently confined to those Mr. Beard decries.

Mr. Beard makes a number of specific indictments of the Roosevelt administration. He charges that the President progressively left his peace policy behind and took steps in the Atlantic and Pacific that led us into a shooting war without informing Congress or the people. It must be admitted that the flippant and irrelevant wisecracks with which the President dismissed searching questions in his press conference about foreign relations will not add to the stature of Mr. Roosevelt in history. Second, Mr. Beard charges that Mr. Roosevelt authorized or ordered the Navy to convoy merchant shipping in the Atlantic when he and other spokesmen for the administration publicly denied this. Mr. Beard makes it clear that the naval and military advisors of the President knew that convoying would mean ultimate shooting and that shooting would mean war. Third, he charges that Mr. Roosevelt made assurances to Britain at the Atlantic Charter meeting which committed the United States to support Britain and Holland against Japan in the Far East, and that he told this country on his return that no new obligations had been accepted. Fourth, he asserts that Mr. Hull's "ultimative" memorandum of 26 November 1941 presented the Japanese with a situation in which war was the only logical outcome. Fifth, he claims that there could have been no real surprise about the Japanese attack on Pearl Harbor on 7 December 1941. The President had been expecting something of that kind as early as the first of December. Therefore, he holds that Roosevelt's war message to Congress on 8 December describing the Japanese attack as a treacherous surprise was in the nature of a lawyer's special plea. That the country entered the war united seems to be of small concern to Mr. Beard.

Naturally the author has a field day with the entry in Mr. Stimson's diary for 25 November which said that in the critical situation it was merely a question of "maneuvering them [the Japanese] into a position of firing the first shot." Was this the time to have gone to Congress with the information in the possession of the Administration? Could Congress have been convinced of the seriousness of the situation without revealing the fact that we had broken the Japanese code? What effect would such a step have had on Japanese action? Would it have forestalled or made more certain the Japanese attack? These are questions which need to be considered before condemning Mr. Stimson.

In the epilogue to his volume, Mr. Beard dismisses the end-justifies-the-means theory about our entrance into World War II by showing that the war to overthrow Hitler's despotism has merely brought us face to face with another despotism greatly strengthened by the results of the war. If neutrality toward Hitler's regime was "shameful" in 1941, what, he asks, is to be said for the commitments made in the name of international amity at Teheran and Yalta? At the end of the "necessary" war, Mr. Beard finds that the Democratic Party is hopelessly split, the nation is heavily in debt, and we are forced to spend immense sums on military preparedness. The peace and security we sought have escaped us. He offers no estimate at all, however, of the situation in which the United States would have found itself had the Axis won the war.

Because of its ponderous size and apparently complete documentation, many readers may be led to conclude that Mr. Beard's volume is to be the "definitive" work on the history of our entrance into the war. The author, of course, has no illusions about this. He repeatedly calls attention to the incomplete nature of the source materials. When the personal papers of the President and the Churchill-Roosevelt correspondence are available to historians, only then may we have the basis for writing a definitive study of President Roosevelt and the coming of the war. Until then Mr. Beard's challenging volume will probably be regarded as the second shot fired in the "revisionist" battle over the responsibility for the outbreak of World War II.—Lieutenant Colonel H. A. DeWeerd.

Flying Research by the NACA

FRONTIERS OF FLIGHT: The Story of NACA Research. By George W. Gray. Alfred A. Knopf, Inc. 371 Pages; Illustrated; Index; $6.00.

THIRTY-THIRD ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS, 1947. Government Printing Office. $.30.

The National Advisory Committee for Aeronautics (NACA) is perhaps the outstanding scientific aviation resource of the U.S. Mr. Gray's book recounts, in extremely lucid fashion, both the history and the major current activities of this organization.

The NACA was created by the Federal Government in 1915 to supervise, direct, and conduct research in aeronautics. It represented one of the first recognitions of scientific research as a resource, and one of the first practical efforts toward carrying out the Government's role of stimulating, supporting and coordinating scientific progress.

The small beginnings of the NACA proceeded step by step through problems of ever widening scope and complexity. Rule-of-thumb aircraft design procedures were progressively supplanted by scientific methods based on reliable tests conducted by the NACA. During the "lean years" between the two World Wars, practically all aeronautical research was concentrated in NACA laboratories. Indeed, it may be said that the major design innovations in

American aeronautics were pioneered by NACA scientists.

The work done lay not only in pure science, but also included solving specific aerodynamic, power plant and structural problems. Improved aircraft cowlings and the first practical American cantilever wing were but two of the contributions. With the advent of the war, attention was focused on improving war-plane performance and on practical trouble shooting.

One of the elements too often forgotten when press releases are distributed about the first flight of some new prototype aircraft is the long and difficult trail that must then be followed before the prototype is converted into a reliable, operational vehicle suitable for regular issue. Vibration difficulties had to be eliminated from the P-51, for example, and shock stall from the P-38, and so on.

Operational problems also have to be attacked. For example, a B-17 on a typical European bombing mission had to carry about 5,000 pounds of bombs and 10,000 pounds of gasoline. But some 70% of the gasoline was being wasted by failure to harness the exhaust heat. The NACA, by the addition of simple "exhaust stacks," created what were in effect small jet engines, which recovered additional power from the exhaust gas, and thus increased the speed and saved fuel.

Written for the intelligent layman, and helped by admirable illustrations, *Frontiers of Flight* traces the path of aeronautical advances in a clear and logical sequence.

An idea of the current NACA activity may be gathered from its recent *Annual Report*. These typical headings show its scope: aerodynamics, including air foils, high lift devices, boundary layer investigation. High speed aeronautics, stability, control and vibration. Propellers, helicopters, seaplanes. The upper atmosphere. Power plants, including turbojets, conventional engines, rockets. Structural design, including new materials and alloys. The reports listed total 583.

The role of the NACA as a coordinating agency is further indicated by the subcommittee memberships, including Government agencies, universities and private industry.

Any review of the NACA inevitably invites a comparison with German aeronautical research. German activity in this field produced spectacular results, including supersonic aerodynamics, sweepback, turbojets, rocket aircraft and a galaxy of guided missiles. In this work the NACA may be said to have fallen behind, for the record of its earlier activity discloses no advances in these fields comparable with that achieved abroad.

On the other hand, the NACA focused its attention on overcoming immediate problems in aircraft that were at once useful for the missions of World War II, and here the Germans failed. For example, the U.S. and Great Britain introduced numerous, totally new aircraft during the war and improved, out of all recognition, those with which we began it. Compare the B-17 at the end of the war with the B-17 in service in 1941! By contrast, the mass of German operational aircraft ended the war pretty much as they had begun.

The problem of the focusing of research is perhaps the most critical one facing present-day military planning. On one hand, there is the attractiveness of new problems and the opening of new frontiers; on the other, there is the need for making today's weapons do today's job well. Evidently, there is the closest connection between overall war planning and planning for scientific research. Even with unlimited money, the availability of qualified scientists and engineers sets a limit to the growth of research activity. In our case, due to the deficit in scientific manpower caused by an unwise draft policy during the recent war, this problem is even more acute.

What is the present role of the NACA? Under the policy statement of March 21, 1946, the NACA has the responsibility for coordinating all Government aeronautical research activity. Its success in carrying out this mission depends partly on the capabilities of its personnel, partly on the funds available, but mainly on how accurate the prediction contained in the directives it receives from higher authority. In terms of the present situation it will require the highest degree of scientific statesmanship on the part of the NACA directorate to plan its research programs so that they may be sufficiently flexible to take account of changing technical intelligence evaluations.

The orchestration of military policy, technical intelligence and scientific research is not a simple matter. Because the results of research are not closely predictable, military policy must also be held flexible to make use of new technical possibilities. To take a single case, the increasing requirement for long ranges and heavy bomb loads has led to increasingly heavier aircraft. With growing weight, there has been a corresponding increase in the length of runway required for take-offs. This, in turn, acts to limit the operational flexibility of heavy aircraft, because extensive ground installations must be built before the airplane can be used.

There are two general ways of solving this problem. Either the funds and manpower must be allocated to create, supply, and defend major air bases, or means must be found for increasing the take-off performance of the aircraft. By the end of World War II the use of JATO rockets was beginning to implement the latter solution. But JATOS, too have limitations in terms of cost, logistics and operating conditions. The advent of the turbojet has rendered this problem even more acute since the static thrust per horsepower is *less* in turbojet airplanes than in propeller aircraft. Published reports indicate that much work on this subject is under way, and the precise nature of the solution will not only de-

termine the direct operational characteristics of the Air Force, but will have repercussions in terms of industrial mobilization, manpower policy, etc.

The end result of these considerations is that the conduct, management and direction of research is an ever-present critical issue. How well the NACA performs its function will determine, in a large part, our military prospects.

Neither *Frontiers of Flight* nor the *Annual Report* mentions the above problems, but they provide valuable background information. The *Annual Report* will serve as a technical review of present activities. Mr. Gray's book is highly recommended as thorough, immensely interesting, and well presented.—GEORGE CHERNOWITZ.

Final Volumes

MILITARY OPERATIONS: FRANCE AND BELGIUM, 1918. Volume IV: 8th August-26th September, The Franco-British Offensive. Edited by Brig. Gen. Sir James E. Edmonds. His Majesty's Stationery Office, 1947. 623 Pages; Maps; Appendixes; Index. $6.50.

MILITARY OPERATIONS: FRANCE AND BELGIUM, 1918. Volume V: 26th September-11th November, The Advance to Victory. Compiled by Brig. Gen. Sir James E. Edmonds and Lt. Col. R. Maxwell-Hyslop. His Majesty's Stationery Office, 1948. 675 Pages; Maps; Appendixes; Index. $7.00.

These volumes complete the history of Britain's participation in World War I; they are the last of fifteen volumes on the operations in France and Belgium. Volume IV, finished in 1940 and published in July 1947, eight years after Volume III, was delayed by wartime restrictions on paper. In addition to British records, the Official Historian consulted the writings of Allied and enemy commanders and historians, and these works are listed. References to American forces and their employment are based on General Pershing's memoirs and the few publications of the War Department on World War I. The complete narrative of these two volumes was checked by our General Staff.

Volume IV covers a period of fifty days, beginning with "the black day of the German Army" up to September 26, when the British armies were lined up opposite the main Hindenburg position and its continuations to the North Sea. This period saw the failure of the German theory of "defense in depth." The idea failed because the "super-counterattack" divisions brought up, although they were employed in a few feeble counterattacks, had generally to be used as replacements for beaten divisions in the line. The Battle of Amiens, the actions at Albert, the Scarpe, Bapaume, Drocourt-Quéant and other localities, and the approach to the Hindenburg position, resulted in an average advance by the British of 25 miles on a 40-mile front, mostly during the twenty-nine days of August 21-September 18. Lest this statement cause eyebrow-raising among participants in the Northern France rat-race of 1944, it should be mentioned that this German advance was frontal, with little help from armored units, over ground which had seen an average advance of 8 miles on a 12-mile front in four and a half months in 1916. The terrain was admirably suited to a defender employing delaying actions. It was traversed by the north-south course of the Somme and the Canal du Nord, included innumerable ground features offering concealment for men and guns, and was cut up by the trenches and wire of former positions.

Volume V narrates the last forty-seven days of the war on the Western Front. During this time all the Allied and Associated (that's us; we weren't "Allied") armies, from the Meuse to the North Sea were moving forward together and the great advance both in width and depth was achieved.

Thanks to American cooperation—although the margin of numerical superiority was not as great as some of us think it was—the Germans were attacked simultaneously all along the front, the great final offensive by thirteen armies (including two American) beginning with four heavy blows on four successive days in the Argonne, at Cambrai, in Flanders, and in front of Amiens. Against this huge drive the Germans could not stand. They gradually fell back, leaving behind 385,500 prisoners and 6,615 guns.

To complete the picture, an account of what was going on behind the enemy front and of the political events preceding the German collapse is given from German sources. After "Reflections" on the final campaign, the volume ends with a 36-page "Retrospect" of the entire war.—N. J. ANTHONY.

The Turning of the Revolutionary Tide

THE CAMPAIGN OF PRINCETON 1776-1777. By Alfred Hoyt Bill. Princeton University Press. 145 Pages; Index; Maps; $2.50.

The American Army under General Washington numbered barely 3,000 men. The campaign lasted only nine days. Nevertheless, this handful of men in these few days changed the course of American history. They turned the tide of the Revolution by the remarkable Campaign of Princeton.

As an episode of the utmost significance in the annals of this country, this campaign deserves to be remembered. As an outstanding example of surprise, of clever strategy, of swift movement and quick decision, it merits close attention of the military student. Mr. Bill's careful and accurate story of the campaign makes exciting reading that will have a wide appeal to the general as well as the military reader. For the latter, the author has been particularly helpful in describing size of forces, weapons and weather, terrain and tactics,

planning and performance, and by including adequate maps for following the movement of Washington's little army.

Washington's problem was how to compensate for his great inferiority in trained officers, in numbers of men, in weapons, in supplies of all kinds. Clearly leadership, morale and superior strategy were the only variables through which victory could be expected. And so the weakness of this Revolutionary army found its compensatory strength. Morale was fortunately raised by the opportune publication of Paine's famous pamphlet. Leadership inculcated a will to victory in the hearts of the ragged Continentals. For nine days Washington's faultless and ingenious strategy completely mystified the enemy. Stonewall Jackson, in his best maneuvers, never carried out any campaign more perfectly devised than this.

Mr. Bill's study is a valuable contribution to the rather meager military history of this campaign.—Brig. Gen. Donald Armstrong.

Assistant Slave Driver

PEOPLE IN COLONIES. By Kumar Goshal. Sheridan House. 329 Pages; $3.50.

The author divides the people of the world into four classes. There are first the miserable people living in colonies who drag out their wretched lives always on the verge of famine, for example, the people of Puerto Rico, Indo-China, Java, Burma and most of the people of Africa.

In the second he places the people of "semi-colonies"—where misery, starvation, drudgery are only one or two degrees higher. Semi-colonies include such countries as the Philippines, China, Iraq, and most of the countries of South America. In the third class the author finds the imperialistic nations of the world whom he holds responsible for enslaving the unfortunate inhabitants of colonies and semi-colonies. This fraternity of capitalistic oppressors includes the archvillains, Great Britain and the United States, and lesser members of the brotherhood are France, Belgium, and The Netherlands. The author also records the early wickedness of Italy, Germany and Japan and tells why the imperialists began quarreling among themselves over their colonial plunder. The author gives Russia a class all to itself. "For the Soviet Union the colonial people had sincere admiration and sympathy," and the example of the champion of the enslaved peoples "is spreading rapidly throughout the economically depressed areas, building up widespread militancy against imperialistic exploitation."

The author really believes that the people of the United States are guilty of "sordid imperialism," intent on keeping the people of South America, China, and the Philippines chained to the chariot of American capitalism. He does except Henry Wallace and maybe a few others. Otherwise, we are grimly determined to abet the British Empire in an effort to keep one and a half million people sweating, starving, dying under the lash of foreign capitalism. —Colonel Presley W. Melton.

Government in Japan

FALLEN SUN: A Report on Japan. By Noel F. Busch. Appleton-Century-Crofts, Inc. 258 Pages; Index; $2.50.

The senior writer of *Life* magazine displays a gift for explaining the strategy and economics of American military occupation intelligibly. This is appreciated by the reader who is neither a strategist nor an economist. Even his account of why Tokyo's most talented Geisha, Miss Peach Blossom, as well as other Japanese people, think and act like Japanese, is entertaining and fairly reasonable. That is, Mr. Busch's *explanation* of why they think and act as they do, not the Japanese psychology itself, is logical enough to the American reader.

The writer says that General Douglas MacArthur has gained the confidence of the Japanese and their ardent support of American military government policies. He does not attempt to forecast the future of the seventy-five million energetic Japanese who, with a high birth rate, are confined to a group of mountainous islands whose area is no greater than that of California and which are lacking even the natural resources of California. He agrees by inference with the American-educated Japanese Baron who, discussing Japan's future under American domination said, "the matter is entirely in your hands. The Japanese are willing to work—they will do whatever you tell them."

If international affairs go from bad to worse you might be an American officer in occupied territory some day. Here is a good book to tell you how and why General MacArthur and his staff are conducting an efficient military government of an alien nation.—Colonel Presley W. Melton.

Fine Narrative

TWELVE WALKED AWAY. By Marguerite Gaylord Tate. Harcourt, Brace & Company. 150 Pages; $2.50.

In November 1946 an Army C-53 transport plane crash-landed on Gauli glacier, which lies on the slopes of the Wetterhorn above Meiringen in the Swiss Alps. The plane was intact and all twelve people aboard, including the author of this book, were alive, albeit slightly beat-up. That was a miracle. Never before had every soul aboard a plane come through a winter Alpine crash alive; never before had the plane been sufficiently intact to give the survivors adequate shelter.

Five days later the survivors were rescued—taken to an accessible spot by a Swiss Alpine rescue party and flown from there to Meiringen in tiny Swiss planes especially adapted to mountain flying and snow landings. Mrs. Tate's story, however, deals more with the five days between the crash and

the rescue than with the rescue itself. She relates with a great deal of wit—there are comic elements in almost every tragedy of this sort—how the little party lived, what they ate, how they slept, what they talked about. Through Mrs. Tate's eyes one gets the picture of twelve garden-variety Americans, better trained to deal with emergencies than most, reacting to disaster. The picture is good; these people are able to meet suffering and the possibility of death with faith and courage and a whimsical sort of humor. The author's writing of her own impressions and thoughts is exceedingly vivid, and her mild amazement at the competence and leadership of the pilot through the five days is understandable, since the pilot is her son.

Mrs. Tate has written a very human and deeply moving story of high courage; it is all the better for being simply written. If there is a trifle too much breathless wonder at the miracle of the rescue and the gallantry of the rescuers, it is easily forgiven, for no one has a better right to express it than Mrs. Tate.—O. C. S.

Books Received

MINSTREL OF THE YUKON. By Jack Hines. Greenberg, Publisher. 231 Pages; $2.75. A description of Alaska in its pioneer days written by a prospector and ballad singer.

LOST ILLUSION. By Freda Utley. Fireside Press. 288 Pages, $3.00. The biography of a woman who was born and educated in England, lived in Russia as a communist, rebelled, and now tells her story in America.

FIGHTING EDITORS. Edited by Walter Howey. David McKay Company. 163 Pages; Illustrated; $2.50. The editors who fought for freedom of press and for justice.

ADMIRALS OF AMERICAN EMPIRE. By Richard S. West, Jr. The Bobbs-Merrill Company. 354 Pages; Illustrated; Index; $4.00. Dewey, Mahan, Schley and Sampson and their contributions to the Navy and to their country. The author is an associate professor at the Naval Academy.

ANOTHER SUCH VICTORY. By John D. Weaver. The Viking Press. 250 Pages; $2.75. A novel with the 1932 bonus march as its background.

NOMAD. By Robin Maugham. The Viking Press. 183 Pages; $2.75. "Sympathetic and frankly partisan account" of the Arabs of the Middle East by a young British officer.

WALTER JOHNSON, KING OF THE PITCHERS. By Roger L. Treat. Julian Messner, Inc. 192 Pages; Illustrated; $2.75. The life story of one of baseball's greatest pitchers.

CHESS FOR YOU AND ME. By Milton Hanauer. David McKay Company. 150 Pages; Illustrated; $2.00. Introductory.

AMERICAN FOREIGN POLICY. By Chamberlain and Snyder. Rinehart & Company. 826 Pages; Index; $5.00. An associate professor of government at Columbia and an assistant professor of politics at Princeton offer text and readings in a field where information is far from complete.

ASSESSMENT OF MEN. By the OSS Assessment Staff. Rinehart & Company. 541 Pages; Illustrated; Index; $6.50. The methods and results of the system used to measure the qualifications of candidates for the Office of Strategic Services

SCIENCE YEAR BOOK OF 1948. Edited and with an introduction by J. D. Ratcliff. Doubleday & Company. 244 Pages; $3.00. "A popular survey of the role scientific development is playing today."

TABLES FOR THE DESIGN OF MISSILES. By The Staff of the Computation Laboratory. Harvard University Press. 226 Pages; $9.00. Calculated for the Bureau of Ordnance, United States Navy, by Harvard's Automatic Sequence Controlled Calculator. For the designer or constructor.

A UNION OFFICER IN THE RECONSTRUCTION. By John William De Forest; Edited by James H. Croushore and David M. Potter. Yale University Press. 211 Pages; Index; $3.75. Telling "impartially" of the good and evil that he witnessed in the Negroes and the whites, in Northerners and Southerners . . . of the emancipation . . . of the genuine chivalry and highmindedness of many Southerners . . . where the old order had perished and the new had not yet appeared. By the author of *A Volunteer's Adventures*.

JET PROPULSION PROGRESS. By Leslie E. Neville and Nathaniel F. Silsbee. McGraw-Hill Book Company. 232 Pages; Illustrated; Index; $3.50. The development of aircraft gas turbines.

THE ESSENTIALS OF MILITARY KNOWLEDGE. By Major D. K. Palit. Gale & Polden, Ltd. 140 Pages; Maps; $3.00. A short study of warfare by a young Indian major. Foreword by Field Marshal Auchinleck.

MY LIFE AS A TEACHER. By John Erskine. J. B. Lippincott Company. 249 Pages; Index; $3.00. *Following The Memory of Certain Persons*, John Erskine now describes his experiences and educational adventures at Amherst College, at Columbia University, and at the American University at Beaune, France, following World War I. A running history of a notable half-century in American education.

THE BABE RUTH STORY. By Babe Ruth as told to Bob Considine. E. P. Dutton & Company. 250 Pages; Illustrated; $3.00. The autobiography of one of baseball's greatest figures.

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