Antiaircraft JOURNAL

NOVEMBER-DECEMBER, 1952

AWARDS

SILVER STAR

M-Sgt. Ariel Hernandez

M-Sgt. Ambrose Thompson

BRONZE STAR

Awards at Fort Bliss for Service in Korea

Capt. Willard C. Hunt
1st Lt. James D. Cowart
1st Lt. Russell F. Glass
1st Lt. Johnny W. Kelley
WOJG Robert H. Parham
M-Sgt. George L. Bishop
M-Sgt. Ernest W. Davidson
M-Sgt. Woodrow W. Noel

Sfc. James Avacoff
Sfc. Richard L. Graffam
Sfc. James A. Hennessee (1st OLC)
Sfc. Burrell Jenkins
Sfc. Eugene R. Qualls
Sfc. Ernest S. Snopak
Sfc. Yuro Tomisato
Sfc. Thomas Turner

Sfc. Gerardo A. Verlinger
Sfc. Clyde W. Williams
Sgt. Primitivo C. Cardon, Jr.
Sgt. Roy N. Collins
Sgt. Robert Franks, Jr.
Sgt. Harold G. Mael
Sgt. Harry E. Miller
Sgt. Donald Petty

15th AAA AW BN. (SP)

Major William P. Mathers
Major Leonard L. Miller
Capt. Bruce E. Esterly (1st OLC)
Capt. James D. McCauley
Capt. Fred A. Selle
1st Lt. Edward D. Bayne, Jr.
1st Lt. Roger H. Belk

1st Lt. Clifton A. Cole
1st Lt. David H. Downey
1st Lt. Joseph N. Peck
1st Lt. James T. Vick (1st OLC)
M-Sgt. Lynwood R. Tucker
M-Sgt. Frank J. Villas (V)
Sfc. Carl J. Meyer (V)

Sfc. Carl R. Miller (V)
Sfc. Marvin S. Holly (V)
Cpl. John A. Anthony
Cpl. Charles Webster (V)
Pfc. George M. Delk (V)
Pfc. Joseph Wise (V)

BRONZE STAR WITH LETTER "V" DEVICE

15th AAA AW BN. (SP)

1st Lt. Chester L. McKinney
Sgt. Harold E. Anderson
Sgt. Gerald R. Seifer

Sgt. Lee A. Williams
Pfc. Harold H. Patchett

AIR MEDAL

Fort Bliss

1st Lt. Wm. T. McAllister (1st OLC)

PURPLE HEART

15th AAA AW BN. (SP)

1st Lt. Chester L. McKinney
Sgt. Harold E. Anderson
Sgt. Marvin S. Holly
Sgt. Gerald R. Seifer
Sgt. Myles V. Watkins
Sgt. Lee A. Williams
Sgt. Kenneth E. Woods
Cpl. Eugene Akers

Cpl. Willard Garlow
Cpl. James D. Rabideau
Pfc. Jodie Brown
Pfc. Franklin P. Guilkey
Pfc. James H. Logan
Pfc. Elmer J. Monk
Pfc. Agustin Montes

Pfc. Harold H. Patchett
Pfc. Walter Staley, Jr.
Pvt. Cecil D. Bostick
Pvt. Barry F. Jackson
Pvt. Robert L. Kibler
Pvt. Hubert M. O'Neal
Pvt. Rufus Robertson

THE UNITED STATES
ANTIAIRCRAFT
ASSOCIATION

OFFICERS

LT. GEN. LeROY LUTES
HONORARY PRESIDENT

LT. GEN. JOHN T. LEWIS
PRESIDENT

LT. GEN. LYMAN L. LEMNITZER
VICE-PRESIDENT

COL. CHARLES S. HARRIS
SECRETARY-TREASURER

ADDITIONAL MEMBERS OF THE EXECUTIVE COUNCIL

BRIGADIER GENERAL ROBERT W. CRICHLOW, JR.
BRIGADIER GENERAL CHARLES G. SAGE
COLONEL THOMAS F. MULLANEY, JR.
COLONEL NORMAN E. HARTMAN
LIEUTENANT COLONEL FRANCIS X. BRADLEY
LIEUTENANT COLONEL H. GLEN WOOD
MAJOR JAMES E. CALKINS

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

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

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

PUBLICATION DATE: December 1, 1952

Antiaircraft JOURNAL

FOUNDED in 1892
Published from 1892 until 1922 as
THE JOURNAL OF THE UNITED STATES ARTILLERY
Published from 1922 until 1948 as the
COAST ARTILLERY JOURNAL

VOL. LXXXXV NOVEMBER-DECEMBER, 1952 No. 6

CONTENTS

COVER: Action in Exercise Hardrocks in Japan. See page 29.
TO ALL MEMBERS OF THE U.S. ANTIAIRCRAFT ASSOCIATION 2
SUPPLY: WORLD WAR II. *By Lieut. Gen. LeRoy Lutes* 4
GENERAL J. LAWTON COLLINS 9
RADIOSONDE. *By Major Harry R. Jackson* 17
SIMPLIFIED WIND DETERMINATION. *By Major H. R. Jackson and PFC. J. G. Torian* 18
THE FIRST GUIDED MISSILE GROUP. *By Capt. Andrew G. Favret* 21
FORT BLISS NEWS 24
STATUS OF TRAINING LITERATURE. *By Major B. G. Oberlin* 25
INDIRECT FIRE WITH THE 40MM GUN. *By Capt. William S. Haller* 26
AAA SPECIALIST BN AT BLISS 27
TRAINING EXERCISE: HARDROCKS. *By Col. Thomas M. Metz* .. 29
HONOR ROLL 30
SIMULATED FIRING PRACTICE. *By Lt. Col. Leonard S. Allen* ... 31
GUIDED MISSILE GUIDANCE. *By Capt. Robert W. Fye* 32
NEW 280MM GUN 36
BUNKER BUSTING IN THE SECOND DIVISION. *By Capt. Ballard B. Small* 37
NEW FLYING TRAILER 40
HEAVY DROPPING AUTOMATIC WEAPONS. *By Capt. Charles E. Vandervort* 41
READY TO FIRE ON D-DAY 42
HOUSING: A PROBLEM IN EUCOM 43
BOOK REVIEWS 44
NEWS AND COMMENT 45
U.S. ANTIAIRCRAFT ASSOCIATION BALLOT 45
ARTILLERY ORDERS 46
ANNUAL INDEX 47

COLONEL CHARLES S. HARRIS, Editor
LT COLONEL RICHARD W. OWEN, Associate Editor
M Sgt Fred A. Baker, Business Manager
Sgt 1cl James E. Moore, Jr., Editorial Assistant
Sgt Paul M. Plumly, Circ. Mgr.

Published bimonthly by the United States Antiaircraft Association. Editorial and executive offices, 631 Pennsylvania Avenue, N.W., Washington 4, D. C. Terms: $3.00 per year. Foreign subscriptions, $4.00 per year. Single copies, 75c. Entered as second-class matter at Washington, D. C.; additional entry at Richmond, Va., under the Act of March 3, 1879. Copyright, 1952, by the United States Antiaircraft Association.

TO ALL MEMBERS OF THE U. S. ANTIAIRCRAFT ASSOCIATION

YOUR Executive Council and the Executive Council of the Association of the U. S. Army have been discussing terms for the merger of the two associations.

The purposes are to form a strong association representative of the entire Army and dedicated to its *esprit*, efficiency, and combat effectiveness and to publish a combined journal dedicated to the same ends.

For some time there has been a feeling within the Army that there should be one Army association and a single journal, rather than a number of branch associations and several competing journals. The movement has been strongly favored by Generals Bradley, Collins, Devers, Hull and many other senior Army officers who have felt that such a merger would encourage unification and promote teamwork.

In 1950 the Infantry and Field Artillery Associations merged to form the Association of the U. S. Army and began publishing the *Combat Forces Journal*, which has become one of the most popular and interesting service publications. Although we declined to merge at that time because of a difference of opinion on terms, many of our Association members favored the merger in principle and felt that a harmonious merger would create new ties of cooperation and mutual understanding between antiaircraft artillerymen and other members of the combat arms.

Battlefield experience in Korea has re-emphasized the importance of antiaircraft as an organic part of the ground combat team and has underlined the need for close coordination among all elements of the Army. The proposed merger of the journals would give us increased contact with the ideas and developments in Infantry, Artillery, Armor, and other branches. At the same time we could tell the story of antiaircraft and guided missiles to a larger audience, and help the members of the other branches to understand better our problems and to realize more fully our capabilities.

The integration of the artilleries is well under way now, and more rapid progress is expected in the near future. Transition courses are being conducted at Fort Sill and Fort Bliss, and the cross assignment of officers has already begun. As time passes, it will be more and more difficult to tell who was Antiaircraft and who was Field, and it is not only logical but important that all artillerymen read and support the same journal and belong to the same association.

The Proposed Memorandum of Agreement on the opposite page was carefully worked out by the council members of both associations. Other senior members of our Association stationed in Washington, including National Guard and ORC representatives, were consulted, and they expressed complete support. The President of our Association, Lieutenant General John T. Lewis, now sick in the hospital, also fully endorses the proposed merger.

Your Council feels that the terms of agreement now proposed are equitable and just and will give us proportionate representation in a progressive, growing association. Of even greater importance is the obvious good will of the Council members of the Association of the U. S. Army. They are anxious for us to come in as an equal, and they believe, as we do, that a merger will be to our mutual benefit. Of course, benefits will not accrue to us automatically. We must enter wholeheartedly and be prepared to do our share.

Your Council strongly recommends that you vote to approve the merger. Above all, we recommend that each member vote on this important matter. Use the attached ballot or send any other notice which clearly indicates your desire.

FOR THE EXECUTIVE COUNCIL:

L. L. Lemnitzer

L. L. LEMNITZER
Lieutenant General, U. S. Army
Acting President

U. S. ANTIAIRCRAFT ASSOCIATION
BALLOT

☐ **For the merger with Association of the U. S. Army.**

☐ **Against the merger.**

(DATE) (SIGNATURE)

(RANK) (UNIT)

MEMORANDUM OF AGREEMENT between the Association of the United States Army, a non-profit corporation incorporated under the laws of the District of Columbia, hereinafter called AUSA, and United States Antiaircraft Association, an unincorporated association, hereinafter called Antiaircraft.

1. AUSA and Antiaircraft agree to merge into a single organization, in accordance with the terms outlined below.

2. Antiaircraft agrees to transfer all its assets, real and personal, tangible and intangible, to AUSA, and AUSA agrees to assume all the liabilities of Antiaircraft.

3. Antiaircraft agrees to dissolve upon merger of Antiaircraft and AUSA.

4. AUSA will add to its existing 21-member Executive Council the present 9 members of Antiaircraft's Executive Council for a period of one year. Thereafter the Antiaircraft representation on the Council shall continue on the same equitable basis as changes in the Association may develop.

5. Antiaircraft members will become full members of AUSA effective upon the merger. Unexpired subscriptions to the ANTIAIRCRAFT JOURNAL will be extended for a like period to the *Combat Forces Journal* without charge.

6. The merger is effected with the firm understanding that all elements will participate equitably in the direction and control of AUSA activities. Antiaircraft members shall be eligible to hold any office or duty in AUSA. Upon date of merger, the President of Antiaircraft shall become a Vice President of AUSA to serve for one year thereafter.

7. When the merger is consummated the ANTIAICRAFT JOURNAL will cease to be published and AUSA will provide a coverage of professional and technical military information on antiaircraft and guided missiles in the *Combat Forces Journal* which will be equal in any one year to at least the total amount of such information published in the closing year of the ANTIAIRCRAFT JOURNAL.

8. AUSA will arrange to get a qualified Antiaircraft editor approved by the Antiaircraft Council to serve as Associate Editor of the *Combat Forces Journal*.

9. The Executive Council of AUSA will take the necessary steps to amend its bylaws as above may require, as soon as those steps can be effected under the terms of those bylaws.

BALLOT

UNITED STATES ANTIAIRCRAFT ASSOCIATION

The President and three members of the Executive Council are to be elected on this ballot, to replace officers whose terms of office expire December 31, 1952.

Please record your vote by making an "X" in the appropriate square or indicate your choice by writing the name of your candidate. Ballots received with signatures, but with no individual votes recorded, will be considered proxies for the President of the Association.

Each candidate was considered in connection with the geographic location of his residence. The Constitution of the Association requires that at least five members of the Council reside in the Washington area, and that at least three of them be on active duty, in order to facilitate the transaction of business.

Ballots received after December 31, 1952, cannot be counted.

Use the ballot below or prepare one to indicate clearly your vote. Mail to the ANTIAIRCRAFT JOURNAL, 631 Pennsylvania Avenue, N.W., Washington 4, D. C.

FOR PRESIDENT (1953-1954)

☐ Lieutenant General John T. Lewis,
Commanding General,
Army AA Command.

☐ _____

FOR MEMBERS OF THE EXECUTIVE COUNCIL

From National Guard (One Member)

☐ Brigadier General Charles G. Sage,
Adjutant General, New Mexico.

☐ _____

From Organized Reserve (One Member)

☐ Brigadier General H. Russell Drowne,
Commanding, 300th AAA Brigade, ORC,
New York.

☐ _____

From Regular Army (One Member)

☐ Lieutenant Colonel George W. Best, Jr.
Commanding, 36th AAA Gun Bn.

☐ _____

Signature _____

Rank & Organization _____

Address _____

6-52

SUPPLY: WORLD WAR II

For Eisenhower's *First* Crusade

By LIEUT. GEN. LEROY LUTES

IN early 1944, after I had just returned from a supply survey in India, China, Egypt, North Africa, and Italy, General Eisenhower requested that I come to SHAEF to make a complete survey of all the supply plans and preparations to support the cross-channel assault on and invasion of Europe. When General Somervell approved the request I organized a party to include Col. I. K. Evans, New York Port of Embarkation, and the following from Army Service Forces: Col. H. R. Westphalinger, Requirements; Col. F. A. Bogart (now Brig. Gen., USAF), Plans; Lt. Col. L. E. Bell and Capt. J. S. Fralich, Stock Control.

We had a rugged flight over via Newfoundland, Ireland, Scotland, Wales, reaching London finally the night of April 7th. Early the next morning I took the group to the Headquarters ETO at 47 Grosvenor Square, where we made an official call on Lt. Gen. John C. H. Lee, who was both the Commanding General, SOS in Europe, and the Deputy Theater Commander under General Eisenhower. He was about to depart on a trip, but in his usual friendly manner, offered every possible assistance and suggested an itinerary. Both he and his Chief of Staff, Brig. Gen. Roy Lord were amazed to learn that we planned to take one or two months to make a complete survey and that we did not want a prearranged itinerary. However, they cheerfully accepted the situation and led us immediately to the War Room where we were oriented on the strategic concept of the cross-channel operation and the plans of the subordinate service elements. We spent the entire day studying the main plans in detail.

Then we found that the American and British staffs weren't working the long evening hours in London that we were used to in Washington. We wanted to continue the work at night, but there wasn't much we could do about it without access to our secret files and some clerical help. The first evening we filled in by a long walk in Hyde Park, where soap-box orators were going full blast with everything from atheism to communism. Around each orator was a small crowd of fifty to a hundred people, and on the outskirts in the park soldiers and their girls were making the best of their time together and not worrying too much about privacy. We were quite interested in a cluster of antiaircraft batteries and rocket guns surrounded by barbed wire. Later in the night I observed the entire group of guns and rockets going full blast against an air attack.

On the 9th of April I proceeded to SHAEF, located near the Ascot Race Course beyond Kingston, slightly southwest of London. It was about a 45-minute ride from Grosvenor Square. The day was clear and cold. The trip was through the most recently bombed section of London, where the Germans had attempted to knock out an electric power plant in southwest London and missed the plant, but badly battered four or five blocks of apartment houses and buildings in the vicinity.

General Eisenhower's Supreme Allied Headquarters were located in a large field, each building well camouflaged with huge green camouflage nets. All of the buildings were one-story brick, and the entire field was inclosed with a brick wall about six feet high.

I was soon ushered in to Lieut. Gen. W. Bedell Smith, Chief of Staff, who accompanied me to see General Eisenhower. I found Ike in the corner of one of the low brick buildings in a large comfortable office with an open fireplace and the fire going. We pulled up three chairs to the fireplace, and Ike immediately launched into an outline of his desire that I check over the logistic plans of his forces for the cross-channel assault. He had known me for a number of years and we had worked together closely on the Third Army Staff on the large Louisiana Maneuvers. He stated that he had complete confidence in my judgment; that he had never heard of the key officers on Gen. Lee's staff, nor of any experience they had in dealing with large forces, either in combat or on maneuvers. He also stated that his subordinate army commanders were considerably worried about Lee and his staff, and that he felt something must be done to allay their uneasiness and his own on this matter. So he wanted me to proceed with a complete investigation, start corrective action wherever indicated, and to let him know if any important changes were necessary.

At this point General Bedell Smith asked me how I intended to proceed with the investigation. I replied that I intended to investigate first the logistic functions of Ike's own headquarters and then to follow down through to the subordinate headquarters, checking the logistic plans in each headquarters, to see how they fitted into the general concept of the operation; after which I would eventually get down to examining the actual loading plans and make a final check on shortages of critical items required. All along we would assist the planning staffs, correcting any deficiencies in plans, as well as contact the United States to expedite any shortages that might develop. This general scheme would require me to visit all of the higher headquarters of the American forces and most of the important American installations in southern and southwestern England. I would have to check the functions of the general staffs in their logistic plans as well as the detailed work of the technical services.

Also, I agreed to render a report upon

the efficiency of the entire supply operation in Europe prior to the cross-channel operation in sufficient detail to estimate the number of days that the operation could be supported once launched. Both General Eisenhower and General Smith seemed satisfied with this plan. Ike walked to the door with me and said, "I am very glad you are here. I feel much better."

I then checked in with Maj. Gen. Bull, G3 of Supreme Headquarters, and with Maj. Gen. Robert Crawford, G4, and outlined briefly to them my conversations with Generals Eisenhower and Smith and the purpose of my visit. We had lunch together in the famous Yankee Doodle Dining Room of Supreme Headquarters—a very nice lunch room which was highly decorated with appropriate American symbols.

After lunch I returned to London and immediately assembled my staff and proceeded to the Headquarters of the First U. S. Army Group. Our visit there was not very successful. G4 Maj. Gen. Moses was not there, and his staff were unable to give us the details of their plans that we wanted. However, we listened to their outline of the plan as they knew it.

The office of Lieut. Gen. Omar Bradley was next on my list. I informed General Bradley that I would like to call upon his G4 at First Army Headquarters and to initiate an investigation of the supply situation throughout the First Army. Bradley seemed very glad to see me and to know that such a check was to be made. We had been classmates at the Command and General Staff School at Fort Leavenworth some years before, and he outlined his problems to me freely. He did not like the setup with Lieut. Gen. Lee serving as both Deputy Theater Commander and the SOS Commander—and later to become the Communications Zone Commander.

After completing the day's work at the First Army Headquarters, I walked in the clear cold evening to the hotel. All the barrage balloons were up and I had the feeling that it would be a good evening for an air raid. My hunch proved right. About 1:15 a.m. the sirens were sounding full blast and everyone blacked out using the heavy black-out curtains provided in all buildings. Many of the guests of the hotel lived there throughout the winter. They would assemble in one of the lower hallways and remain there until the attack was completed. Some would be fully dressed, others in bathrobes. This particular raid lasted about an hour and the anti-aircraft batteries in front of the hotel kept up a constant barrage. Bombs dropped in the city, but none near the

Supplies on the beaches . . . D Day

The floating docks at Omaha Beach before . . . . . and after the storm

hotel. In previous raids on Guadalcanal and other places where I had been, I usually slept through the whole performance, but in London, between the constant blast of the taxi drivers' horns and the firing of the antiaircraft batteries, sleep was impossible.

The next morning I held a conference with the G4 Section of ETO, Colonels Bogart and Evans of my own group, on the subject of shipping priorities. I was not satisfied with the way shipments were being made to Europe in order of priority. As the time approached to attack the continent, it was evident that we must have a system of priorities between the headquarters of the ETO and the ports in the United States which were to support that theater, arranged so clearly and definitely that the theater commander could get what he needed for combat in the order of priority of need. I was determined that we must get this settled at once. The system proposed by ETO was not satisfactory, so I set the staff to work immediately on another system, which would take them approximately a week to work out. Later the system was adopted and arrangements were made by telephone to New York indicating the complete details so that it could be implemented without delay in preparation for the cross-channel operation.

Having started my group on this work, I proceeded to Supreme Headquarters for a conference with Maj. Gen. Robert Crawford, G4. I entered his office with mixed feelings, because both General Devers and General Eisenhower had asked for my detail in this position much earlier, but in each case my commanding general had declined my release.

Bobby Crawford grasped his responsibilities with regard to the allocation of resources between the British and the American armies thoroughly, and as far as I could see, was protecting the American interests as well as he could. I indicated to him that he and his own staff could make more and fuller use of the staff of the SOS under General Lee, thereby avoiding duplication in the detailed work. General Crawford agreed, but argued that he found it impossible to get data from the staff of the SOS fast enough and accurate enough for his purposes. However, he promised to attempt to improve these relationships and procedures, and I agreed to check at the SOS Headquarters and help from that end of the line. Again our staff group dropped in to the headquarters of the First Army Group for a conference with the G4 Section, but were disappointed to find that the Group G4 Section was still only in the preliminary planning stages and entirely unable to get down to the practical details so necessary in the logistical field.

So we moved over to the First Army in the same building, hoping to get our teeth into the early details of their supply planning, only to find that they had just moved to Bristol, on the Bristol Channel about 150 miles west of London. However, I again had a talk with General Bradley who encouraged me and gave me full authority to consult with any members of his staff during our stay in England. But he still didn't think General Lee should be both the Deputy Theater Commander and the Communication Zone or SOS Commander.

This same day I sent Colonel Westphalinger to investigate the combat vehicle situation, and Colonel Evans to the forward echelon of the Communication Zone headquarters to discuss the question of U. S.-U. K. tonnages: i.e., to get into the problem of tonnages that would have to be sent from the United States directly to the continent after the invasion started and the tonnages that could be sent directly from the United Kingdom during the first ninety days of the operation. I considered this necessary since it would be impossible to load out of British ports all the tonnages that would be required on the continent, due to the congestion in these ports and the requirements of the civilian population in the United Kingdom. At the same time I sent Colonel Bell and Captain Fralich to Cheltenham to start an investigation of the stock control methods used by the technical services in the United Kingdom, to satisfy ourselves whether or not the stock control methods were sufficiently satisfactory to enable us to know what was actually in the United Kingdom.

The next few days were consumed in studying the ammunition requirements with the Ordnance officers of the various units in ETO with a view to ascertaining the exact position for the ammunition support of the coming operation. Also we outlined the system of shipping priorities to be used out of the Port of New York during the attack and in the first three months of the operations on the continent. We also started the investigation at SOS Headquarters and SHAEF to determine the requirements for highly critical items and the actual stock situation of these items. This investigation disclosed that data going into SHAEF was approximately three weeks old, and that many of the critical items that had been of considerable concern to General Crawford, G4, were now being expedited and would be available for the operation. However, General Crawford was not getting data fast enough from SOS Headquarters in Europe to enable him to keep his current planning up to date.

One main cause for the trouble was that the various special and technical

"Willow Run" . . . Vehicle assembly in Normandy

staff officers at the SOS Headquarters were dealing directly with the logistics office at SHEAF. At first glance this might seem to be the best method and one that would save time. But our experiences had shown that such independent procedures were dangerous until proper controls and coordination were provided. This we explained to Colonel Stratton, G4 at SOS Headquarters. He was informed that data from the various staff sections going into SHAEF was reported to be late and inaccurate and that he should promptly grasp the matter firmly in his own hands and review all data and require it all to pass through his office to SHAEF until he was assured that it was dependable. Of all professions known to man, the military must be most exacting in having accurate and prompt information on which plans can be based.

The days continued to be filled with conferences with the First U. S. Army Group, the Advance Section of the Communication Zone, the First and Third Army staffs and the various technical service Officers and staffs, as well as Maj. Gen. Crawford, USA, and Maj. Gen. Brownjohn of the British Army at SHAEF. It was supposed to be springtime in England, but to me it was bitter cold. I admired the fortitude of the bare-legged British boys and girls in the fields and towns, playing games and riding bicycles—their faces and legs beet red from the cold weather. Confidentially they told me they had always felt the cold, too.

The time had now arrived to make a tour of some of the field installations and headquarters. So, we began to gather loose ends. Colonels Bogart and Evans arranged conversations with Washington to explain the agreements made with the London people on shipping priorities; to insure that the system on shipping priorities was clearly understood in the Port of New York, particularly the high priority categories that must be shipped prior to D Day; and further, the categories that would be needed in high priority during the first sixty days on the continent. Of course, these priorities could be revised as the operations developed, but for this operation it was not practical normally to revise the priorities in less than 30-day intervals.

I also instructed the staff to work out tonnage allocations within such priorities during my absence on tour. They were to work these out carefully with the SOS Headquarters and SHAEF Staffs. Also, we initiated studies with Brig. Gen. Harry Vaughan, Engineer Corps, who was to command the forward echelon of the supply zone in France, of the various requirements to maintain our armies after they were landed on the continent. We found here a serious delay. The computations for requirements and tonnages had bogged down in the First Army Group Headquarters and were not getting through to the Forward Echelon SOS. In desperation they had dumped the problem into Vaughan's lap. We were apprehensive because we knew it would develop further delays all along the line in filling requirements as well as in disclosing the actual supply situation. We particularly wanted plans to cover at least ninety days support on the continent. It has been my experience that regardless of how confident the Chiefs of Technical Services are regarding their knowledge of what they have in stock, when requisitions from troops begin to come in, shortages develop, and I was most anxious to ferret out these shortages now, not have them discovered at the last moment.

The discovery of this delay caused me to decide to return to Bradley's headquarters of the First U. S. Army Group to discuss the matter with Maj. Gen. Leven Allen, Chief of Staff. He admitted that the operational plans of the

Ammo dump in France

First and Third Armies had been delayed, but blamed this on constant changes in the troop basis, which were being made at General Montgomery's headquarters, or the headquarters known as "21 Group." Although a planning group had been working in London for almost two years on plans for this cross-channel operation, the commanders had not been designated until January 1944, which in turn had caused a complete upset in the planning. In other words, neither Eisenhower nor Montgomery nor Bradley fully accepted the plans as originally drawn. The revision of the plans at this late stage caused the delay in passing down those portions of the plans so necessary for logistic and supply planning.

This same difficulty we encountered in Washington with our own General Staff. It has been the curse on the back of all logistical planners and operators in all military history. The logistician is expected to be ready immediately to support any tactical or strategical operation, but the tactical and strategical planners develop very slowly a recognition of the lead time necessary to plan and prepare logistical support.

At this time my group conferred with the Ordnance Officer, ETO, to examine some of the critical ordnance items which should be considered for shipment. We established the necessity for immediate shipment of critical carriers M-29 for the First Army.

We conferred with the Artillery Officer of the First U. S. Army Group regarding the future push of heavy artillery. We advised him as well as G3, SHAEF, that advance planning should include a careful analysis of possible requirements for heavy artillery, pointing out that the fighting in Italy had developed a heavy demand for 8-inch artillery and huge amounts of 155mm gun ammunition as well as artillery tubing. We emphasized that heavy artillery requires time to produce; and since the Ground Forces earlier in the war had deemphasized heavy artillery we would have to increase our production now if it were to be secured. Our advice was not taken seriously, but I think they later regretted it.

Conference with Brigadier General Frank Ross, Chief of Transportation, showed me that he had moved along well in his preparations. He had garnered some 300 coastal vessels, averaging 200 tons to approximately 3500 tons, for loading with supplies to maintain the forces during the first three weeks after the assault. The names of these vessels had been placed in the hands of the British War Office, who were to designate what ships would go to specific beaches. Detailed loading plans could not be made until this data was obtained from the British office. Ross disclosed that requisitions for supplies were coming from the chiefs of the technical services in the Advance Section of the Communication Zone in driblets only, which confirmed my former discovery that the entire planning was behind schedule. However, he certainly had set up an excellent centralized control system to keep track of his vessels and his shipping capabilities at all times. In a last minute conference Maj. Gen. Harry Vaughan confirmed the delays which we had discovered in the supply and planning. He thought they were due to changes in the operational plans at Montgomery's and Bradley's headquarters. *It was now evident that the time had arrived when these changes could no longer be made; that the tactical and logistical plans must be made firm.*

Our series of conferences with Transportation and G4 representatives on outloading supplies and equipment developed another disconcerting problem. For two years we had laboriously stockpiled equipment and supplies in the United Kingdom for the great invasion of Europe. Now it developed that the ports of the U. K. could not receive the necessary imports for the military and civilian population and at the same time outload to the continent more than 12,000 tons per day. On that basis we would have to ship from the United States at least 18,000 tons per day directly to Europe, which in turn might cause a duplication of the supplies and equipment which we had so diligently stockpiled in Europe. The solution of this problem was going to take careful planning.

Another matter of concern was the requirement for shipping. Not so, perhaps, to supply people in the U. K., but our headquarters in Washington were taxed with heavy requirements for shipping for all corners of the globe. I requested General Lee's staff to develop at once their estimates of the shipping tonnages that could be cleared from the ports of the United Kingdom daily and the differences that we would have to make up from ports in the United States. Knowing that these instructions would require the staff to work for some time, I sent a memorandum to General Somervell in Washington covering these points and by telephone conversation with the staff in Washington alerted them to requirements for various port battalions to be shipped over in May.

We then got under way for Cheltenham and other places where the field logistic installations were located.

To be continued in next issue.

SEASON'S GREETINGS

This issue brings us to the close of another prosperous year—the sixty-first year of publication for the *Antiaircraft Journal* and its predecessors.

For the Executive Council and the editorial staff we express thanks for the generous support from the Association members and wish to all a Merry Christmas and a Prosperous New Year.

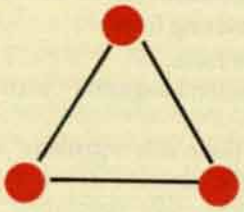
The Chief of Staff of the U. S. Army

GENERAL J. LAWTON COLLINS

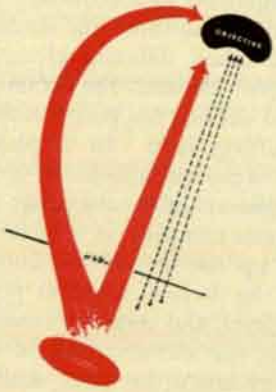
re-emphasizes the simple principles behind the Army's concept of organization and attack

General Collins on Guadalcanal in 1943 when he commanded the 25th Division

STRESS THE FUNDAMENTALS*



"We have incorporated this general theory of attack into the 'triangular concept'—three elements constituted alike."



"The final assault is the coordinated and combined effort of the holding element, the maneuvering element, the fire support element and, if needed, the reserve."

"Terrain analysis is particularly important in determining where the major effort is to be made, and I feel it should always be made through maneuver."

THIS year the Army will lose approximately half of its trained men. This means that we shall gain three quarters of a million new men. I want to be sure that these new men will, from the very beginning, grasp our principles of fighting and organization, particularly in small units.

These fundamentals hold the key to our success. We must know them thoroughly and stress them at all times, not only to our newcomers but to our junior officers and noncommissioned officers. For we will continue to have a great Army only as we continue to produce superb small units.

Superior squads make superior platoons, battalions, regiments, divisions. The spearhead of every attack is a small unit.

I want to re-emphasize here and drive home hard the simple principles behind our ideas of organization and attack, and the close relationship between these concepts and the analysis of terrain. I hope to tie these things together by a connecting thread to make them more easily understood.

The reasons underlying our doctrine of attack are well known to many of the older hands in the Army. We have heard and studied them many times. But primarily for

Army manuals and training directives are being rewritten to emphasize the fundamentals of tactics stressed by General Collins in this article.—*The Editors.*

*Reprinted from the November issue *Combat Forces Journal*.

the benefit of our younger men, I want to repeat these principles.

If we analyze any attack, we will find certain things which must normally be done, whatever the size of the unit. They fall into phases, often referred to as the "fours F's": "find 'em and fix 'em," "fight 'em," and "finish 'em." The first thing we must do, if we are not immediately in contact with the enemy, is to seek him out and to pin him down in position with fire power—we must "find 'em and fix 'em." I think this is really one operation, not two. We must know who our opponent is and where he is. We also want to hold him in place and keep him occupied, so we can carry out the rest of our plan of attack. This finding and fixing normally requires one element, one principal unit, of the commander's force.

When we have located the enemy and pinned him down, we then have to maneuver against one or another of his flanks; or if he is widely dispersed, it may be more effective to hit him in the middle. But more often it will be a maneuver around one flank or the other, so we need a second element in our force —a maneuvering element—for this "fight 'em" phase.

In the final phase we must drive the attack home, capitalizing on the envelopment or extending it, in order to "finish 'em." This last phase may require the use of the third element of our force, the reserve, though sometimes we can finish the enemy off without committing the reserve.

THESE three elements of a force must all be organized alike. For one time we will use one of them to find the enemy and pin him down, the next time we may use the same element for the maneuvering force, and another time it may be in reserve. The three elements must be interchangeable and naturally their organization must be the same.

"We will continue to have a great Army only if we continue to produce superb small units. Superior squads make superior platoons, battalions, and divisions. The spearhead of every attack is a small unit."

In addition to the three elements of any attacking force, large or small, which I have mentioned, we need one final element and that is fire power—heavy fire power which we can shift without shifting a lot of men and weapons. We need a fire support element, as I like to term it, to give us the fire superiority that will permit us to close with the enemy and defeat him.

The size of the unit does not change the concept. The principles are the same for a platoon, a company, a battalion, a regiment, or a division. In practically every attack, the troop leader is normally doing the things I've just described:

- He has to find and fix the enemy with an element that leads into the attack.
- He has to maneuver against him.
- He has to drive the attack home, possibly by using his reserve. And he must guard himself all this while by proper flank and rear security.

When his maneuvering force is up in position to make its assault, the full combat power of the attacking element is then brought to bear. The final assault is thus the coordinated, combined effort of the holding element, the maneuvering element, and the fire support element, and the reserve too, if it is needed.

That is the essence of our entire attack, in simple terms—the principles from which our attack methods and techniques stem. The right troop formations to use—the right weapons to use in fire support—exactly who will make the final assault and when—all these things must be decided right on the spot, after considering the factors involved. But the decisions arrived at must always be based on the principles I've outlined above.

WE have incorporated this general theory of attack into our Army organization. We call it "triangular"—three elements just alike. Each infantry unit has:

- a finding and fixing force;
- a maneuvering force;
- a reserve force.

Each is interchangeable with the other.

There are three rifle squads in a platoon; three rifle platoons in a company. There are three rifle companies in a battalion, three battalions in a regiment, and three regiments in a division.

And besides these three like elements there is the other, different element—the fire support element—the commander's means of shifting fire power without actually shifting men. In a platoon this is the weapons squad. It is the weapons platoon in a company; the heavy weapons company in a battalion. And so on up the line to the division artillery in the division. And at practically every level, and certainly from the battalion up, this element may be supplemented by armor, by other artillery, and by tactical air support.

This is the basic infantry organization —the organization evolved to meet the needs of our American Army doctrine of attack.

There is tremendous advantage in this organization. Not only because it is sound in combat principle. But also because every new, young combat leader

Be flexible in your planning, in your use of formations, and in your orders.

Don't tie yourself to any fixed or stereotyped formation.

Be ready for anything—

Ready to catch the enemy by surprise through maneuver;

Ready to feint;

Ready to counter an enemy thrust;

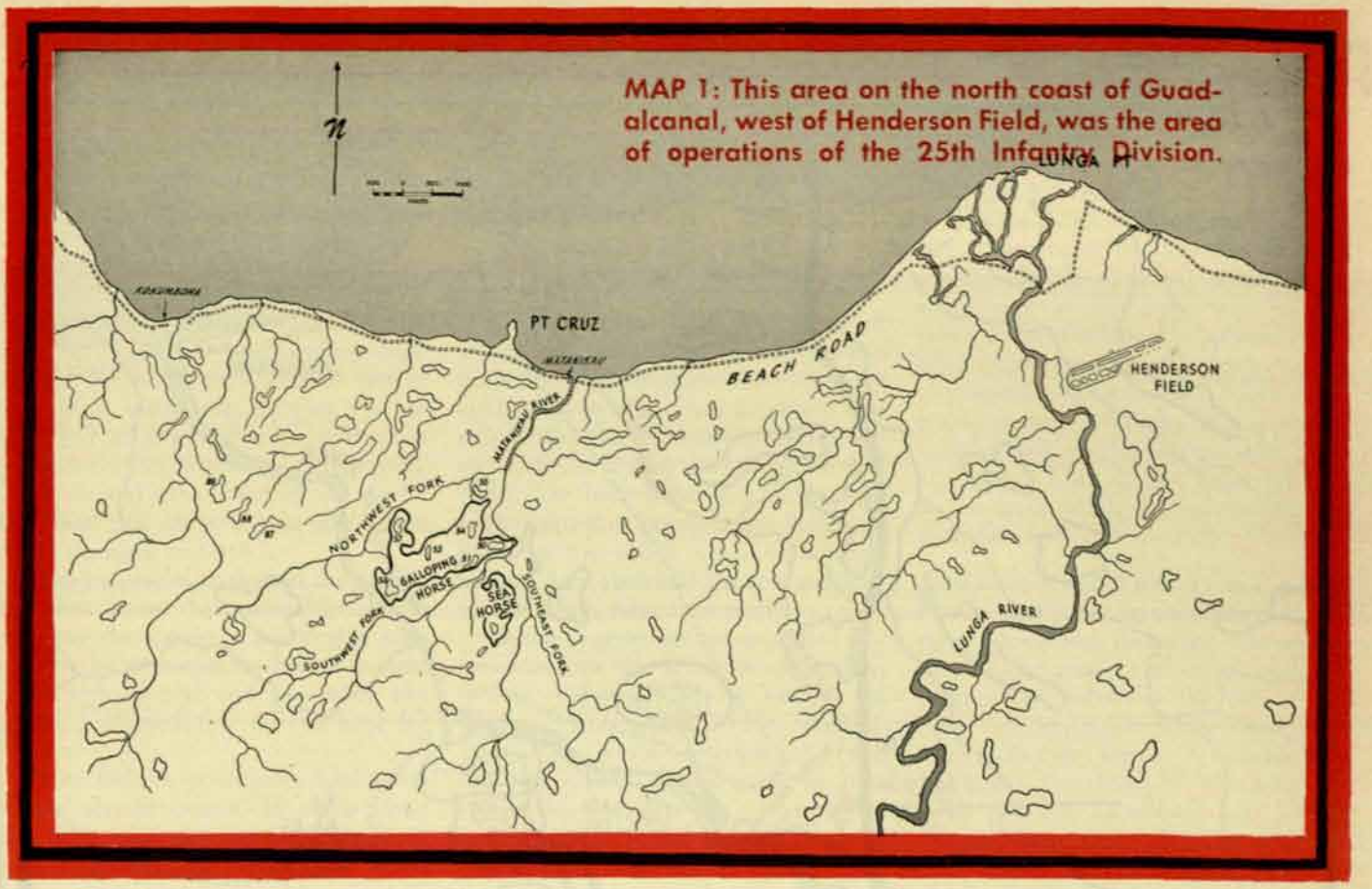
Ready to slam home a knockout blow at the opportune moment.

Don't commit yourself too early. Adjust yourself to the situation which develops.

Probe the enemy carefully with only one element.

Avoid costly frontal attacks.

Keep your reserve protected and under cover until the opportune moment.



MAP 1: This area on the north coast of Guadalcanal, west of Henderson Field, was the area of operations of the 25th Infantry Division.

can understand it easily.

When once a new officer or noncommissioned officer understands just how to fight a platoon, he then understands the principles for commanding a company, a battalion, a regiment, or a division, because there is no change in basic theory whatever, up or down the scale. The one difference is simply that the distances are greater, and this changes the logistical problem. But the tactical problem remains identically the same, whatever the size of the unit.

I HAVE described the basic concept of attack—how one element leads into the attack and holds—how another maneuvers and closes—and how we follow through with a reserve. This is all pretty simple. We must keep on stressing its simplicity and soundness in every part of our training.

We must put these things across so every soldier, commissioned or enlisted, cannot fail to understand them.

AND now I want to address myself for a moment directly to every commander:

Our basic concept of attack gives every one of you a great opportunity to be flexible in your planning—in your use of formations—your orders.

Don't ever tie yourself to any fixed or stereotyped formation.

Instead keep yourself ready for anything—ready to catch the enemy by surprise through maneuver, ready to feint, ready to counter an enemy thrust, ready to slam home a knockout blow at the opportune moment. Don't commit yourself too early. Adjust yourself to the situation which develops before you:

—by probing the enemy carefully with only one element—by avoiding costly frontal attacks—by capitalizing on maximum surprise through maneuver—by keeping your reserve protected and under cover until the opportune moment, away from needless exposure to fire.

By doing these things you can avoid exposing your men to unnecessary casualties.

In brief, I want every commander of every rank to avoid any stereotyped form of attack. I am anxious to see you use economy of force whenever possible—in the initial phases of your attacks, and in your development of maneuver. I want you to cut down the exposure factor in your attacks.

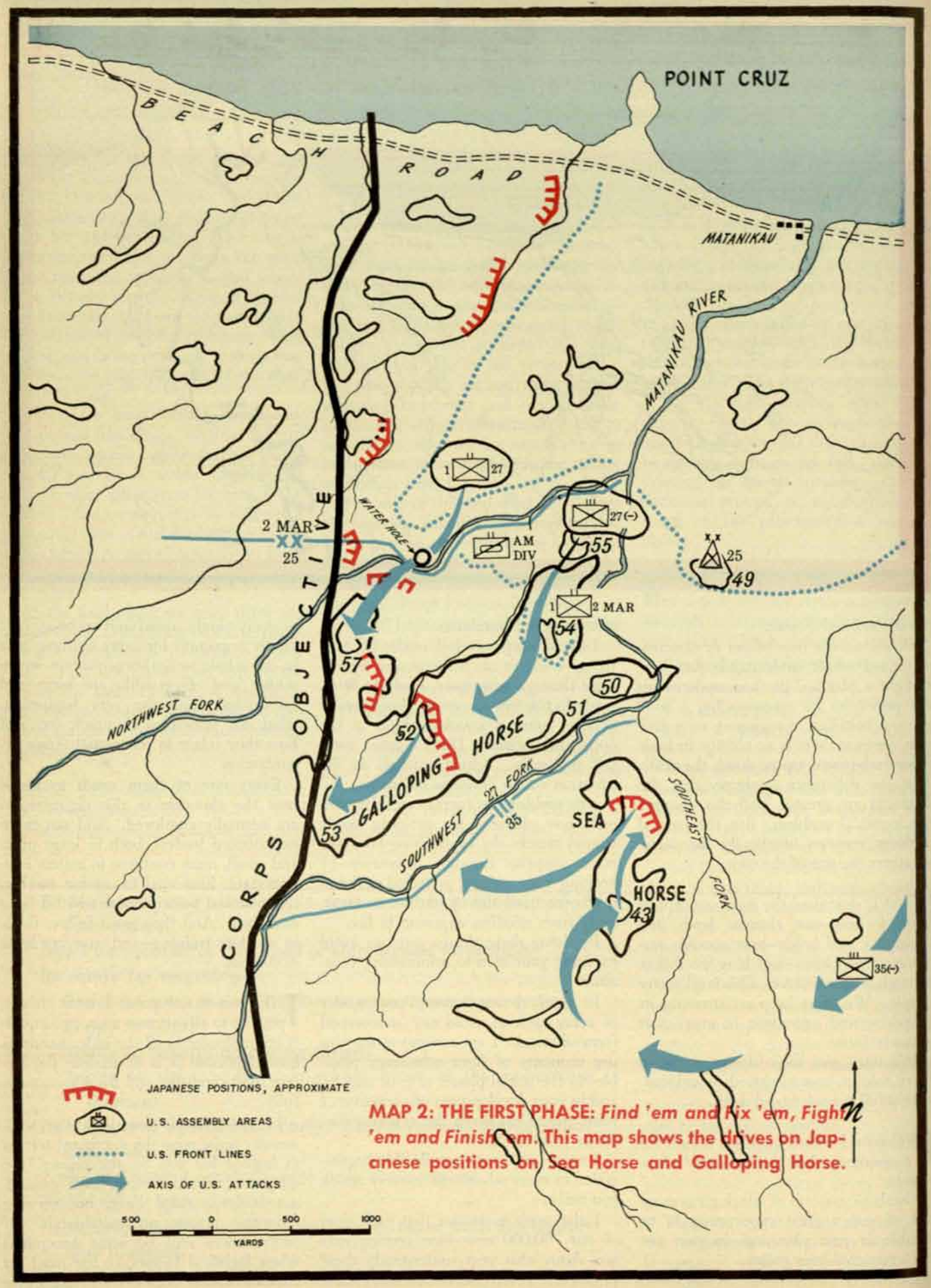
I want you to use our flexible organization to every advantage in every attack you make.

I also want to ensure that each man of our 750,000 new men coming into our Army this year understands these principles. Teach them fully and clearly to every single squad and section. It is vitally important for every fighting man in our whole tactical organization, every soldier and officer alike, to learn and understand from the very beginning, what our principles of attack are, and how they relate to our actual Army organization.

Every one of them needs to know how the elements in this organization are normally employed. And our more experienced leaders, both in large units and small, must continue to realize how important, how vital to combat success, these tactical principles are which I have described. And they must follow them in all their training—and in every hour of combat.

THE next major point I want to emphasize to all our new men, and equally re-emphasize to all our older hands, is how important it is to analyze the terrain most carefully, and use it most carefully.

In most attack situations, the commander must seize the dominant terrain to impose his will on the enemy. By dominant terrain I mean high ground, not hollows; ridge lines, not ravines; mountain ranges, not marshlands. Of course there will be some exceptions when logistical factors, or the need for communication centers or maneuver



MAP 2: THE FIRST PHASE: *Find 'em and Fix 'em, Fight 'em and Finish 'em.* This map shows the drives on Japanese positions on Sea Horse and Galloping Horse.

"Fire superiority is gained by the skillful use of the fire support element or other support—such as artillery, armor or air—in conjunction with the fire of the holding or maneuvering elements. While our artillery or our air support cannot do the job alone, neither can our riflemen."

room override this general guiding principle. But the man who gets the high ground first is the man in most attacks who gains victory at cheapest cost in men and matériel. Terrain analysis is particularly important in determining where to make the major effort. And I feel that this effort should always be made through maneuver.

After his careful analysis of the ground has been made, the commander should then use the terrain in his tactical plan to carry his operation farther. We must seize high ground and any other key terrain features before we can hope for success.

Our attacks to secure such dominating terrain should usually be made along the ridge lines running into this dominating ground, and not up the draws and ravines leading into the position. Attacking along the ridge lines, the attacker gains higher and higher ground —places for better observation and better locations on which to place his fire support unit.

Zones of action for smaller units or sectors indicated by boundaries between units and organizations—these must be established so as to favor maneuver and ensure that the dominating terrain and any such key feature as a village, lie well within the boundaries of a single unit. If the boundary between two battalions is a ridge line, which is itself dominating terrain, then obviously the responsibility for the whole ridge is in doubt.

Failure to grasp the fundamentals I've mentioned in this article is responsible, in my judgment, for a number of common errors which I have observed. First, there is the mistaken idea that fire superiority is gained solely by riflemen. This idea grows out of a lack of understanding of our fundamentals of organization. Rifle fire does help to gain fire superiority, particularly at the close-in ranges. But as a general rule, fire superiority is gained by skillful use of the fire support element and other available and appropriate support—artillery, armor, air—in conjunction with the fire of the holding or maneuvering elements. Our artillery or air support, or even both, cannot do the job alone. But neither can our riflemen.

Another pitfall, which comes from the fact that some of our junior leaders do not fully understand our principles of attack and the vital importance of terrain, is the tendency to depend time after time on the frontal attack instead of maneuvering around the flanks of an enemy position. Actually, frontal attacks must be avoided wherever possible. They are costly. They do not make full use of the tools which the commander has available.

AND now I would like to cite a specific case that points up examples of everything I have been discussing—the soundness of our concept of attack and our organization, whatever the size of the unit—and the vital importance of terrain analysis in every attack. A man can talk best about the things of which he has some personal knowledge and so my example concerns a division which I commanded in World War II.

Map 1, Page 11, shows the situation which my 25th Infantry Division faced at Guadalcanal. The Matanikau

Men of the 3d Battalion, 35th Infantry, maneuver through dense, trackless jungle in the envelopment of Sea Horse.

Galloping Horse. ***The head of the horse is hill 53; Hill 55 the rear legs and Hill 50 the tail.*** **(*From* Guadalcanal: The First Offensive)**

River flows into the sea to the west of Henderson Field. It has two main forks, the Northwest Fork and the Southwest Fork, and two smaller forks, all of which figured in our operation. Between all these forks there was high pampas grass which soon burned off. But in the stream basins between, there was very thick jungle.

The troops already there held the position shown on Map 2, Page 12. The only contact they had with the enemy was in the area shown as held by the Japanese, and on the series of knolls or high plateaus called Galloping Horse, so called because of the shape of these ridges on our aerial mosaics. The Japs also occupied some high ground to our immediate front which looked like a sea horse on our photographs, and was also accordingly named.

The general plan of the XIV Corps called for a holding attack and an envelopment of the enemy's south flank. Elements of the Americal Division and the 2d Marine Division were to make the holding attack. The mission given to the 25th Division was to make the major effort of the Corps, outflank the Japanese, and drive them into the sea.

THE first thing we were faced with was where and how to make this effort. We had a well-located OP, though we couldn't see too much of the enemy; but we knew about where he was. From the Division OP on Hill 49 I could look right down into the very deep gorge of the Matanikau. It was almost a sheer drop into the gorge. We had to decide —"Well, now, what are we going to do? Are we going to attack across this gorge —which will mean going right down into it? Or are we going to skirt it? Or just what *are* we going to do?"

When we reached Guadalcanal we were told by those already there that the fighting was something brand new. We could "throw the book away." I said to myself, "We'll see." For I knew that the principles taught at Benning and written into our manuals were sound. I was sure we could use them to advantage in this particular situation.

I wanted first to find out where the ridge line lay between the four forks of the Matanikau. I wanted to see if there was any route of approach at all which would enable us to avoid a frontal attack straight down into and across the gorge and uphill again. So I got into an airplane at Henderson Field and flew over the front-line area.

All I could see looking down on this jungle area was treetops. But I went back and forth over them until I was able to trace the ridge lines on the air map which I had right on my lap with me. It was rather difficult, but I was finally able to get a good picture of the ridge lines from the air. I made up my mind for certain that what we were going to do would be to use what I had been taught—and what I had been teaching—at Fort Benning.

We would use one regiment, the 27th Infantry, as the "finding and fixing" force *(Map 2)*, passing it through the Marines now there. One battalion of the 27th would jump off in the 2d Ma-

Under tropical skies and a camouflage net, the crew of a 105mm howitzer fires in support of the attacking forces

> ***"Our basic concept of attack is simple, but we must continue to stress its simplicity and soundness in all our training."***

rine Division sector. We planned to pound the hollow to their front from the air (the Northwest Matanikau Fork). Meanwhile, we would move two battalions of the 27th up to get a foothold on Galloping Horse while we held the attention of the enemy with the other battalion.

So while the 27th Infantry pinned the enemy down and held his attention, we launched the 35th Infantry on the enveloping attack. Two battalions of it clambered along the ridges shown on the map, under cover of the jungle, until they had turned the Japs' south flank. We ordered them not to shoot at all unless they ran into something. What I wanted was the capture of Sea Horse.

The third regiment, the 161st Infantry, was held in division reserve. We did not commit it at all, but left it in bivouac instead where it could get some rest. The regimental commander of the 35th Infantry also kept one of his battalions back in reserve in case anything went awry.

Our mission was made particularly difficult by the fact that we had no map of the area with any amount of detail on it. The units had to reconnoiter as they went.

ONE battalion of the 27th crossed the Matanikau at the Japanese water hole and seized the high ground on the forelegs of Galloping Horse. Another battalion of the 27th pushed up the hind legs of the horse, captured the succession of hills to the horse's head at Hill 53. This pocketed all the Japanese in the large wooded area between the four legs of Galloping Horse and the Northwest Fork of the Matanikau River.

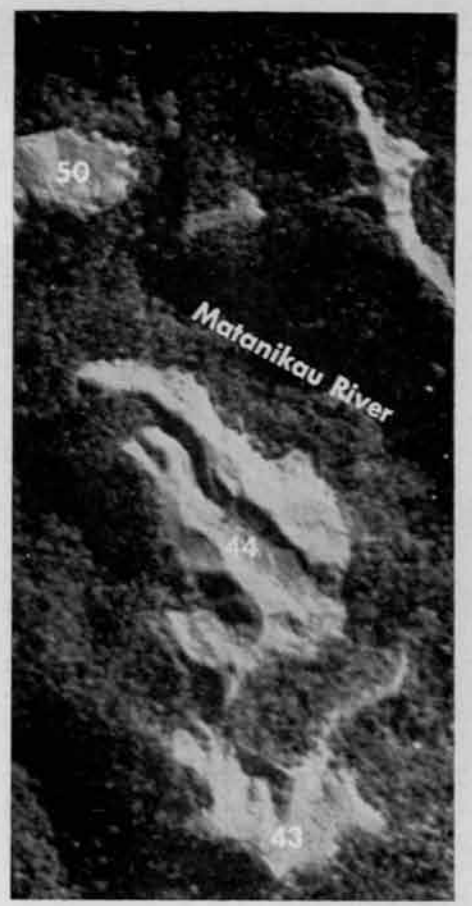
Some of the maneuvering elements of the 35th got lost. But just the same they caught the Japs by complete surprise and captured Sea Horse with hardly more than a single company. And shortly after that we had two whole battalions sitting on Sea Horse, and we had successfully surrounded the Japs within the basin of the Southeast Fork.

AFTER these two maneuvers had worked so well, we had the 35th drive out *(Map 2)* to link up with other elements of the 27th whose mission was to take the successive ridges of Galloping Horse and finally Hill 53. The 27th had a hard fight to accomplish this.

Our flanking movements by the 35th Infantry and our attack by the 27th up Galloping Horse succeeded in pocketing the enemy forces in the valley of the Southwest Fork of the Matanikau. It became necessary during the operation to use some units of the 161st Infantry, our reserve regiment—in order to protect the left flank of the 27th as it fought up Galloping Horse, and in order to mop up the resistance in this third pocket of Japs.

I want to make it clear that we had *created* these three pockets of Japanese. We had done it by seizing the dominant terrain features in the Division's zone of action.

After we had the high ground the battle was largely won. When the Japs trapped in the pockets of the low ground wouldn't surrender, we annihilated them with artillery and air, then finally moved in to mop up.



Sea Horse. *The head of the horse is Hill 43; the neck extends north to Hill 44, the body.* (*From* Guadalcanal: The First Offensive)

THE *second phase* of this operation destroyed the last Japanese resistance on the island. It was interesting from a tactical point of view because it demonstrated the need to maintain complete

The maneuver successful, elements of the 35th Infantry dig in on Sea Horse.

flexibility in both our planning and our operations.

The 25th Division was now assigned an objective that included Hill 87 and the ridges to the west of it. *(Map 3, below.)* I decided to hold the enemy on Hill 87 by using the 27th Infantry as the "finding and fixing" force. The 161st Infantry would make the envelopment —outflanking Hill 87 from the south and then pushing on to Hills 88 and 89 without waiting for Hill 87 to fall. I kept the 35th Infantry in reserve and at the same time charged it with protecting the south flank of the Division.

But the Japanese weren't holding Hill 87 in force (as they should have done) and the 27th Infantry captured the entire hill before 1000 of the morning we jumped off. So the 27th was in a much better position to pursue the Japs than the 161st, and we had the opportunity to drive straight on to Kokumbona, cut the beach road, and trap all Japs in front of the division on our right. This shift in plan made it necessary of course to shift our division right boundary 90 degrees to the right, or else we would have been in the line of fire of the American units on our right flank.

There was now an excellent opportunity to exploit our newly won advantage and with the authority of the Corps Commander I directed the 27th Infantry to drive to Kokumbona followed by two battalions of the 161st. This left one battalion to secure the lines of communication of the 27th and mop up any enemy remaining south of Hill 87. By noon of the second day, the 27th had seized Kokumbona and established a block across the beach road, thus bottling up all Japanese to the southeast of it.

> ***"We senior officers of the Army in command of larger units must never lose sight of the fundamentals of small unit tactics."***

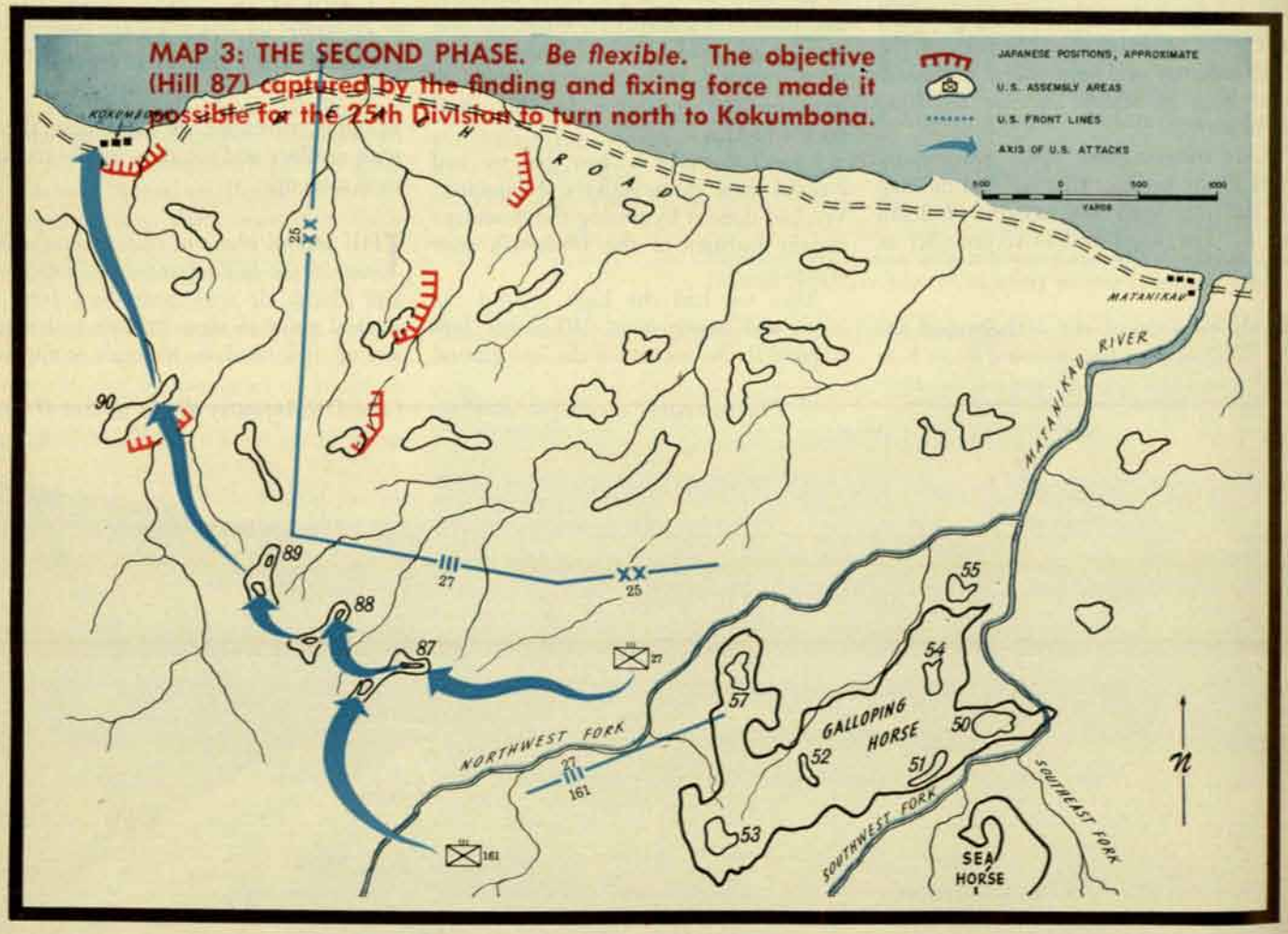
I GIVE you this example to show that our planning and operations must never be stereotyped. Flexibility is of prime importance at all times.

It is also an example of how the principles I have been discussing are applied by a division. But they work just as well for a platoon or a company.

When I go out in the field now to inspect, I want to see in particular what the platoons, companies, and battalions are doing tactically. If an officer doesn't know how to command a battalion, he can never command a regiment, a division, or an army.

But if he can command a battalion well, he can command anything. For a battalion commander has essentially everything in his command that an army commander has. So if you will train good *platoon* leaders, good *company* and *battalion* commanders, I will guarantee you good divisions and a good Army too in the bargain.

And there is another side to the coin. Just as we expect our lieutenants to be ready to command battalions and our colonels prepared to command divisions, so also must we senior officers of the Army commanding larger units never lose sight of the fundamentals of small unit tactics. In that way our field inspections will mean more, much more—to the men, to the Army—and to the Nation.



MAP 3: THE SECOND PHASE. ***Be flexible.*** **The objective (Hill 87) captured by the finding and fixing force made it possible for the 25th Division to turn north to Kokumbona.**

RADIOSONDE

By MAJOR HARRY R. JACKSON

Instructor, AA & GM School

IN the past we arrived at our met data on the ballistic density and temperature of the atmosphere by measuring temperature and density at the surface and then making an educated guess as to their values aloft. The solution was based on an idealized temperature distribution of the atmosphere.

We don't have to do that any more. The radiosonde has been added to the artillery's bag of tricks. Now we can actually measure the temperature, pressure, and relative humidity aloft for any altitude we choose.

The radiosonde (Fig. 1) is used in conjunction with a radio receiver and recording device (Radiosonde Receptor AN/FMQ-2) (Fig. 2). The radiosonde is sent aloft by means of a hydrogen-filled balloon. As the radiosonde ascends into the atmosphere it sends back to the receptor actual measurements of the conditions aloft in terms of temperature, relative humidity, and pressure, which information is recorded by the receptor. Essentially, the radiosonde measures the data aloft and converts these measurements into radio frequencies which are transmitted to the receptor. By knowing what these frequencies mean in terms of temperature, relative humidity, and pressure, we can obtain the temperature and density for any altitude reached by the balloon.

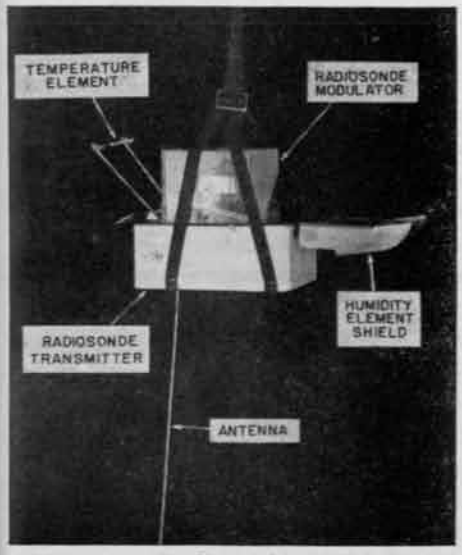


Figure 1—Radiosonde AN/AMT2.

The radiosonde itself (Fig 3) consists of a simple two-tube FM transmittor and a modulator, which includes measuring elements and the simple circuits necessary to modulate or change the transmitted signal according to the measured changes in temperature, pressure, and moisture of the atmosphere. The modulator (Fig. 4) consists basically of a simple aneroid barometer, mechanically linked to a pin arm which moves, as the aneroid capsule expands, across a series of contacts and insulators called the commutator bar. The commutator bar and pin arm act as a switching mechanism for switching in the various measuring circuits, so that the radiosonde measures successively temperature and then relative humidity in such a way that while these elements are not measured simultaneously we have practically a continuous record of their values.

The temperature is measured by a resistance-type element, the resistance of which varies according to temperature. As the temperature changes the transmitted carrier signal is changed or modulated.

Moisture content is measured in terms of relative humidity by means of a plastic strip coated with lithium chloride. As the humidity changes the conductance of the strip changes, again modulating the transmitted carrier frequency.

In other words, the radiosonde simply converts temperature and humidity measurements into audio frequencies which can be received and evaluated at the met station.

Pressure measurements are handled in a slightly different manner. Each contact and each insulator on the commutator bar corresponds to a definite pressure; so by keeping track of each time the pin arm moves on and off each successive contact, we can determine from the printed record the atmospheric pressure for any given altitude.

Because there is a basic relationship between temperature, pressure, and altitude, we can determine by graphical means the height of the radiosonde at the time each signal is received by the receptor.

This fact is very important since it makes the entire method independent of the rate of rise of the balloon.

Up to this point the record is printed in terms of audio frequencies. It is necessary before releasing the radiosonde to determine the fixed relationship between the frequencies recorded by the receptor and the actual atmospheric conditions. This process we call the ground check. It is nothing more or less than a calibration of the radiosonde measuring elements. With the ground check data we evaluate the final receptor record and obtain the actual values of temperature and density for each zone of the standard artillery atmosphere. Our next step, of course, is to apply the accepted weighting factors to these zone values

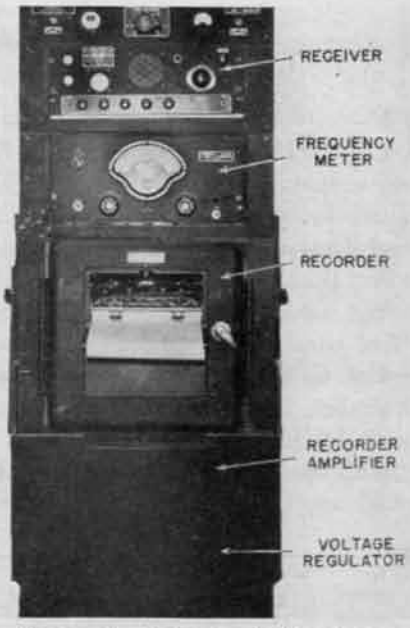


Figure 2—Radiosonde Receptor AN/FMQ-2.

which gives us the ballistic data which comprises the actual met message.

This process of obtaining ballistic density and temperature by means of the radiosonde may appear to be complicated when described so briefly, but in practice it readily becomes a smooth operation, and relatively simple.

NOTE. The detailed operations involved in this method are outlined in TM 20-240, Meteorology for Artillery, November, 1950.

The radiosonde described and illustrated above can be used in conjunction with soundings made by theodolite or by SCR 584. In either case the theodolite or radar takes readings primarily for use in determining wind speeds and directions.

This radiosonde will be replaced by a later model with slight changes, radiosonde AN/AMT-4, which is designed for use with the Rawin Set AN/GMD-1. The new ground meteorological direction finder can be carried in the field with troops on a two-wheel, one ton trailer. It will be used both by AAA and FA troops, and is designed to give better operation and higher accuracy than previous radars.

EDITOR'S BOX

Radiosonde has been used by the Navy and Air Force since early in World War II. However, we have made little progress with it in AAA. Most of the commands and the training centers now have the equipment, but few can be considered proficient in its use. Much wider utilization is contemplated.

Evidently radiosonde offers definite accuracy advantage in conditions where the temperature distribution in the atmosphere aloft may vary from a normal pattern It also has limitations.

We need a lot more attention to this matter on how to use it and when. As it involves expense in manpower and funds we may need to learn, too, when it is not required .

We shall welcome further articles on the subject.

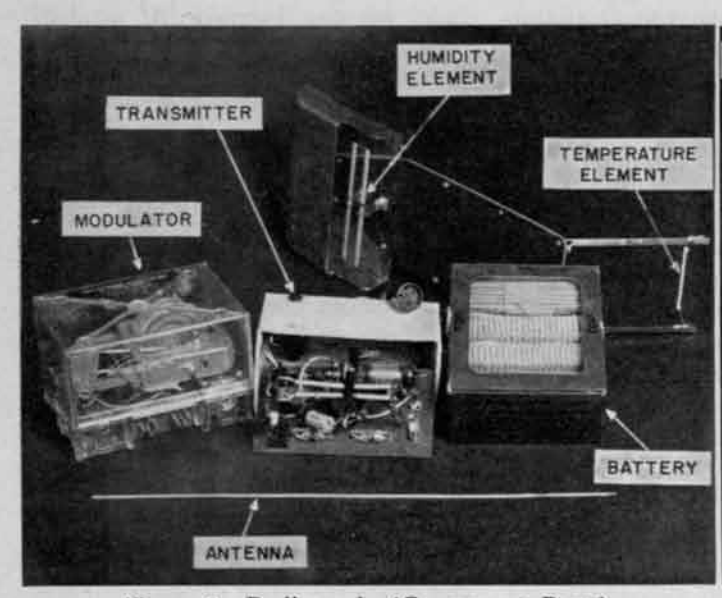


Figure 3—Radiosonde (Component Parts).

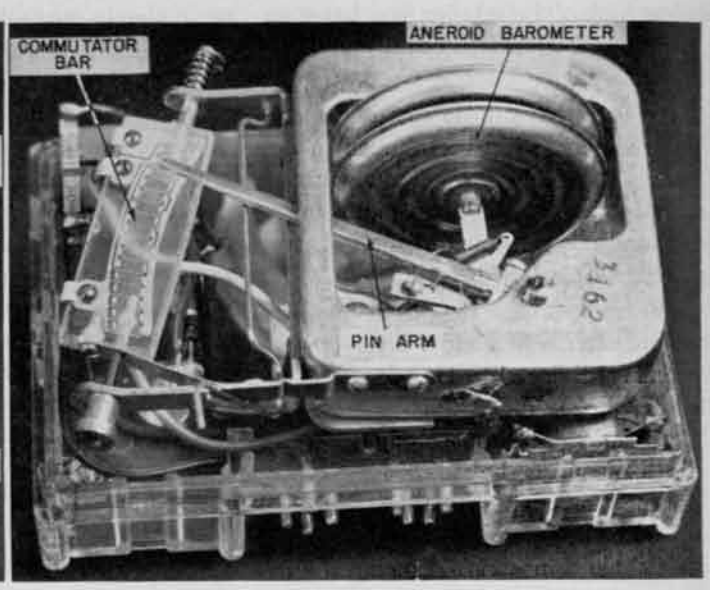


Figure 4—Radiosonde Modulator.

SIMPLIFIED WIND DETERMINATION

By MAJOR H. R. JACKSON & PFC. J. G. TORIAN*

REALIZING the genuine need for fast, simple, but no less accurate techniques for determining meteorological wind data, we have here in the School at Fort Bliss, admittedly with some misgivings, undertaken a study of the simplified wind finding procedure outlined by Col. C. S. Harris in the November-December, 1951 issue of the ANTIAIRCRAFT JOURNAL.

With apologies to Colonel Harris the initial approach was one of complete skepticism; however it was decided to approach the problem through an empirical mathematical analysis using the basic material presented by Colonel Harris, certain reports on file with AFF Board No. 4 on the validity of meteorological data, and other reports from the Meteorological Section, TAS, Fort Sill, Oklahoma.

The theory and procedure of the present standard system of determining the ballistic wind is outlined in TM 20-240, November, 1950. This standard method has the empirical virtue of prescribing for each zone of wind a weighting factor in proportion to the effect which that zone wind has on the projectile, considering the entire trajectory. [For antiaircraft firing the weighting factors are fairly uniform in the lower half of each standard altitude. Above the mid point, however, the weighting factors for equal depth zones decrease more and more as the altitude increases. The wind in each zone tends not only to affect the projectile movement in that zone but it also affects the remaining velocity and direction of the projectile and causes effects which continue to show up later in the trajectory. Hence we note that the weighting factors for AAA decrease rapidly near the top of the standard altitude—or near the end of the trajectory. Ed.]

*PFC. J. G. Torian, graduate mathematical analyst, is an assistant meteorolical instructor in the School.

The idea of weighting factors is sound; however the standard method of applying these weighting factors warrants consideration as to accuracy and necessity.

Refer to Figure 1. Curve A portrays the standard weighting factors for anti-aircraft for standard altitudes up to and including standard altitude 10 (24,000 feet). It is achieved by plotting the percentage of the standard altitude as the abcissa against the sum of the weighting factors up to that percentage of the standard altitude as the ordinate. Values are taken from wind weighting factors for message 2, Table IId, page 97, TM 20-241, Nov. 1950.

The ordinate, unit weight, indicates the sum of the weighting factors up to the pertinent percent of the standard altitude. For example, at 50 percent of the standard altitude the curve gives the unit weight as .62; at 75 percent of the standard altitude the unit weight is .89.

Above zone 10 even lesser weighting factors are given to the higher altitude zones. For standard altitude 11 (30,000 feet) there is no material difference, but for higher altitudes Figure 1 applies only in principle.

If we determine the average or resultant mean wind for any standard altitude and use that as the ballistic wind, then we are using a straight line wind weighting factor system as portrayed by curve B in Figure 1. Each equal depth zone is given equal weight. The scheme offers a very simple and practical solution. When the balloon rate of ascension is known or measured the average wind speed and direction can be computed readily from one reading at the desired altitude. When the wind speed and direction are rather constant at all altitudes this system gives accurate results; however that condition is not normal; consequently, the results will vary from the weighted ballistic winds, largely due to overweighting winds in the upper 20 percent. Even so, it is emphasized that the average wind solution has the great advantage that it is a one-step solution with fewer chances of error.

The system now in use (defined empirically by curve A) is superior in the respects mentioned. However, what of the application of these factors? This is achieved by applying the proportionate factor to the average wind speed and direction of a series of layers. For the tenth zone, for example, it is achieved by applying factors to the average wind data of the zones two through ten, respectively. A process of averaging nine different wind speeds, to the nearest mile per hour, nine different wind directions to the nearest 100 mils, and applying nine different scalar factors to these nine different vectors to get the vectorial result. Thus, many of the empirical virtues and much of the value of the factors as such, are lost in application. The question arises as to whether the slight deviation from linearity of the more effective factors as demonstrated by curve A, *necessitates* the many operations of the application. Attention is called to the fact that we approach the *most perfect* system when the operations involved are both necessary and *sufficient*.

Thus, we find that those two systems represent two extremes. One which does not contain enough conditions to make it sufficient and one which contains more operations than we deem necessary.

One solution is to compute the average speed and direction of the wind up to a certain percent of the altitude in question. This can be achieved by observing the elevation and azimuth angles to the balloon from the point of release, at a time interval in which the balloon reaches the selected representative altitude and computing the ballistic data as a single function of the observed elevation and azimuth angles, time, and altitude.

Let us analyze to find a basis for selecting the proper representative altitude. From the table of weighting factors Table IId, page 97, TM 20-241, Nov. 1950, we note that for each standard altitude up to 24,000 feet the lower half of the standard altitude is given a total weight of .62 and the upper half, .38. If we were to select the representative altitude at 80.65 percent of the standard altitude and we measured the average wind data to that point we would give the lower half a weight of $\frac{50}{80.65} = .62$. Likewise, the upper half a weight of $\frac{30.65}{80.65} = .38$. While this apportions the weights properly between the lower and upper halves, it cannot be quite right because the wind above 80.65 percent is completely ignored. It appears though that we could compensate by selecting the representative altitude at a slightly higher percentage.

In his simplified procedure Colonel Harris now selects the representative altitude at 83.3 percent of the standard altitude for all AAA winds up to 30,000 feet. Note Curve C in Figure 1.

Though we have encountered the wind in only 83.3 percent of the standard altitude, we have measured 94 percent of the effective wind. The point P indicates that in both methods 86 percent of the weight has been given to the wind up to 72 percent of the standard altitude, with a maximum deviation of .02 percent below that point. This underweight of .02 which takes place at top of the 7th zone is dispersed equally among the lower 7 zones. Actually the representative altitude has been selected

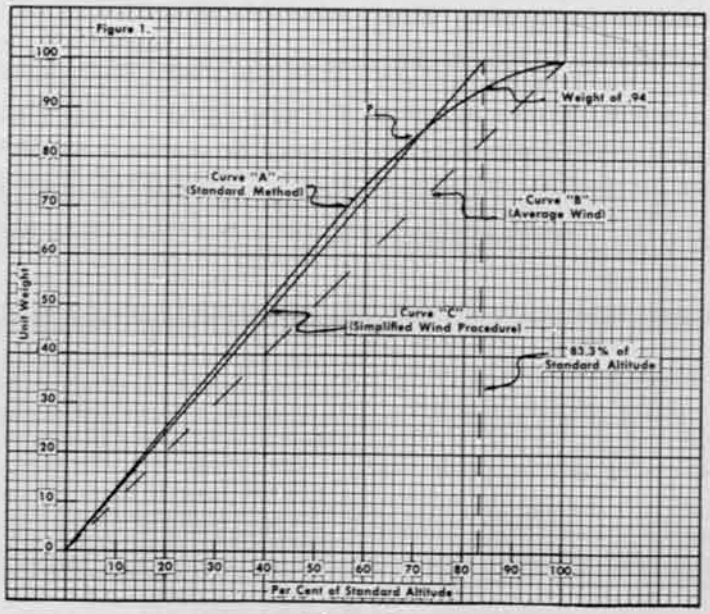


Figure 1

TABLE I
Comparison of Factors *Applied* by Standard Method—A and Factors Effected by Simplified Method—C

Standard Altitude (feet)		Zone Numbers 2	3	4	5	6	7	8	9	10	11
1,500	A	1.00									
	C	1.00									
3,000	A	.62	.38								
	C	.60	.40								
4,500	A	.41	.39	.20							
	C	.40	.40	.20							
6,000	A	.31	.31	.27	.11						
	C	.30	.30	.30	.10						
9,000	A	.20	.22	.20	.19	.19					
	C	.20	.20	.20	.20	.20					
12,000	A	.15	.16	.15	.16	.27	.11				
	C	.15	.15	.15	.15	.30	.10				
15,000	A	.12	.13	.12	.13	.24	.18	.08			
	C	.12	.12	.12	.12	.24	.24	.24			
18,000	A	.10	.11	.10	.10	.21	.20	.12	.06		
	C	.10	.10	.10	.10	.20	.20	.20	.00		
24,000	A	.07	.08	.08	.08	.16	.16	.14	.13	.11	
	C	.075	.075	.075	.075	.15	.15	.15	.15	.10	
30,000	A	.06	.06	.07	.06	.13	.13	.12	.11	.18	.06
	C	.06	.06	.06	.06	.12	.12	.12	.12	.24	.04

carefully at 83.3 percent to give a fine mathematical balance in overweighting and underweighting. Under the normal wind changes at the successive altitudes the procedure should give accurate results.

Table I shows the weighting factors applied by the standard system in Line A; factors applied by the simplified system in Line C.

As Colonel Harris pointed out, the simplified method in some form has been used for years. TM 20-240, 1944, outlined its use and provided data tables for that purpose. In procedure, however, it is a radical simplification. Here the ballistic wind for each standard altitude is measured from one significant reading at the representative altitude.

The big question is, are not the deviations in the accepted factors in the simplified system within the limits of:

a. The accuracy of the weighting factors as such?
b. The errors introduced by the extensive computations, interpolations, plottings, and by the series of averaging in the standard system?

The main point of this article has been to emphasize that we are inclined to overvalue the accuracy of the system now in use and to emphasize that we have in the operations involved, only pretended to embrace the empirical soundness prescribed by the system. All the empirical soundness in the world is useless if the conditions for gathering data do not permit a sound application. To this extent we have a new system which we deem not only more accurate in its results, but faster and with greater potentialities in accord with developments in the future.

We are continuing our study and tests with the hope of offering an article soon on the procedure for simplified wind determination. Meanwhile, we refer you to Better Wind Data in the November-December, 1951 ANTIAIRCRAFT JOURNAL or to TM 20-240, 1944.

With all of our enthusiasm and talent for gunnery in the AAA, it is surprising that we still follow an archaic and laborious standard procedure in our met stations so poorly adapted for use near the battlefront.

By all means let's push the simplification toward a more practical solution. Also let us push the practical training. For this we need an inquisitive AAA officer to supervise the operation of each met section, and just now he will probably have to train himself.

If we begin to check the met messages regularly and test the accuracy by an independent solution, we shall soon note a vast improvement in interest and results.—Ed.

BOOKS TO GET AHEAD ON

These military books are best sellers today. Thousands of officers and men—old-timers and those returning to active duty—are building their military libraries with these up-to-date editions. Some buy a book a month; others a book every quarter.

The Officer's Guide $3.50
The Noncom's Guide 2.50
Company Administration and the Personnel Office 2.50
The Serviceman and the Law.. 3.50
Index-Digest to the Uniform Code of Military Justice 2.50
New Drill Regulations 1.50
Cadence System of Teaching Close Order Drill 1.00
Map and Aerial Photograph Reading, Complete 2.75
Basic Training Guide 2.50
Essentials of Military Training.. 3.75
Kill—Or Get Killed 3.75
Modern Judo; 2 vols., each 3.00
Small Arms of the World 6.00
The Military Staff 3.00
Intelligence is for Commanders 3.85
Income Tax Guide (for military personnel) 1.00
Principles of Insurance ..... .75

and 2 background books that point the way

The Red Army Today, by Ely.. 3.50
The army you may someday have to fight.

The Price of Survival, by Sweet 2.85
A clearly marked course for the future.

Order from
ANTIAIRCRAFT JOURNAL
631 Pennsylvania Ave., N.W.
Washington 4, D. C.

THE FIRST GUIDED MISSILE GROUP

By CAPTAIN ANDREW G. FAVRET

BEFORE the end of World War II, Army leaders became seriously interested in guided missiles for tactical use. They were not thinking in terms of the "push-button war" that had captured the imagination of the public; but they did foresee the possible development of new weapons that could effectively supplement antiaircraft and field artillery. Several research and development programs were initiated to determine what form these new weapons should take. On 11 October 1945, the 1st Guided Missile Battalion was formed at White Sands Proving Ground in the New Mexico desert. This unit was destined to be the forerunner of tactical guided missile units for the Army. Its mission was to assist the Ordnance Department in the various guided missile development programs at the Proving Ground.

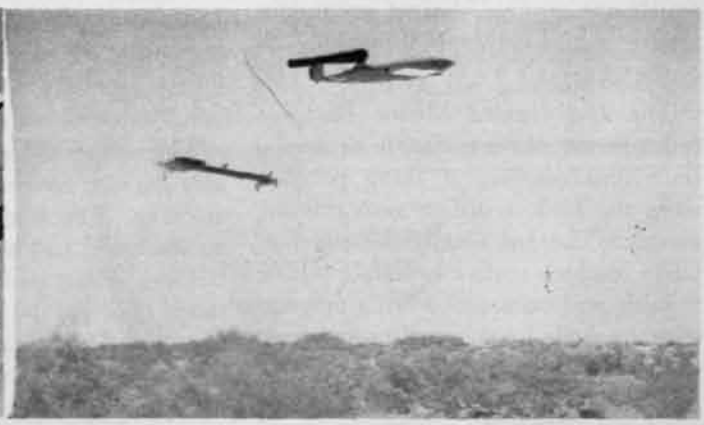
The development of new weapons is a slow and laborious process, but the personnel of the 1st Guided Missile Battalion worked closely with civilian contractors and Ordnance personnel. Members of the battalion assisted in the assembly, test, and launching of many German V-2 rockets which were brought to this country and fired at White Sands. In the spring of 1947 the battalion furnished the first all-soldier crew to fire a missile in the United States. This 17-foot acid-aniline rocket was called the WAC Corporal B. This early period was characterized by individual participation in a variety of programs and skills.

By spring of 1950 progress in guided missile development and the consequent proximity of tactical guided missiles seemed to warrant a larger organization, and the present 1st Guided Missile Group was formed on 25 April, 1950, at Fort Bliss, Texas, under the command of Colonel Ovid T. Forman, an antiaircraft artillery officer whose former units were employed to shoot down German "buzz bombs" during World War II. The 1st Guided Missile Group has three battalions including the original 1st Battalion at White Sands.

The original mission of the 1st Guided Missile Group was to insure that the Army be ready for guided missiles when guided missiles are ready for the Army. This did not mean to sit back and wait until the first finished weapon is produced and then begin a furious training program. Rather, it meant to begin training immediately on available test vehicles in order that tactical missiles could be employed in the field at the earliest possible date. This meant taking advantage of every opportunity for guided missile training: continued assistance in the development work at White Sands Proving Ground, sending personnel to factories and laboratories throughout the country to obtain on-the-job training, and missile operations and training by the group itself on whatever "hardware" available. The bits of information and experience from all these individual sources must be collected, kept up to date, and disseminated to other trainees. Long before tactical units can be formed and employed, training doctrine and basic organization should be determined; the logistics and tactical concepts of employment should be available. The 1st Guided Missile Group, assisting in their development, has accumulated a wealth of practical experience with every missile of interest to the Army. The Group is now commanded by Col. Oren Swain and is currently engaged in training guided missile specialists for the first tactical units to be formed.

The 1st Guided Missile Battalion, commanded by Lt. Col. Ferdinand Stano, provides assistance in development work at White Sands which continues to be a valuable source of training. Many officers and enlisted men of the 1st Guided Missile Group are filling jobs in guided missile projects at White Sands which would otherwise require civilian engineers and technicians. The Group, in turn, obtains firsthand knowledge on all development projects and excellent training of selected individuals. The developing agency and the ultimate using agency maintain a continuous liaison on the working level which is profitable for both and promises a more satisfactory weapon when the project is

The Loon is prepared for launching.



The Army Loon missile separates from its booster sled and flies to the target.

completed. Since much of the development work is carried on at factories, laboratories, and test sites in other parts of the country, arrangements were made to place individuals or small detachments wherever useful on-the-job training could be obtained. This occasionally meant participation in the guided missile program of the other services as in the case of a detachment with the Naval Ordnance Test Station at China Lake, California. The personnel of this detachment worked side by side with Navy and Marine personnel.

Training on specific tactical missiles and advanced training (firing operations) are conducted by the 2nd and 3rd Guided Missile Battalions. Both of these battalions are primarily concerned with the training of troop-trained guided missile specialists. These are the operator and crewman type of specialists who would normally be trained in the unit or in an RTC, but must be specially trained for guided missile units since there is no other source for such personnel or for qualified cadres to train these specialists within the units. Three types of such specialists are trained by the 1st Guided Missile Group. The integrated fire control crewmen operate the ground guidance (fire control) equipment and perform duties similar to a normal radar operator. The G.M. matériel crewmen assist the service school trained technicians in assembling, testing, and maintaining missiles. The launching chiefs and specialists perform various duties in the launching area in connection with the preparation and firing of missiles. The troop-trained specialist courses are of approximately three months duration. These courses provide thorough training in the appropriate operations and in the handling and care of the special test equipment required. Safety precautions receive special emphasis throughout all of the courses.

The 2nd Guided Missile Battalion trains personnel for surface-to-air missile units and conducts a firing program using the Lark, a surface-to-air training vehicle. The 3rd Guided Missile Battalion conducts surface-to-surface missile training and maintains a firing program with the Army Loon, a surface-to-surface training vehicle.

The group also maintains several supporting facilities of a specialized nature. The Radio Controlled Airplane Target (RCAT) Detachment operates and maintains ground controlled targets to support missile firing operations. This detachment also trains RCAT personnel for other units. The electronic modification shop fabricates special electronic apparatus for the group training and firing operations. The machine shop, sheetmetal and welding shops, and the training aids shop contribute invaluable assistance to both the training and firing programs.

Unfortunately, only a limited number of individuals can be trained by assisting in development programs. The 2nd and 3rd Battalions, therefore, conduct formal training courses to produce the required specialists. The first three weeks of these troop-training courses are devoted to familiarization, basic mathematics, physics, and electricity. This period is essentially a rapid review which permits an accurate evaluation of each trainee's aptitude and prepares him for the later portions of the course. The training then begins to specialize on a specific missile system and eventually receives practical training on the actual equipment in all the duties and operations which he will be expected to perform. The final portion of this training includes team training with various types of specialists working together on missile check-outs and simulated launching operations in order to develop confidence in themselves and the other members of the crew.

Some graduates of these courses who display outstanding technical ability are sent to the AA and GM Branch of the Artillery School at Fort Bliss for further training as radar mechanics (repairmen), G.M. electronic guidance specialists, or guided missile mechanics. Other trainees are selected to participate in the group's advanced guided missile training (firing program) and are retained in the 1st Guided Missile Group as potential instructors.

This advanced training phase is probably the most interesting of all the group activities. The firing of live vehicles is an important part of any guided missile training. Every possible source was contacted to obtain the parts and equipment necessary for the group to initiate its own firing program. The group's first firing program utilized the Army Loon, a modified version of the Air Force JB-2 missile which, in turn, was patterned after the German V-1 or "buzz bomb." These missiles have been available in quantity for several years although not considered a tactical missile. In April of 1950 the group obtained 66 JB-2 missiles from the Air Force. This missile utilized an autopilot monitored by a magnetic compass and barometric altimeter to maintain it on a preset course, but once the missile had been launched this preset course could not be altered. The Navy had been flying modified versions of the JB-2 with a more elaborate guidance system. The group adopted the Navy guidance system and dubbed its missile the "Army Loon." Extensive modifications of the propulsion and guidance systems and the airframe are required. These modifications are all performed within the 1st Guided Missile Group.

Missiles alone, however, were not enough. Specialized launching and flight control equipment was also necessary. Lt. Col. John F. Freund assisted by Captains Richard Moriarty and Bruton Schardt led in the work to design and improvise the required equipment. Both short and long length launchers were constructed by Group personnel. A firing panel, flight control panel, command transmitter, and semi-automatic potting board were designed and fabricated by members of the 1st Guided Missile Group under the supervision of Major Edwin B. Hagerman. Obsolescent booster rockets were obtained and tested. The first Army Loon was launched on 15 December 1950 by C Battery, 3rd G.M. Battalion under the command of Captain Richard F. Thomure, and many additional Loons were launched during the following year. Many months of valuable training and operational experience were made possible by improvising and exploiting existing skills and materials available in the 1st Guided Missile Group.

The first Loons launched were employed to solve the numerous problems involved in successfully launching this missile. Successful launchings were obtained during this phase from both the short (30 foot) and long length (420 foot) launchers. Later flights utilized the guidance system to direct the missile through several turns to a preselected ground target. The Army Loon was the first guided missile to be launched under the complete control of the 1st Guided

Missile Group and will be remembered by many missile specialists of tomorrow as their first "basic trainer."

After the first Loon launchings the 1st Guided Missile Group was directed to carry out the Army Surface-to-Air Missile Training Program. This program included the launching of a considerable number of "Lark" vehicles and was initiated to provide guided missile training for Army personnel and to produce information that might be useful in future planning. This program proved to be a valuable addition to the group's advanced training.

The Lark has many advantages as an advanced trainer. The missile, originally developed for the Navy to combat attacking aircraft, has also been employed by the Air Force as a training vehicle to train guided missile technicians. It is powered by two liquid rocket motors using mixed acid as oxidizer and aniline as fuel. The "bird" is boosted up to flying speed by two 11,000 pound thrust JATO units mounted in a kite assembly which fits the tail section of the missile. Aerodynamic drag causes this entire booster assembly to separate from the missile when the booster rockets burn out, allowing the Lark to continue under its own power toward the target. The missile has a special guidance unit designed to insure a successful burst on the target. If the normal guidance system is not operating properly, appropriate emergency commands may be sent to the missile from the ground or it may be destroyed in mid-air by a signal from control.

A small group of officers and enlisted men were selected to undergo an intensive course on the Lark missile given by engineers of the Fairchild Guided Missile Division. Two distinct courses were given—one for electronics specialists, and the other to train propulsion and handling personnel. These courses were followed by a series of launchings at Fort Bliss ranges, and a duplication of the original courses, using Army instructors, in order to increase the number of trained personnel.

The original contractor course lasted eight weeks and the first Lark missile was launched less than three weeks after the completion of the course. This first shoot was an appropriate graduation exercise for the trainees. Captain Jonas W. Stuckey was selected as power plant check-out officer with M/Sgt. I. E. Tilby as crew chief. Major Hagerman was electronics check-out officer and M/Sgt D. N. Vinson was the electronics crew chief. Captain Ralph I. LaRock was designated flight control officer. His duties included range safety, employment of targets, and emergency ground control of the missile in flight. 1st Lt. Jack M. Sabata supervised the installation of the elaborate communications system required and the operation of the tracking radars. Captain Howard E. Pleuss handled all transportation and the preparation of the necessary range facilities including the launcher and the launching control station (protective shelter from which the final firing sequence is controlled). South McGregor Antiaircraft Range was selected for the Lark launchings. Located in the center of a vast section of New Mexico desert, the launching site is about thirty miles from Fort Bliss, the last eleven miles being a narrow dirt road. Two weeks before the shoot the only facility available at the range was a telephone line to Fort Bliss. Many supplementary items of equipment to be used in the firing were improvised or fabricated by group personnel. Practically all of the support facilities of the Guided Missile Group were required to accomplish this task.

The machine shop and the sheet metal and welding shops fabricated many necessary items on short notice. The electronic modification shop assisted in constructing a firing panel and in improvising an electrical power system for the launching area. The communications section set up a field communications system to permit centralized control of the entire operation. The Radio Controlled Airplane Target (RCAT) Detachment prepared their ground controlled targets to serve as targets for the missile. Other units within the group constructed a large reinforced concrete pad for the launcher. Radar crews were on the job to support the operation. Drills, practices, and dress rehearsals were conducted to insure success and to increase the training value of the operation.

By utilizing every available facility the group was able to launch its first Lark missile on the scheduled date despite late deliveries of critical equipment. Since that date the Lark launchings have continued at regular intervals constantly integrating new personnel into the operations and gradually improving the required procedures and techniques.

Both Lark and Loon firings have produced many types of specialists capable of being transitioned to other missiles in a relatively short time just as an experienced pilot learns to fly a new plane, or an automotive mechanic masters the latest model car. These launchings also marked an important step toward the tactical employment of guided missiles. Although both these missiles had been flown previously under carefully regulated test conditions, these were the first to be fired under tactical troop conditions.

The 1st Guided Missile Group is at once a training center, an operational missile unit, a storehouse of guided missile "know-how," and a preview of things to come. Its personnel have a wide variety of backgrounds—old Regular Army sergeants, draftees fresh from basic training, electronic technicians, artillery cannoneers, and engineers with graduate degrees.

The men in the group sense the importance of their task; they approach each operation with enthusiasm and confidence. They are proud of the fact that they are pioneers in a new field and appreciate their responsibility to the Army and the nation.

When tactical guided missile units are formed throughout the Army, key personnel trained by the 1st Guided Missile Group will be ready to assure the success of the guided missile program.

Lincoln Finds A General
By KENNETH P. WILLIAMS
Vol. III, $7.50
Order From
ANTIAIRCRAFT JOURNAL
631 Pennsylvania Ave., N.W. Washington 4, D. C.

FORT BLISS NEWS

KOREAN TACTICS SHOWN

Tactics now being employed by United Nations Forces in Korea in using antiaircraft artillery in close support of an infantry attack were demonstrated on the Dona Ana Range, on September 25.

More than 200 civilians and 800 officer and enlisted students from the Antiaircraft and Guided Missiles Branch of The Artillery School witnessed the demonstration which was staged by the Combined Arms and Tactics Department of the AA & GM Branch.

Spectators were given a view of infantrymen moving into the assault under a cover of supporting artillery fire. The same type of red cloth back markers used in Korea to identify the U. N. infantrymen to supporting artillery observers were worn by the Fort Bliss soldiers simulating the attack on the enemy strong points.

Initial firing began with the AAA laying down a heavy barrage over the enemy positions. Then, with the enemy gunners pinned down, the infantry moved up with the light AAA firing overhead.

Actual deployment of troops, as developed on the Korean battlefields, and use of organic infantry supporting weapons, including light and heavy mortars, rocket launchers and machine guns, were employed. In addition, a flame thrower was used to drive the "enemy" from their pillboxes as the infantry closed in. Realism was added to the demonstration by the detonation of concealed explosive charges simulating enemy counter artillery fire.

Antiaircraft artillery in the 45-minute show included mobile quad .50 machine guns, twin 40mm guns and 90mm guns.

Lt. Col. W. G. Springer, infantry liaison officer, opened the demonstration with a description of the theoretical problem involved in the operation against a simulated enemy force. He also gave a running commentary during the course of the firing.

Coordination of the attack and detonation of explosives were supervised by Major Arthur R. Datnoff, assistant infantry liaison officer.

GEN. WATERS HEADS 1st GM BRIGADE

Brig. Gen. William E. Waters arrived recently to assume command of the 1st Guided Missiles, formerly the 38th AAA Brigade. He has just returned from Korea where he was commander of the 25th Infantry Division's Artillery.

A native of Kentucky, Gen. Waters graduated from VMI in 1921 and was commissioned as second lieutenant, Field Artillery.

Col. Gwinn U. Porter was recently assigned as brigade executive.

1ST GUIDED MISSILE GROUP

In addition to a new commanding officer, Col. Oren Swain, the group has a number of other additions to its officer staff.

The group executive is Col. Arthur G. Kiel who came to Fort Bliss in July from the Pentagon.

Lt. Col. Edwin H. Druley has arrived from Trieste to command the 259th FA Battalion.

Lt. Cols. Thomas D. Caulfield and Bert H. Backstrom are now in the group on special duty in the planning section.

RECEIVES BATTLE STREAMERS

Battle Streamers and campaign citations of World War II were presented the 111th Brigade, New Mexico National Guard, in ceremonies held August 23 at Fort Bliss during the 15-day summer training camp. Governor Edwin L. Mechem of New Mexico reviewed the troops.

Decorations presented to the 111th included the Distinguished Streamer "Manila 1941," Distinguished Unit Streamer "Bataan," Distinguished Unit Streamer "Defense of the Philippines" and the "Philippine Presidential Citation," December 7, 1941, to May 10, 1942.

The 111th Brigade, formed into the 200th AA Regiment on the eve of World War II, was commanded by its present leader, Brig. Gen. Charles G. Sage. It suffered heavy casualties during the early days of the war and later many of its men failed to return from Japanese prison camps.

BLISS LEADS IN BLOOD DONATION

Congratulatory telegrams from the Honorable Frank Pace, Secretary of the Army, and General Mark Clark, Far East Commander, praising the work of the Fort Bliss Blood Donor Center during the past year, were read at the anniversary ceremony held recently. The Bliss Center's record topped that of any other Army Blood Center now in operation.

AFF BOARD 4 STAFF CHANGES

Colonel Arthur H. Bender became the new deputy president of Army Field Forces Board No. 4, succeeding Col. Charles E. Shepard who was recently ordered to FECOM.

Lt. Col. Arpad Kopesak is the new executive.

Lt. Col. C. C. Young is the new head of the Heavy AAA Group of the AAA Service Test Section.

Antiaircraft officers who visited recently were: Colonels Jack Madison and J. A. Sawyer; Lt. Colonels Al Richards and Dick Irvin, all of OCAFF; Lt. Col. E. Bodeau, AA Command; Col. R. H. Krueter (Ret.), Col. John Steele, 5th AAA Group commander and Col. Sy Gilman.

Lt. Col. A. R. Colquhoun, newly arrived British liaison officer, has served in Washington, D. C., with the British Army staff and as an instructor in the AA School Manorbier, Wales.

COMPOSITE GROUP C. O.

Colonel William A. Hampton has assumed command of the 1st Composite Group. He had recently returned from FECOM where he served in the G1 section.

KOREAN AWARDS

Since publication of the last issue of the JOURNAL the following have received decorations for service in Korea:

Bronze Star

Lt. Col. Henry E. Ostheus, OLC
Major Stanton C. Parker
Capt. George W. Eddy
Capt. Joe G. Waterman
1st Lt. David R. Anderson
1st Lt. Harold P. Fields
1st Lt. Melvin C. Gross
1st Lt. Jesse S. Hailey
1st Lt. Van H. Messimore
1st Lt. Roscoe H. Monroe

Silver Star

1st Lt. Abraham Epstein

STATUS OF TRAINING LITERATURE

By MAJOR B. G. OBERLIN

The ORC Field Artillery Training Bulletin, formerly published by The Artillery School at Fort Sill, Oklahoma, has been changed to The Artillery ORC Training Bulletin and will be published alternately at Fort Sill and at Fort Bliss, Texas. Fort Bliss issues will be prepared by AA & GM Br, TAS. The purpose of the bulletin is to keep reserve officers abreast of current activities in the artillery branch. The same mailing list will be used for both editions. Comment and suggestions from readers are welcomed.

FIELD MANUALS

FM 44-38, Service of the M9 and M10 Type Antiaircraft Directors, dated August 1952, is now off the press and in distribution. This manual supersedes FM 44-38, November 1944, and Changes No. 1, March 1947. The new manual contains 525 pages and 124 illustrations. It is divided into three parts; a general description of the equipment, service of the directors in the air defense mission, and service of the directors in the seacoast surface mission. There are six appendixes, which cover references, principles of operation, maintenance including check lists, minimum training schedule, first aid, and destruction of matériel.

FM 44-33A, Service of AAFCS M33, is being written to cover the latest AAFCS matériel. FM 44-33, Service of AAFCS T33, was distributed in November 1951.

FM 21-80, Recognition Training, is now in preparation. Jet-engined aircraft not only travel at faster speeds than propeller-driven aircraft, but many distinguishing features found in older planes are eliminated. It has been necessary to adapt recognition training methods to these new conditions. The manual is expected to be in distribution by late summer 1953.

Among other projects are a manual on the Duster, the improved twin 40mm gun motor carriage T141, and a series on guided missiles to cover tactics and techniques of employment, fire control and gunnery, and service of the missile fire unit. A special text will be written first on the same guided missile material which will appear in the manuals at a later date. Classification of guided missile literature is high at present but may be downgraded by the time the manuals are printed. An unclassified discussion of the basic principles of aerodynamics, propulsion, and guidance of guided missiles has been published in recent issues of the ANTIAIRCRAFT JOURNAL. This series of three articles was written by an instructor in the Department of Guided Missiles at AA & GM Br, TAS.

TECHNICAL MANUALS

TM 44-225, Orientation for Artillery, and TM 44-234, AAA Service Practice, are in the hands of the printer and expected to be in distribution in December, 1952.

TRAINING CIRCULARS

DA TC No. 27, Fire Control and Gunnery of the 75mm AA Gun (Skysweeper) with Gun Mount T69, is printed and in distribution. It contains 82 pages with 74 illustrations of this new matériel.

Training circulars on Service of the AN/TPS-1D and Safety Precautions for Guided Missiles Training are in preparation.

CHANGES

C2 to FM 6-40, Field Artillery Gunnery, has been printed and is in distribution. This change adds Appendix XI to the manual and is titled Antiaircraft Artillery Employed in a Field Artillery Mission. The change covers fire commands, map data and corrections, and fire direction to include duties of fire direction center personnel. Examples of fire direction procedure are given.

C1 to FM 44-4, AAA Guns, which adds information on the VT fuze and the use of fire unit analyzers is cleared for printing. C2 to FM 44-4, which incorporates principles of employment for the AAFCS T33 and AAFCS M33, has been forwarded to the Chief of Ordnance for review. Distribution is expected before the end of 1952.

C1 to FM 44-2, AAA Automatic Weapons, which discusses surface firing and contains firing exercises, is being reviewed at OCAFF.

ARMY TRAINING TESTS

ATT 44-8, AAA Battalions (Light 75mm Mobile), has been printed and is in distribution.

ATT 44-5, AAA Brigade (Group), is now in the hands of the printer.

Changes to ATT 44-1, AAA Gun Battalion (90mm), and ATT 44-3, AAA AW Battalion (SP), have been printed and are in distribution. Changes to ATT 44-2, AAA AW Battalion (Mobile and Semimobile), and ATT 44-4, AAA Gun Battalion (120mm), have been forwarded to OCAFF for review before printing. These changes to ATT's cover chemical, biological, and radiological situations.

TRAINING FILMS

TF 44-1554, Light AAA with Infantry and Armored Divisions, has been completed and is ready for distribution. This film has a running time of about twenty minutes. The film stresses the variety of uses, high rate of firepower, accuracy, and mobility of light AAA weapons. Animated charts explain the organization of a light AAA battalion. The film shows light AAA in defense of an infantry division in bivouac, a division on the march, division artillery in a forward area, artillery while displacing, engineers building a bridge, a bridgehead after the bridge is in use, and similar situations with an armored division. Light AAA is shown in action against attack by both enemy planes and ground forces.

Other training films which are expected to be released this winter include Light AAA in Close Support of Infantry, Emplacement of M33 Trailer, March Order of M33 Trailer, Emplacement of M33 Acquisition Radar, and March Order of M33 Acquisition Radar.

Training films ready for photography include Trial Fire AAFCS M33, Start-Stop Procedure AAFCS M33, Orientation and Synchronization AAFCS M33, and Fire Missions with AAFCS M33.

Scenarios are being written on the following subjects: Tracer Observation, Computing Sight M19, and Reconnaissance, Selection, and Organization of Position for Heavy and Medium AAA.

INDIRECT FIRE WITH THE 40MM GUN

By CAPTAIN WILLIAM S. HALLER

DURING the month of June 1952 each battery of the 398th AAA AW Battalion (Smbl) spent one day firing by the indirect method at stationary targets on the artillery range at Camp Edwards, Mass. The weather was clear and warm for most of the firing. Each battery was allotted 96 rounds of cartridge HE-T SD, MK 2. Fuse, PD MK.27.

The problem was developed and executed under the supervision of Major Robert W. Browning, executive officer, Capt. William S. Haller, S3, Capt. John A. Baugh, liaison officer, and 1st Lt. Ralph M. Des Rosiers, communications officer, with a dual purpose in mind—one to fulfill the annual training requirement of firing in the ground support role and the other to prepare for the mission of training civilian component AAA units this summer.

Two guns in each battery were used. One was equipped with the azimuth and elevation scales on the hand drive assembly housing as described by Lt. Hoffman in the ANTIAIRCRAFT JOURNAL, Jul-Aug 1951. The second gun was equipped with an aiming circle head mounted on the rear sight bracket of the speed ring sight. This device was used to lay the gun in azimuth by conventional field artillery methods. A gunner's quadrant was used to lay the gun in elevation.

The batteries operated their fire direction centers at the observation post for instructional purposes and the firing data was sent to the guns by telephone. The FDC employed only the horizontal control operator using the range deflection fan and a computer; using the graphic firing table. The vertical control operator was not used owing to the flat terrain at the range.

Some difficulty was experienced by the HCO in plotting observer corrections of 25 yards on the 1:25,000 scales. Corrections of 25 yards are required because of the small lethal radius of the 40mm shell. However, the personnel were inexperienced and with more training, fewer errors will be made.

The range to the targets from the gun varied between 1700 and 3300 yards. At 1700 yards, one mil of elevation will move the burst approximately eighty yards and at 3300 yards one mil of elevation will move the burst approximately forty yards. It is evident from the above that some method of accurately positioning the gun in elevation must be used for targets at close ranges. The method used was the gunner's quadrant.

SOME trouble was experienced at the gun equipped with the elevation scale at close ranges because of inaccuracy, especially at targets around 1900 to 2400 yards. The elevation pointer would introduce an error in elevation when he repositioned his crank which would frequently cause the observer to receive erratic rounds.

It is recommended that the elevation scale be numbered from ten to fifty rather than plus or minus twenty since it is virtually impossible to engage a target by indirect fire when the elevation is below ten mils and the tracer burn out point of presently available ammunition is 3500 yards with a corresponding elevation of 47.3 mils. These recommendations are based on the premise that the computer will send down the firing elevation to the gun as he reads it on the graphic firing table. If the method described by Lt. Hoffman is used, it will be necessary for the computer to add or subtract the necessary figures from his slide rule reading to obtain the firing elevation for the gun. This will slow down the operation of the FDC and introduce human errors.

BY the same token, if the azimuth scale is set to zero when the gun has been positioned for the first round, it will be necessary to construct for each mission a new base line index on the fire control grid in order to make the necessary corrections. It is recommended that a deflection be sent to the gun directly as read from the range fan using a base point index that has been constructed by actual registration of the gun. This will speed up the operation of the FDC and tend to reduce human errors in plotting.

THE gun which was equipped with the aiming circle for azimuth laying was pointed by initially setting the 0-3200 line of the aiming circle parallel to the axis of the bore, and then it was pointed to the center of the field of fire by reciprocal laying with another aiming circle. In fact both guns were initially layed by this method.

Aiming stakes were then put out about twenty yards in front of the gun. The aiming circle mounted on the gun did not jar out of adjustment while firing and proved to be quite accurate.

Both guns were registered on a base point, and after registration the adjusted elevation index and the corrected base line index were constructed on the graphic firing table and the fire control grid respectively. After these indices were constructed all readings of deflection and elevation for succeeding fire missions were read directly by the operators and called to the guns.

Once the fire control grid is set up it is possible to adjust with either of the guns. During fire for effect both guns can be fired by reading the corrected elevation and deflection for the second gun.

CONCLUSIONS:

Firing of the 40mm gun by indirect methods can be accomplished quite successfully with various types of sighting systems.

Because of the 3500 yard tracer burn out point the range limits are about 2000 yards in depth and they necessitate firing in relatively level terrain. Therefore it is recommended that units attempt to procure high explosive ammunition having a longer time of flight for this type of firing.

AAA SPECIALIST BN AT BLISS

TO meet the Army-wide demand for men specialized in AAA warning, the AAA Replacement Training Center, commanded by Colonel Earl W. Heathcote, has organized the Specialist Training Battalion. Since its establishment in November, 1951, it has trained and graduated 3,145 men.

Designated the 5th AAA RTC Training Battalion, the primary mission is to train personnel in such specialized fields as fire control and radar operators, air warning Specialist, and operations assistant.

With Major Fred R. Whitehead, Sr., commanding, Captain Thomas M. Beckman, executive, and Captain Archibald P. Hendley, S3, the battalion has four lettered batteries, commanded by Captains Woodrow W. Williams, and Berry Carroll, Jr.; 1st Lt. Robert C. Frye and 2nd Lt. Paul R. Edwards. Each battery has two classes, each in a different phase of training. A class graduates every week.

Minimum requirements for assignment to the battalion are an Aptitude Area I score of 105 or better and an Aptitude Area IX score of 110 or better. Prior to attending one of the courses, applicants must have received at least eight weeks of basic combat training.

The courses are of eight weeks' duration, with approximately 200 hours being devoted to the respective specialized technical instruction and 180 hours allotted to general subjects.

The Fire Control Section is commanded by Lt. Carl E. North who instructs eight classes of 37 men each. Each is in a different phase of training, emphasizing such subjects as energizing, checks and adjustments of the M9 director, tests of the M9 director, cable system M7 and M1, orientation and synchronization of the range platoon and the gun platoon. To give the trainees a well-rounded background in fire control operation, subjects such as visual tracking and preventative maintenance are also taught.

These subjects are taught with a minimum of lecture and a maximum in actual performance of the various duties of a fire control operator.

Training is climaxed with a two-day field problem at a Fort Bliss firing range, where all positions in the range and gun platoons are manned by the trainees under close supervision.

Radar operators, under the supervision of Lt. Walter S. Walters, are instructed in the uses, characteristics, technical operation, and emplacement of gun laying and surveillance radar. Approximately seventy hours of instruction are devoted to fundamentals and the operation of the various radar sets in the AAA RTC radar park. The student is instructed in the chief functions of the various sets as related to antiaircraft activity, including searching for targets and tracking a selected target manually and automatically. The course is further broken down into such important subjects as operational adjustments, orientation and synchronization, jamming and anti-jamming of radar equipment, and data transmission.

In data transmission the student learns the cabling system of the range and gun section. He is also given a thorough understanding of the related electrical voltages of the various cables and the functioning of the radar in its continuous representation of azimuth, height, and elevation angle positions of the target. In the data transmission system he learns how these position voltages are furnished the gun director.

All this is given a combined application in a field problem during the seventh week of training, when the radar operator works with the other specialist sections in organizing a range platoon which joins with the 90mm battery in firing their range problem.

The radar operator is also taught the mission and technical operation of sur-

Co-Authors

1st Lt. Edward P. Czapor, Asst. Chief of Radar Section.

1st Lt. Carl E. North, Jr., Chief Fire Control.

1st Lt. Robert W. Stein, Chief Air Warning Section.

CWO Thomas E. McGuire, Chief Communication Section.

Fire control class receives instructions.

Radar operators are given practical experience.

veillance radar in working with the air warning specialist in the operation of an AAOC by providing an AAA IS radar network. In this course the radar operator actually sets up and operates an AAA IS radar network in a combined field problem with the air warning specialist during the sixth week. In this problem the radar operator receives further technical training in searching a designated defended area and sending target position data in the Geographical Reference System to the air warning specialist in the AAOC for plotting.

The students taking this course not only learn the duties of a plotter, but also those of a chief plotter, intelligence teller, journal recorder, and observer. They are also trained in aircraft recognition, observation and outposts, compass, binoculars, camouflage and concealment, and communications. Students must also have a working knowledge of the Geographical Reference System and the items of equipment to be found in an operations center, and their use.

In the sixth week, students go to the field for four days of practical application. Here they set up a tactical operations center and operate in conjunction with the radar personnel manning three surveillance radars, located in three different positions approximately ten miles distant from the operations center. These positions simulate an AAA defense and are in contact, 24 hours a day, with the OC by means of wire and radio. During the problem, the trainees are broken down into three teams, each in charge of an instructor, who supervises and alternates the men so that each works as a chief plotter, plotter, journal recorder, intelligence teller and OP observer.

Since communication is the very heart of the air warning and operations center, it is the mission of the Communications School to train student personnel of the Air Warning School in the principles and techniques of communications common to this field.

In addition, the school conducts a five-hour course in basic electricity, which is given to each class of radar operators, fire control and air warning specialists during the first week. This course is designed, not to make electrical technicians, but to enable the student to understand the terms and characteristics of the vast electrical networks and equipment that will be a part of his training. This includes terms, voltage sources, batteries, Ohm's law, characteristics of A.C. and D.C. and principles of induction.

The lesson presentation is divided into four basic categories: message center procedure, wire, radio and general communications subjects.

In message center procedure, the student learns the methods of procedure, use of the SOI and Cryptographic Procedures with the use of the M209 Converter. This includes message writing, routing and means of message conveyance. The objective is to enable each student effectively to read, relay and transmit messages according to military requirements and standards and, if necessary, to operate the M209 Converter. At all times, the importance of effective and fast communications and necessary security is kept before the student. He is taught message procedure and security measures accordingly.

In teaching wire communications, an introduction is given to wire techniques and wire networks common to AAA units. After this, the student is taught to prepare and use line route maps and circuit diagrams with appropriate markings and symbols. Other classes present methods and terminology of field wire and surface line construction. Although actual pole line construction is not emphasized, the students are taught pole climbing because field wire lines involve a certain amount of overhead wiring. An important phase is the connection of simplex and phantom circuits with repeating coils. The students also learn the characteristics, installation and operation of the BD-71 and BD-72 switchboards, and the EE-9 field telephone.

So that the student understands terms of radio operation, such as frequency range, transmission range, output, tuning, etc., he is given a class in basic radio theory. After this, he is taught various radio sets of the AAOC net. The classes on each of these sets are directed to give characteristics, installation (or tuning and alignment), operation and first echelon maintenance of the sets, including SCR-188, SCR-543, SCR-593, SCR-536 and AN/GRC-9.

The general communications subjects of the school combine those that might be common to more than one type of communications. With the phonetic alphabet, radio voice procedure is taught. This teaches the prowords and phrases of radio and wire communication by voice. The when, how, and why of safeguarding military information is given in a class on signal security. Classes are also held in proper maintenance procedures and echelons of signal equipment.

At the end of their eight weeks' course, graduates of the battalion are assigned to AAA units in the United States and in overseas commands.

Notify the Journal of Your Address Change

In this issue of the JOURNAL there are two different ballots. Turn to page 2 for the ballot on the proposed merger of the U.S. Antiaircraft Association and the Association of the United States Army. Study the provisions carefully and send in your vote before 28 February 1953.

The second ballot, on page 3, is for the annual election of officers of our Association. Mark your choices and return before 31 December 1952.

Training Exercise: HARDROCKS

By COL. THOMAS M. METZ

ONE of the most difficult tasks which confront the commander of deployed AAA units is that of training. An AAA unit under these circumstances is harassed by numerous administrative and operational requirements which leave the commander with little time available for training.

With that little time he must first conduct training in those subjects which are prescribed by higher command, like troop I&E, Morality and other subjects. Next he must consider those subjects which maintain or improve his unit's capability to carry out its air defense mission, for he wants his unit to be ready when the shooting starts. But all too often either through pressure of other requirements or lack of training facilities or areas, he neglects training in those subjects designed to round out his unit as a member of the combined arms team.

In the beginning of strained international relations AAA units are rushed through training in order to employ them in defense of vital areas. This deployment takes place both in the Zone of the Interior and in the Communications Zones of overseas theaters. Here these units sit, day in and day out, year in and year out, standing guard. Oftentimes they lose sight of the fact that they are mobile units which higher authority may move without advance notice to a combat zone where they must function in a field army with other units of the combined arms.

During the early months of this year, the 9th AAA Group, commanding the AAA defenses of Southern Japan, was confronted with a growing staleness in the art of field soldiering. Units of this command had been deployed around vital areas of Southern Japan since the beginning of the Korean War. Alert periods were exacting and left little time for coordinated training. The 40th AAA Brigade, commanded by Brigadier General James G. Devine, had directed an all-inclusive training program designed to qualify its units for service in any zone of action and under any circumstances.

This training directive included subjects which could not be conducted in the vicinity of the defended areas, namely, terrestrial firing, 3.5" rocket firing, tactical road marches, demolitions and mine laying, hand grenades, small unit infantry tactics and other such subjects. It was readily apparent that the most expeditious and efficient way to comply with this training directive was to move to a suitable area for a period of extensive field training. Fortunately, the operational requirements imposed by General Headquarters and Far East Air Forces provided for the withdrawal of one battery per battalion for the purpose of "off-site" training. Accordingly, the 9th AAA Group ordered training exercise Hardrocks to give each battery of the command an intensive six-day period of field training.

Four task forces were formed consisting of one battery of 90mm guns and one battery of automatic weapons together with an aggressor force of one platoon from the headquarters battery of the gun battalion. Four majors were assigned as task force commanders in order to give them an opportunity to command and develop leadership. Each of the four task forces bore the name of its commander. They were Majors Kermit D. Woolridge, Peter V. Kulo, Edward J. Rumpf, and Frank W. Smith.

Each Task Force Commander was given a broad directive to make a tactical move (less range equipment) to the maneuver area and establish a base camp. Only equipment authorized by appropriate T/O and E was permitted in the training area. Needless to say by the end of the first day, trucks were dispatched to home stations with such items as squad tents, steel cots, hibachi pots (Japanese charcoal burner) and the like. While in base camp the Task Force Commander conducted, during the first four days, an intensive training schedule which stressed basic soldiering and small unit infantry tactics. Throughout this period the 9th Group reserved certain times for demonstrations which were controlled at group level. These demonstrations included close air support attacks controlled by a tactical air control party, demolitions, defense against airborne attacks, gas chambers, bazooka firing and hand grenade instruction. The majority of these demonstrations were concluded with practical participation by all personnel.

The last two days of the six-day period were devoted to a continuous infantry-artillery maneuver with emphasis on night patrolling and small unit problems in offensive and defensive actions. Most of this work was physical in nature and gave all ranks an opportunity to demonstrate leadership.

Much valuable experience was derived from this method of training and aided materially in dusting the cobwebs off of these troops who through nobody's fault are subjected to the monotony of defending vital areas over long periods of time. For those who played the game, by far the majority of the participants, many valuable lessons were learned.

With the introduction of atomic weapons it is envisaged that future wars will be fought with units in extended formations. A front may even consist of the infantry holding only key terrain features. Such dispersion will invite enemy patrol action and guerrilla warfare, and antiaircraft artillery troops attached to divisions, corps and even armies should be trained to cope with these attacks.

In considering training directives, higher AAA commanders should envisage extensive training in field maneuvers. This should include terrestrial firing by both gun (90mm) and AW units and should stress training in infantry tactics and weapons. Releasing units from tactical positions to accomplish field training should be provided for at high levels of command.

Monotony is the curse of deployed AAA units, especially those deployed in the Zone of the Interior and the Communications Zones of Overseas theaters. Long periods of inactivity with no action other than an occasional trial shot problem or target practice does much to destroy morale. Intensive field training conducted at least every six months will give a unit a much needed shot in the arm, and, in addition, will give the AAA confidence in working with the other units of the combined arms.

HONOR ROLL

Original Honor Roll

88th AAA Airborne Bn
Lt. Col. R. B. Barry, Jr.
228th AAA Group
Col. T. H. Pope
107th AAA AW Bn (M)
Lt. Col. E. R. McIver
305th AAA Group
Col. John S. Mayer, N. Y.

Separate Commands

Army AAA Command
Lieut. Gen. J. L. Lewis
Third Army Training Center
Brig. Gen. C. H. Armstrong
East AAA Command
Brig. Gen. F. L. Hayden
Central AAA Command
Col. D. J. Bailey
West AAA Command
Brig. Gen. R. W. Berry
Hqs. Far East AAA Spec. Sch.
Lt. Col. W. H. Nicolson

Guided Missile Dept.

AA & GM School
Col. F. M. McGoldrick
Officer Candidate School
Col. K. R. Kenerick
AAA Repl Training Center
Col. E. W. Heathcote

Brigades

34th AAA Brigade
Brig. Gen. R. R. Hendrix
35th AAA Brigade
Brig. Gen. Homer Case
40th AAA Brigade
Brig. Gen. James G. Devine
47th AAA Brigade
Col. G. C. Gibbs
51st AAA Brigade
Col. H. P. Hennessy
56th AAA Brigade
Brig. Gen. H. F. Meyers
103rd AAA Brigade
Brig. Gen. R. Y. Moore
105th AAA Brigade
Brig. Gen. A. H. Doud, N. Y.
107th AAA Brigade
Brig. Gen. J. W. Squire, Va.
111th AAA Brigade
Brig. Gen. Chas. G. Sage, N. Mex.
112th AAA Brigade
Brig. Gen. J. W. Cook, Calif.
114th AAA Brigade
Brig. Gen. G. W. Fisher

Groups

1st Composite Group
Col. T. H. Leary
4th AAA Group
Col. L. A. Bonifay
6th AAA Group
Col. W. J. Wuest
7th AAA Group
Col. M. J. Martin
10th AAA Group
Col. G. R. Carey
11th AAA Group
Lt. Col. L. S. Allen
13th AAA Group
Col. W. A. Cauthen
14th AAA Group
Col. H. E. Michelet
19th AAA Group
Col. D. D. Martin
65th AAA Group
Col. B. E. Cordell
68th AAA Group
Col. W. B. Hawthorne
142d AAA Group
Col. J. Snead, Ala.
197th AAA Group
Col. A. S. Baker, N. H.
200th AAA Group
Col. C. M. Woodbury, N. Mex.
205th AAA Group
Lt. Col. J. H. Pindell
207th AAA Group
Lt. Col. R. G. Irish, N. Y.
208th AAA Group
Col. F. J. Zeller
211th AAA Group
Col. G. F. Lineham, Jr., Mass.
214th AAA Group
Col. J. G. Johnson, Ga.
218th AAA Group
Col. V. P. Lupinacci, Pa.
220th AAA Group
Col. D. MacDuff
226th AAA Group
Col. John D. Sides, Ala.
227th AAA Group
Col. P. L. Wall, Fla.
228th AAA Group
Col. T. H. Pope
233rd AAA Group
Col. W. T. Stone, Calif.
250th AAA Group

260th AAA Group
Lt. Col. G. V. Selwyn, D. C.
326th AAA Group
Col. M. D. Meyers, Pa.
374th AAA Group
Col. T. F. Mullaney, Jr., Illinois
515th AAA Group
Col. F. G. Rowell, N. Mex.

Battalions

1st AAA Training Bn
Lt. Col. H. E. Graham
2nd AAA AW Bn
Lt. Col. J. L. Butler
2nd AAA Training Bn
Lt. Col. J. Martinelli
3rd AAA AW Bn
Lt. Col. J. P. Goettl
3rd AAA Tng. Bn.
Lt. Col. A. S. Naylor
4th AAA AW Bn (M)
Lt. Col. R. J. Connelly
4th AAA Training Bn
Maj. C. M. Smith
5th AAA Training Bn
Maj. F. R. Whitehead, Sr.
6th AAA Training Bn
Lt. Col. G. L. Crawford, Jr.
7th AAA AW Bn
Lt. Col. S. J. Paciorek
8th AAA Training Bn
Maj. M. D. Kert
9th AAA Training Bn
Maj. W. E. Osburn
10th AAA Training Bn
Lt. Col. V. T. Terribile
11th AAA AW Bn
Lt. Col. J. E. Wales
11th AAA Training Bn
Lt. Col. A. O. Chittenden
12th AAA Training Bn
Maj. L. E. Marlowe
14th AAA Gun Bn
Maj. H. C. Lorck
15th AAA AW Bn (SP)
Lt. Col. B. H. Johnson
21st AAA AW Bn (SP)
Lt. Col. J. W. Dry
32nd AAA AW Bn
Lt. Col. E. F. Moody
34th AAA Gun Bn
Lt. Col. H. B. Reubel
36th AAA Gun Bn
Lt. Col. G. W. Best
37th AAA Gun Bn
Maj. R. G. Duncan
38th AAA Gun Bn
Lt. Col. S. R. Kelley
39th AAA AW Bn (M)
Lt. Col. P. J. Lacey, Jr.
41st AAA Gun Bn
Lt. Col. C. F. Chirico
50th AAA AW Bn
Lt. Col. J. T. Hennessy
53rd AAA Gun Bn
Maj. J. M. Rutledge
56th AAA Gun Bn
Lt. Col. M. A. Selsor, Jr.
60th AAA AW Bn
Lt. Col. Wm. D. Ward
63rd AAA Gun Bn
Lt. Col. C. F. Coffey
64th AAA Gun Bn.
Lt. Col. D. B. Nye
65th AAA Gun Bn
Lt. Col. H. C. Brown
66th AAA Gun Bn
Lt. Col. C. M. Brown
68th AAA Gun Bn
Lt. Col. R. H. Stephens
69th AAA Gun Bn
Lt. Col. M. G. Meyer
71st AAA Gun Bn
Lt. Col. B. R. Brown
73rd AAA AW Bn
Lt. Col. P. W. Pedrotti
74th AAA Gun Bn
Maj. L. A. Waple
76th AAA Gun Bn
Lt. Col. J. D. Gemmell
77th AAA Gun Bn
Lt. Col. W. P. Wright, Jr.
79th AAA Gun Bn
Maj. R. A. Boaz
80th AAA Airborne Bn

82nd AAA AW Bn
Lt. Col. H. K. Clark
91st AAA AW Bn
Lt. Col. R. A. Clafee
97th AAA Gun Bn
Lt. Col. W. F. Corcoran
120th AAA Gun Bn
Lt. Col. H. C. Gray, N. Mex.
123rd AAA Gun Bn
Lt. Col. I. E. Dominguez, P. R.
127th AAA AW Bn (SP)
Lt. Col. H. G. White, N. Y.
133rd AAA AW Bn
Lt. Col. E. J. Modjeske, Illinois
137th AAA AW Bn
Lt. Col. L. B. Tipton
140th AAA AW Bn
Lt. Col. E. S. Mathes
144th AAA AW Bn
Lt. Col. R. T. Dunn
150th AAA Gun Bn
Lt. Col. L. O. Ellis, Jr., N. C.
259th AAA Gun Bn
Maj. L. T. Darcy
336th AAA Gun Bn
Lt. Col. A. A. White
340th AAA Gun Bn
Lt. Col. G. V. Selwyn, D. C.
398th AAA AW Bn
Lt. Col. L. B. Dean
443rd AAA AW Bn (SP)
Lt. Col. T. F. Gordon
450th AAA AW Bn
Lt. Col. B. N. Singleton
459th AAA AW Bn
Maj. M. W. Johnson
464th AAA AW Bn
Lt. Col. R. E. Glasgow
502nd AAA Gun Bn
Lt. Col. P. J. Maline
507th AAA AW Bn
Lt. Col. J. M. Carson
552d AAA Gun Bn
Lt. Col. L. N. Rieman
678th AAA AW Bn
Maj. J. B. Crayton, S. C.
685th AAA Gun Bn
Lt. Col. P. O. Franson, Mass.
697th AAA AW Bn
Maj. W. C. Thompson, N. Mex.
698th AAA Gun Bn
Lt. Col. F. Monico, Illinois
708th AAA Gun Bn
Lt. Col. F. F. Quist
710th AAA Gun Bn.
Capt. T. T. Chisman
711th AAA Gun Bn
Lt. Col. N. J. Walton, Ala.
712th AAA Gun Bn
Maj. F. N. Buchanan, Fla.
716th AAA Gun Bn
Lt. Col. Joe R. Stewart, N. Mex.
717th AAA Gun Bn
Lt. Col. E. D. Pelzer, N. Mex.
718th AAA Gun Bn
Lt. Col. J. J. Loughran
720th AAA Gun Bn.
Lt. Col. G. A. Duke, Calif.
726th AAA Gun Bn
Lt. Col. C. F. Arnold, N. Mex.
736th AAA Gun Bn
Lt. Col. F. T. Lynch, Dela.
764th AAA Gun Bn
Lt. Col. E. D. Wynsted
773rd AAA Gun Bn
Lt. Col. G. F. Slavin
804th AAA AW Bn (M)
Maj. S. N. Caudill, N. Mex.
867th AAA AW Bn
Lt. Col. W. R. Par
903rd AAA AW Bn
Lt. Col. F. J. Petrilli
933rd AAA AW Bn
Lt. Col. R. M. Huston
950th AAA AW Bn
Lt. Col. J. P. Wallis, Ga.
951st AAA Gun Bn
Lt. Col. W. G. Babbitt
30th AAA Lt. Btry
Maj. W. E. Barkman
Btry A, 37th AAA Gun Bn
Lt. A. B. Whitesides

Operations Detachments

115th AAA Opns. Det.
Maj. E. F. DeLeon
131st AAA Opns. Det.
Maj. J. L. Welling, S. C.
142nd AAA Opns. Det.
Maj. B. D. Boyett, Ala.
177th AAA Opns. Det.
Capt. J. J. Niehoff
181st AAA Opns. Det.
Capt. C. Geek
186th AAA Opns. Det.
Maj. Wm. S. Wall, Calif.
286th AAA Opns. Det.
Capt. J. B. Stopyra, Dela.
327th AAA Opns. Det.
Maj. F. W. Smith
506th AAA Opns. Det.

510th AAA Opns. Det.
Maj. R. H. Moser
511th AAA Opns. Det.
Maj. G. J. Burk

SIMULATED FIRING PRACTICE

By LT. COLONEL LEONARD S. ALLEN

ROTATION problems and the influx of new officers have stepped up the importance of proper command procedure used during target practice and combat firing of AAA gun batteries. From my experience there is a definite need for a standard stereotype procedure to be used by a battery commander in firing his battery. This need is emphasized in the 11th AAA Group, in defense of New York, where all officers at all times have to be prepared to take command of their battery and shoot at a possible enemy invader on short notice.

I developed the Simulated Firing Practice and utilized it originally in the 259th AAA Gun Battalion. It is now used throughout the 11th AAA Group and has proven its merit in better command efficiency. By practice and repetition, and the use of short cuts prepared in advance, the time taken to complete the Simulated Firing Practice from Battle Stations to the application of Trial Fire Correction has been reduced to thirty-five (35) minutes.

The Simulated Firing Practice as it is written is equally applicable to SCR 584-equipped or T33/M33-equipped batteries. The first command is "Battle Stations," and follows through in sequence with "Prepare to Fire Settling Rounds," "Prepare for Calibration Fire" (or Trial Fire) and finally firing on target. As a check and analysis on the efficiency of the utilization of the Simulated Firing Practice, a time record is kept, and turned in to the Battalion S3, along with the calculation of Calibration and Trial Fire Problems. The time record has proved valuable particularly to the battery commander, in analyzing the efficiency of the battery, and in determining where the process might be speeded up. The Simulated Firing Practice command procedure and time record is as follows:

SIMULATED FIRING PRACTICE COMMAND PROCEDURE

		Time
1. BC	"Battle Stations." (Alert button on M33)	.....
2. Ex 0	"Guns ready for action." (Ready signal on M33)	.....
3. Range 0	"Range section ready for action."	.....
	Settling Rounds	
4. BC	"Prepare to fire settling rounds."	.....
5. BC (to Ex 0)	"Firing Azimuth.....QE.....Fuze....." (This for high elevation over 800 mils.)	.....
6. Ex 0	"Data applied. Guns ready to fire settling rounds."	
7. BC	"Fire one salvo."	.....
8. Ex 0	"One salvo fired."	.....
9. BC (to Ex 0)	"Firing Azimuth.....QE.....Fuze....." (This for low elevation under 800 mils.)	.....
10. Ex 0	"Data applied. Guns ready to fire settling rounds."	
11. BC	"Fire one salvo."	
12. Ex 0	"One salvo fired." (Automatically checks orientation and synchronization.)	.....
	Calibration Fire	
13. BC	"Prepare for Calibration Fire."	.....
14. BC (to Range 0)	"TSP No.....Azimuth.....Elev.....Slant Range....."	
15. Range 0 (to BC)	"Range section ready for calibration fire." "Firing Azimuth.....QE.....Fuze....."	.....
16. BC (to Ex 0)	"Firing Azimuth.....QE.....Fuze....."	
17. Ex 0	"Guns ready for Calibration fire."	.....
18. BC	"Gun No. 1, fire one round. Gun No. 2, fire one round." (Etc. until all guns have fired four good rounds. Guns should be oriented and leveled after each round is fired and elevation verified with a gunners quadrant. Firing azimuth and fuze should be checked.) Time last shot fired	.....
19. Range 0	Reports to BC all deviations in range, azimuth, and elevation. Records same, computes calibration corrections. Delivers completed record to BC.	.....
20. BC (to Ex 0)	"Calibration corrections as follows: Gun No. 1, Azimuth (+ or —) mils, elevation (+ or —) mils, fuze (+ or —) mils." Gun No. 2, etc.	
21. Ex 0	"All calibration corrections applied."	.....
	Trial Fire	
22. BC	"Gun No.....prepare to fire Trial Shot Point No....."	.....
23. BC (to Range 0)	"Azimuth.....Elevation.....Slant Range....."	
24. Range 0	"Range section ready for TSP No..... Firing Azimuth..... QE.....Fuze."	.....
25. BC (to Ex 0)	"Firing Azimuth.....QE.....Fuze....."	
26. Ex 0	"Gun No.....ready for TSP No....."	
27. BC	"Gun No.....fire one round." Time trial fire completed.	.....
28. Range 0	"Trial fire corrections applied to computer." (Having recorded deviations and computed corrections for computer and applied them.)	.....
	Firing on Target	
29. Ex 0	"Guns ready for action." (Battery having been alerted and guns having been manned.) (On M-33-equipped batteries Guns Ready signal is operated.)	
30. BC to Ex 0 & Range 0	"Target Designated." (On M-33-equipped battery target having been acquired, pushes Designate button which signals radar trackers and gun crews. Guns then go into Automatic.) (In 584-equipped battery, radar tracks target.)	
31. BC to Ex 0	"Guns Automatic." (For 584-equipped battery only, when computer commences predicting.)	
32. Range 0	"Fuze....." (Keeps BC informed of fuze numbers using M-33. This distance may be estimated on 584, equipped battery.)	
33. BC to Ex 0	"Fire." (Pushes fire button on M-33.)	
34. BC to Ex 0	"Cease Fire." (Pushes cease fire button M-33.) (Guns continue in Automatic.)	
35. Ex 0 BC	".....rounds fired."	
36. BC	"Cease tracking" or "Fire." (Pushes Fire button on M-33 in the event firing is resumed.)	
37. BC to Range 0	"Drop target" or "Seach for new target."	

Lt. Col. Leonard S. Allen formerly commanded the 259th AAA Gun Battalion (120mm), NYNG in the AAA Defenses of New York City. He is now executive of the 11th AAA Group in the same command.

We recently visited some of the battery positions of the 11th AAA Group—as well as some of the 80th Group—of the 52nd AAA Brigade, and were impressed with the positions and the gunnery preparations carefully worked out.

We thoroughly concur with Colonel Allen in the need for practice in a standard routine procedure as outlined. We would raise serious question though as to the practicability and value of conducting either calibration or trial fire just prior to an expected enemy attack. The attendant excitement would be a handicap. Seasoned batteries did conduct such trial fire on Okinawa. Even so, they did it hours before the expected attack, and largely to confirm corrections already determined.—Ed.

Soldier's guide to GUIDED MISSILES 3

Guided-Missile Guidance

Captain Robert W. Fye

IMAGINE the advantage of the ability to correct the course of artillery projectiles after they leave the gun!

The incorporation of a guidance system in a projectile, along with a means to physically change the projectile's path, permits it to correct for errors at the target. The result is a guided projectile, or "guided missile."

The first article in this series described how and why guided missiles fly, as well as some of the effects of supersonic flight. The second discussed the principles of jet propulsion and the operating characteristics of the jet engines used in missiles. The purpose of this final article in the series is to discuss the vital element in any guided missile that makes it a useful weapon: its guidance system.

Need for Guidance

UNGUIDED rockets have been employed in warfare in the past, but they were always outmoded by such improvements as cast gun barrels, breech loading, and rifling which gave more accurate and longer-range fire. Since an artillery projectile reaches its maximum velocity as it leaves the gun barrel, it is comparatively easy to predict and shape its path, which is essentially a ballistic or parabolic trajectory. On the other hand, a jet-propelled missile usually does not reach its maximum velocity until sometime after it is launched, making it difficult to predict its course unless there is some form of guidance.

Reprinted from the *Combat Forces Journal* July 1952 issue.

CAPTAIN ROBERT W. FYE, Artillery, is an instructor in the Guided Missiles Department of the Antiaircraft and Guided Missiles Branch of The Artillery School, Fort Bliss, Texas. He is a 1945 graduate of the Military Academy. During 1949-50 he earned a Master of Science degree at the University of Southern California, studying aerodynamics and guided missiles.

Aiming . . . after the trigger is pulled

But, if a missile can be guided throughout its flight, its initial dispersion or inaccuracy can be corrected during the remainder of the flight. This permits the missile to use jet propulsion and thus far outdistance, in range, all conventional artillery.

The ability to change the course of a missile in flight has other advantages. For example, a free-flight, unguided projectile cannot correct for nonstandard atmospheric conditions it encounters (unforeseen side winds, changes in air density, and other elements), or for nonstandard conditions of manufacture (the inability, with mass-production methods, to make two items exactly alike), both of which result in deviations of the projectile from its standard trajectory. However, guided missiles can compensate for these factors, since they have the means to detect and correct for variations from their desired flight path.

Further, there has never been an antitank or antiaircraft artillery projectile that could maneuver with its target. Thus, the accuracy of fire against such targets is dependent upon pre-fire prediction and is limited by the capability of the enemy to maneuver after the prediction is made. This is a serious limitation, particularly in antiaircraft fire. Guided missiles can overcome this advantage of maneuver which the enemy possesses if they are designed to match their targets, maneuver for maneuver.

So the requirement for incorporating guidance systems in missiles stems from three factors. First, control is needed to make missiles accurate at the long ranges that jet-propulsion power plants give them. Second, nonstandard conditions of manufacture and the atmosphere must be considered and compensated for, since they can produce sizable errors at the target. Finally, in order for missiles to be effective weapons they must be able to match the evasive action of targets.

Fundamentals

TWO problems arise in any effort to control unpiloted craft in flight. Initially, the missile must be properly aligned or oriented in space. This means that the missile can interpret up from down, left from right, and rolling from stabilized flight. Control of this type is called attitude control. However, a missile needs something besides attitude control in order to hit a target. It requires a method to keep it on the desired path or trajectory. This is called path control.

Attitude control must be effected before path control can be attempted. For example, if a missile is not roll controlled, we do not know the position of its movable control surfaces or fins which we wish to position so as to guide the missile along its desired path. It is obvious that if a missile which we presume to be roll stabilized has actually rolled over on its back, a command to the missile to go left will result in the missile's moving off to the right.

To control a missile's attitude, we are concerned with the angular motions of yaw, pitch and roll which the missile can undergo. Figure 1 shows that these motions occur about three mutually perpendicular axes through the missile. In order for the missile to have complete attitude control, it must be able to detect any of these three angular motions, which it interprets as yaw, pitch, or roll errors, and correct for them by yawing, pitching, or rolling the missile back to its proper attitude. Gyroscopes are normally employed in missiles to establish a reference from which these angular errors may be detected. Figure 2 indicates the basic components of the ordinary gyroscope, which operates on the

principle that a mass (the rotor or flywheel as it is sometimes termed) rotating at high speed possesses a certain degree of rigidity in space (the property a gyro has of remaining fixed in its plane of rotation as it spins around). Thus its spin axis establishes a fixed line in space regardless of motion of the rest of the gyro or the missile in which the gyro is mounted. The gimbaling system of the gyro is so arranged that one gimbal moves with the missile as it rolls, pitches, or yaws, while the other gimbal remains

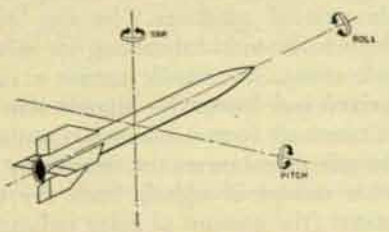


Figure 1. *Yaw, pitch and roll axes.*

fixed with the rotor. This relative motion between gimbals is equal to the angular motion which the missile has undergone, and can be converted to a usable electrical error signal. The signal actuates a power system, called a servo, which positions appropriate control surfaces so as to correct the missile's attitude and reduce this error to zero.

WHAT about these control surfaces? In most cases they are movable vanes or fins, similar to the rudders, elevators, and ailerons used by conventional aircraft. When moved from their neutral position in a high velocity air stream, they cause the missile to turn, climb or dive, or roll. Unfortunately, there are times when these surfaces are not effective, namely, when the missile is not traveling at sufficient velocity and when the missile is in the upper reaches of the atmosphere, where the air is quite thin. In both cases, the air stream will not exert a sufficient force on the control surfaces to enable them to control the direction of motion, or attitude, of the missile. For control under these conditions, we must resort to other means. The Germans solved the problem of controlling their V-2 missile while at low velocity in a unique manner. The V-2 was too large to be boosted into immediate supersonic flight. It rested on its launcher until the thrust from its rocket motor exceeded the over-all weight of the missile, at which time it took off. During this period the missile was traveling slowly, picking up speed as it ascended, and yet this was a critical period in the life of the missile. If it were not stabilized early in its flight, control could never be established and the flight was almost certain to fail. Since its control surfaces were not yet effective, the Germans devised a system of carbon jet vanes, actually small control surfaces, which they placed in the exhaust stream of the rocket motor. Regardless of the velocity of the missile itself, its jet stream from the motor left the missile at about 6,730 feet per second! Hence, moving the jet vanes, when attitude errors were detected, deflected the exhaust gases and produced a force on the missile similar to that produced by the movement of conventional control surfaces in an air stream. This force caused a change in the direction of motion of the missile. Of course, these "internal" control surfaces, exposed to temperatures on the order of 3000°F, burned up within a short period of time, but by then the missile was traveling at such a velocity that its control could be turned over to the missile's external control surfaces.

For control at high altitudes, the air is not dense enough to permit the use of control surfaces, and jet vanes would long since have been consumed. A solution to this problem is obtained by mounting the missile's power plant (which, in all probability, would be a rocket motor rather than an atmospheric jet engine at the altitudes we are now considering) in a series of gimbals similar to the gimbaling system used with a gyroscope. By causing attitude error

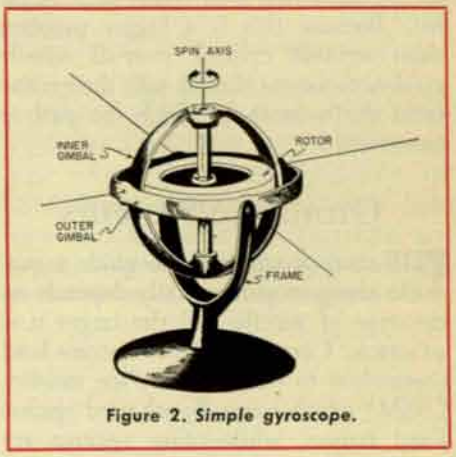


Figure 2. *Simple gyroscope.*

signals to rotate these gimbals with respect to one another, the direction of the motor's line of thrust can be changed, resulting in a change in the missile's attitude or heading.

Regardless of the methods used to achieve it, attitude control has only one purpose—to orient or stabilize the missile in space so that it can, in turn, receive and properly respond to path control commands. Note that all of the functions performed to obtain this attitude control (detection of yaw, pitch, and roll errors and their correction through proper movement of control surfaces) are accomplished entirely within the missile, requiring no outside source of information. The problem is quite similar to the actions of the automatic pilot used

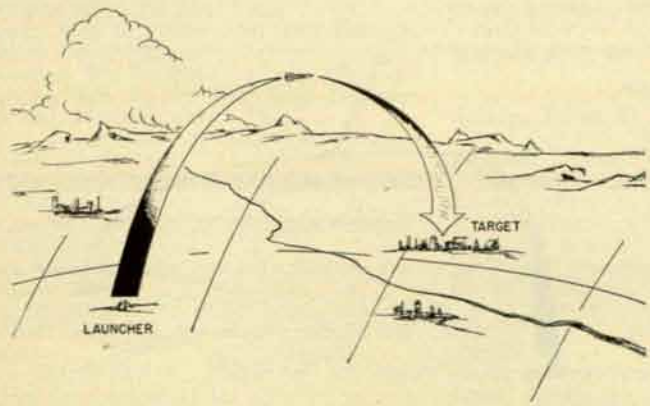


Figure 3. *PRESET. Programmer in missile causes it to follow predetermined path to target.*

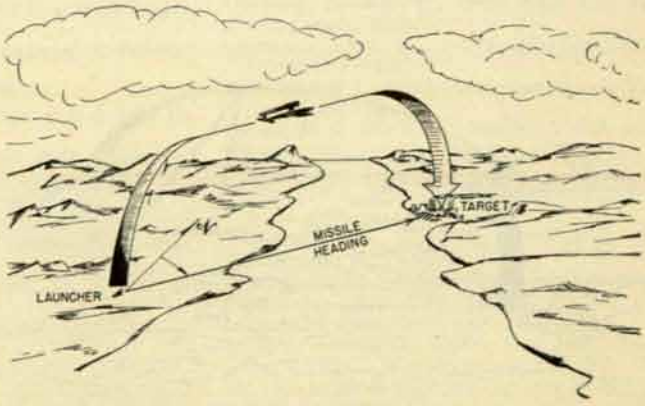


Figure 4. *TERRESTRIAL REFERENCE. Compass, altimeter and airlog keep missile on prescribed path.*

in many conventional aircraft today.

Assuming the missile is aware of its attitude in space and can keep itself properly aligned, it is still faced with the problem of guiding itself or being guided along some flight path to the target. This is path control, the process of noting where the missile is, comparing its location with where it should be, and correcting for any deviations so that the missile will continue on a course that will result in a target hit. Because this is a bigger problem than attitude control, over-all missile guidance systems usually take their name from the manner in which the path is controlled.

Guidance Systems

THE method employed to guide a missile along its path usually depends on the type of missile and the target it is to attack. Certain guidance systems lend themselves to surface-to-surface missiles (SSM) which normally are used against fixed targets, while other systems are particularly adaptable to surface-to-air missiles (SAM) or air-to-air missiles (AAM), where enemy aircraft or missiles are the targets. We will discuss the systems used principally by SSM.

Preset. This is a system wherein a predetermined path (indicating a fixed target) is set into the missile before launching. It cannot be adjusted during flight. The missile is set to fly a given distance and any corrections for wind or other effects must also be made prior to launching. The German V-2 was a preset-guided missile, in which a programmer, or time clock, within the missile closed various electrical contacts as the flight progressed, causing different functions to be performed, such as pitching the missile over from the vertical after launching, or cutting the missile's fuel off. Figure 3 shows a typical trajectory of this missile. Such a system is very simple, but since all programmer adjustments and settings must be made before launching, unforeseen factors that cause the missile to deviate from its prescribed path during flight cannot be corrected. Hence the accuracy of the system is quite poor; the V-2 had a radial probable error of about eight miles at a range of 150 miles. Nevertheless, preset guidance systems have certain values where great accuracy is not required. Also, there are times in the development of a missile where flight test data are needed on such things as the propulsion and aerodynamic performance of the missile. Rather then test the missile with its entire guidance system, it may contain only a programmer which causes it to perform certain simple maneuvers which are sufficient for the test being conducted.

Terrestrial Reference. This is a more refined guidance system, in which the missile flies a predetermined path, using components or devices in the missile which react to some phenomena of the earth to keep it on the path. The phenomena which might be used are the earth's gravitational, magnetic and electric fields, and its atmosphere. The German V-1 was an example of a terrestrial reference-guided missile. It used a magnetic compass to keep it headed in the direction of the target, an altimeter to keep it at the proper altitude, and an airlog to determine distance traveled toward the target. An airlog is a wind-driven propeller carefully calibrated so that a given number of turns of the propeller, mounted in the nose of the missile, is equivalent to a specific ground distance covered. The propeller counts its revolutions and when these equal the predetermined distance to the target, the airlog initiates a signal to dive the missile into the target. Figure 4 illustrates the trajectory flown by such a missile. This system has generally the same advantages as preset guidance and is likewise quite limited in range due to the arbitrary preflight predictions that must be made and set into the missile's guidance components.

Radio Navigation. This is a system of guidance for the control of a missile along a predetermined path in which the missile obtains information from one or more fixed radio transmitting stations in order to stay on the desired path. The navigation systems of SHORAN (SHort RAnge Navigation and LORAN (LOng RAnge Navigation) are examples of this type of guidance. In the latter, which is the most interesting for missile applications, the missile carries a radio receiver and listens for signals sent simultaneously from two base transmitters. The missile measures the time delay between receipt of signals from the two stations (the amount of delay indicating how much nearer the missile is to one station than the other). The missile's path is calculated prior to launching so that to be on course the missile should always be listening for and measuring the same delay between received signals. To do so, the missile flies a curved, hyperbolic course. If the missile deviates from this path, it will not hear the signals with the correct time interval between them and will navigate to get back onto its proper path. This scheme of guidance is illustrated in Figure 5. Such a system has the advantage of using presently known techniques, but like any system which depends upon radio or radar transmissions, it is subject to interference and enemy electronic countermeasures. These can take the form of either deceiving the missile with false signals or jamming the missile so that it cannot hear the base stations' transmissions.

Celestial Navigation. This is another system in which the missile flies a predetermined path, navigating itself along

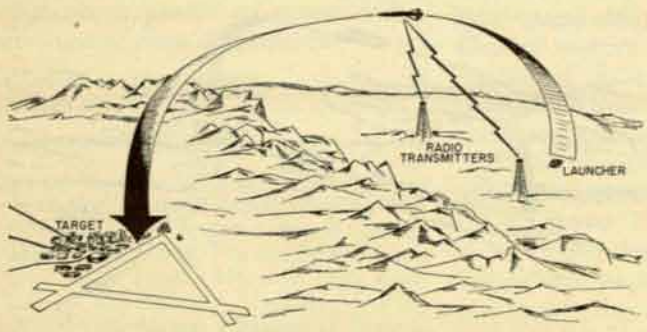


Figure 5. *RADIO NAVIGATION. Missile navigates upon receipt of signals from synchronized ground transmitters.*

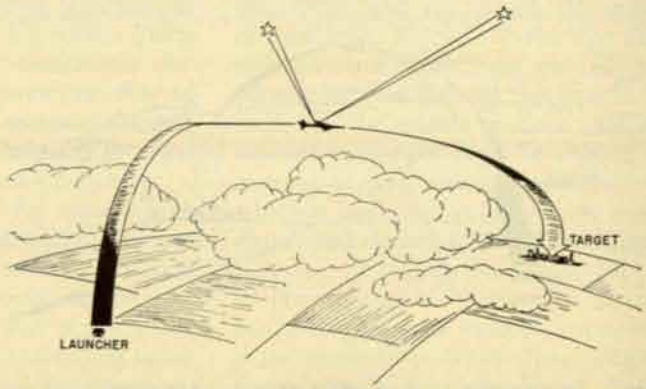


Figure 6. *CELESTIAL NAVIGATION. Missile determines its position and navigates by observing the stars.*

the path by celestial observations. The method employed is essentially that used by navigators at sea who determine their position by observation of two or more stars. The missile must contain star-tracking telescopes which remain locked on previously designated stars throughout the flight. They continuously "shoot" these stars, determining the missile's actual position which is compared with where the missile should be at this time. Errors in missile position cause steering commands to be generated which bring the missile back on course. In Figure 6, this system is illustrated. Such a guidance system is entirely self-contained within the missile and hence is not subject to enemy countermeasures. Also, its accuracy is independent of range, since star observations can be made just as accurately at the end of a flight as at its beginning. However, the missile-borne equipment for such a system is quite complicated, and weather conditions can influence its usefulness.

Inertial. In this guidance system, the path of the missile can be adjusted after launching by devices wholly within the missile which make use of Newton's second law of motion—force is equal to mass times acceleration ($F=ma$). These devices, called accelerometers, are sensitive to accelerations which the missile undergoes, as it flies along or deviates from its flight path, due to the missile's thrust, side winds, or other forces that may act on the missile. After detecting these accelerations, it is a simple matter to doubly integrate them (a mathematical process that may be accomplished electronically or mechanically) to obtain the distance the missile has traveled due to the force. So we might call the accelerometers "distance-meters" or odometers, just as the devices in automobiles which indicate velocity are called speedometers. With this distance information the missile can tell how far it has deviated from its prescribed flight path or what distance toward the target it has covered, and what corrections must be made. Like celestial navigation, this is a completely self-contained system, requiring no commands or other signals from the ground. Complexity of missile equipment is a drawback of this system.

Captain Fye has discussed five basic systems of guidance, all of which have particular application against fixed targets, where the missile, probably an SSM, flies a predetermined path. Systems suitable against moving targets are largely classified and cannot be discussed in this series.—THE EDITORS.

ARTILLERY ORDERS

DA Special Orders Covering September 1 through November 30.
Promotions and demotions not included.

COLONELS

Coburn, Melville B., Far East Command, Yokohama
Dunn, Charles G., Far East Command, Yokohama
Rasbach, Joris B., 7689th Hq Gp USFA, Salzburg, Austria

LIEUTENANT COLONELS

Cushing, Christopher B., 71st AAA Gun Bn., Ft. Belvoir, Va.
Dunlap, C. E., Jr., Far East Command, Yokohama
Epley, Albert D., 4054th ASU AA & GM Br TAS, Fort Bliss, Texas
George, Rogers E. Jr., 168th AAA Gun Bn (75mm-Mbl), Ft. Bliss, Texas
Harper, Wm. E., 1225th ASU, Fort Hancock, N. J.
Harvey, A. W., Far East Command, Yokohama
Hudgins, Seth F., Stu Det Army Language School, Monterey, Calif.
Miller, Gay E., 33rd AAA Gun Bn., Fort Bliss, Texas
Molloy, Robert W., 526th-AAA Gun Bn., Fort Totten, N. Y.
Orrick, Edwin G., 4050th ASU TAS, Fort Sill, Oklahoma
Price, William H. Jr., 35th AAA Brigade, Fort Meade, Md.
Roesser, Millard H., 8658th AAU AAA & Maint. Instr. Det., Lakenheath, Suffolk, England
Schweidel, Kermit R., 1129th ASU NH NG Instr Gp, Concord, N. H.
Sigley, W. B., Far East Command, Yokohama
Vance, William M., EUCOM, Bremerhaven
Webster, George B., OCAFF, 8575th AAU, Fort Monroe, Va.

MAJORS

Capron, Paul Jr., 35th AAA Brigade, Fort Meade, Md.
DeMetropolis, Harry R., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Hufstetler, John R., 549th AAA Gun Bn., Camp Stewart, Ga.
Matthews, Charles W., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Maykovich, James, Far East Command, Yokohama
McGovern, James F., USA Alaska, Fort Richardson
Price, T. A. Jr., Far East Command, Yokohama
Stoddard, James V., Eastern Army AA Command, Stewart AFB, N. Y.
Weeks, Roland L., 44th AAA Gun Bn., Niagara Falls, N. Y.
Worthen, F. P., Far East Command, Yokohama

CAPTAINS

Attridge, Robert D., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Beckman, Thomas M., Far East Command, Yokohama
Bifano, Salvitore A, EUCOM, Bremerhaven.
Biloon, Arthur A., EUCOM, Bremerhaven
Bjorklund, Floyd H., 31st AAA Brigade, Fort Lewis, Washington
Brown, Thomas E., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Chambers, J. T., Far East Command, Yokohama
Clarke, C. C., Far East Command, Yokohama
Crout, Francis C., 28th AAA Group, Fort Custer, Mich.
Cole, L. A., Far East Command, Yokohama
Damico, Wm. P., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Dick, Arthur J., 18th AAA Group, Indiantown Gap, Penna.
Dinkins, H. W., Far East Command, Yokohama
Dour, William W., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Elkhorn, Wm. N. II., 32nd AAA Gun Bn., Fort Bliss, Texas
Fields, Leonard B., 685th AAA Gun Bn., Fort Devens, Mass.
Fikentscher, Arthur, EUCOM, Bremerhaven
Foster, Jack W., 28th AAA Group, Fort Lewis, Washington
Gerome, George W., USA Alaska, Fort Richardson
Gillo, Joseph P., 33rd AAA Gun Bn., Fort Bliss, Texas
Gordiner, Truman W., 594th AAA Gun Bn., Fort Custer, Mich.
Graham, Joseph N., 7689th Hq Gp USFA, Salzburg, Austria
Hall, Horace L., 708th AAA Gun Bn., Indiantown Gap, Penna.
Hanna, M. L., Far East Command, Yokohama
Hanson, Willard O., 4052nd ASU AAA & GM Center, Fort Bliss, Texas
Hoffman, Robert H., Far East Command, Yokohama
Honeywell, S. S., EUCOM, Bremerhaven
Judson, Paul F., TRUST, Trieste
Kemper, G. E., Far East Command, Yokohama
Krakauskas, Walter A., 235th FA Obsn Ba., Fort Sill, Okla.
Lupkey, Francis D., Office Secy of Defense, 8475th AAU, Washington, D. C.
Marrin, James G. Jr., Stu Det AA & GM Br TAS, Fort Bliss, Texas
McDermott, John P., USA Alaska, Fort Richardson

(Continued on page 46)

The Army's newest and biggest artillery piece—the 280mm gun—is test-fired at the Aberdeen Proving Ground by a civilian technician.

NEW 280MM GUN CAN FIRE ATOMIC PROJECTILE*

At Aberdeen Proving Ground, Md., the Ordnance Corps gave photographers the first public look at the Army's newest and biggest gun—a 280mm giant that is capable of firing atomic projectiles as well as conventional shells. The gun weighs about 85 tons. Range of the gun varies with the type of shell used, but maximum range is probably about 25 miles. A 280mm battery will consist of two of these guns plus eight 5-ton trucks.

*Reprinted from the November issue of *Combat Forces Journal*.

he 280 can be trav-
rsed 360 degrees
nd elevated to 55
egrees—as it is
ere. If the gun were
position to fire, the
ransporter unit
ould be detached.

Rear view of the 280. The hydraulic power rammer is pushing a shell into the breech. After the powder charge is rammed home the loading track is moved out of the way. The soldier at the left is peering through the sight of the big gun.

The 280 is transported by two prime movers between which it is suspended. Top speed on highways is reported to be 35 miles an hour. Either prime mover can pull or push the load. They can turn and drive parallel to one another, carrying the gun between them. The driver of the leading tractor can control the throttle and brakes of both units. Drivers communicate with one another by telephone.

BUNKER BUSTING IN THE SECOND DIVISION

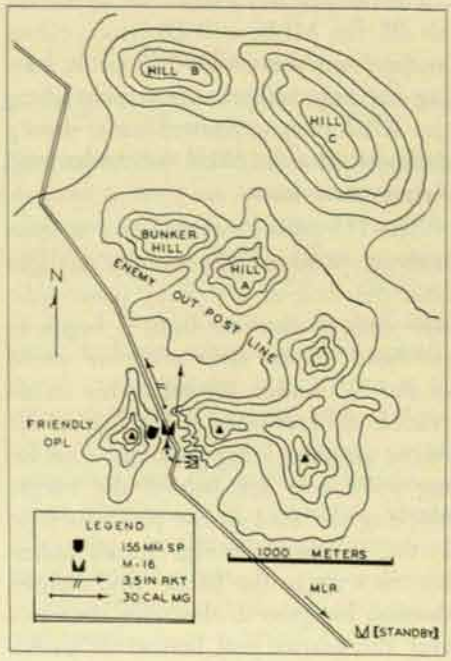
By CAPT. BALLARD B. SMALL

IN February 1952, the Chinese facing the Second U. S. Division had been working on their earthworks in that particular sector for over seven months. As a result, some of their strong points were fabulous networks, resembling some long-worked mine more than military positions. The effect of ordinary light and medium artillery on these deep positions was almost negligible.

A Chinese prisoner answered an IPW query as to "how much earth was put on the roof of CCF bunkers" by admitting that it all depended upon the height of the mountain—meaning that their "bunkers" were often tunnels all the way through the hill from the reverse slope. In some cases these tunnels were backward borings into the hillside from inside deep communication trenches, first dug horizontally around the forward slope to connect the network. Often these tunnels branched out into immense rooms behind zigzag baffles. When under our shell fire, the Chinese would retreat into these shelter rooms and sit in safety behind solid hillside, while we poured ineffective rounds against the outside.

IPW, however, also learned from prisoners that our heavy artillery with delay fuzes made deeper penetrations and their explosions caused earth shock and structural damage even inside deep shelters.

So, the Second Division Artillery decided to use the 155mm SP gun in a direct assault fire program, to be carried out from such point-blank ranges as would permit entrances through the apertures so as to effect deep penetration beyond. These weapons were frequently moved up to within 2000 yards of their targets and on occasion within 1000 yards of enemy positions in order to achieve their maximum effectiveness and accuracy. Such a program was conducted in the zone of the 23d Infantry, under the supervision of Lt. Col. Robert M. Backes, commanding the 37th FA Battalion. Colonel Backes personally supervised the construction of a number of



these forward firing positions, necessarily under direct observation of the enemy, and in two cases, within automatic weapons' range. The first of these positions for a 155mm gun was prepared on the site of one used previously by a 90mm gun. The position was simply deepened and made larger in all directions, and in this first case, was not prepared with any overhead cover, which was found essential and made a part of subsequent constructions. This first position was completed sometime in February.

Colonel Backes planned to move the SP gun forward during darkness, accompanied by an infantry security force. The SP was to leave its rear area position sometime after 0300 hours and move out in front of the friendly MLR to a position on the very outer fringe of the friendly outpost line, several thousand yards beyond the MLR. It was certain that the noise of the movement would be heard and the final movement into position was to be made during the last minutes of darkness so that daylight would rise before the Chinese had any opportunity to send out patrols to investigate, for the firing position was within 900 yards of the nearest Chinese foxhole.

One squad of infantry was to be deployed as security in front of the firing position, and would remain as long as the gun was in place. This squad was to be equipped with one .30 caliber LMG, a 3.5 inch rocket launcher and in addition to the other riflemen, featured a single sniper, equipped with a scope-mounted M1. The assistant S3 of the battalion in that sector was assigned to coordinate between the troops who occupied the outposts flanking the firing position, the assault gun crew, and the security force. The troops manning the friendly outposts were in suitable positions to give assistance if the assault gun came under ground attack.

In addition to these measures Col. Backes decided to employ one of the M16 AAA half-tracks which were committed to his support. Lieut. Charles E. Smink, A Battery, 82d AAA AW Battalion, commanded the AAA platoon supporting that battalion and was called upon to furnish one of his tracks for the action. He also decided to accompany the track in the mission.

Twenty-four hours in advance, Smink received a written plan for the action, giving his position and describing the operation as a whole. The plan specified that the single half-track would be under the command of the infantry officer and would open fire, cease fire and move at his direction. For the AAA portion of the action, the operations order did not specify any further details except the times for departure and arrival at the firing position, the name of the infantry lieutenant in charge, and the fact that the track would be released upon his order at the completion of the firing.

Lieut. Smink had at this time eight half-tracks, all M16's, stationed in dug-in positions on the infantry main line of resistance. With a view toward using his most experienced crew and a half-track in the best possible mechanical condition he selected A241 and alerted the crew immediately by a personal visit. Arrangements were made to increase the track's ammunition supply by 7,500

rounds. This ammunition was stacked and lashed on the wooden roof of the cab and onto the hood in front for easy access. The regular basic load was retained on the floor of the fighting compartment.

Lieut. Smink left the committed track's place on the MLR open. Adjacent tracks were informed of its mission and ordered to keep the continuity of coverage by widening their own areas of responsibility as he specified in new sector boundaries.

Another half-track whose MLR position was nearby was alerted and prepared to relieve A241 if the need arose. It was issued 7,500 additional rounds of API in loaded belts.

An open radio net was operated at all times so as to connect with the platoon CP back at the infantry battalion CP and with all the remaining tracks of the platoon. During the first day, because of technical difficulties, Lieut. Smink lost direct contact with his platoon CP, but at all times was able to reach the rear by relay through one of the MLR tracks. Additional communications were provided by the infantry from the SP's firing position to the force occupying the outpost to the right. Also, the artillery laid wire from the observer's shelter several yards left of the assault gun's position, to the gun itself and left up the hill several hundred yards to the outpost, from which artillery wire and radio communications ran back to the 37th Field Artillery Battalion FDC. Actually, the wire was knocked out later by enemy shelling; however, communication was maintained at all times by one of the alternate means provided.

The security squad fanned out a hundred yards or so in advance of the assault gun's position, straddling the road in order to hold off any enemy ground attack until the 155 could be removed Their positions covered perhaps 150 yards when the lieutenant had finally set out each man. The bazooka team lay in the ditch beside the road, in front of the 155mm gun position. A six-foot high barrier of ammunition boxes had been constructed on the road here so that friendly traffic would not inadvertently drive beyond friendly control at the OPL limit. The day was cold and the infantrymen were permitted to wriggle back and forth down the ditch on the left side of the road to the defilade behind the pass—or crawl back over the hill from their holes, in order to make use of a fire which was kept burning for heating rations and warming. All members of the security squad wore white camouflage suits to conceal themselves in the patchy snow covering the area at that time.

On the first day Lieut. Smink crossed his IP, the MLR, at 0500 hours, riding in the front seat of his half-track, leaving his jeep behind. Movement along the MLR was permitted only during darkness since the MLR was under good enemy observation.

The 155 pulled into its firing position without incident just before daylight after delaying at a waiting point some 800 yards to the rear until it began to get light. In the same way, but ahead of the SP, Smink moved to his secure point in defilade immediately behind the M16's assigned firing position. This firing point was just behind the barrier blocking the road in the pass. As soon as the 155 began firing, Smink pulled his track up to the barrier and sighted through his guns to check for clearance over the barrier and limitations in his field of fire. The coverage was found to be excellent for both the hills designated by the Second Division as "Bunker Hill" and "Hill A," and the M16 was then returned to its secure position, where it remained for the rest of the day. He did not fire at all the first day.

The 155 began firing at approximately 0800 hours. At 1100 hours, the Chinese began placing scattered and inaccurate sniper fire on the general position. The infantry sniper returned the fire at points he considered likely, but so far as was known, did not inflict any casualties. Other riflemen of the security squad were permitted to fire occasionally from various positions, but no visual contact was made with any enemy. The sniper fire from both sides continued all day with no casualties resulting.

The 155 ceased fire at approximately 1600 hours, on schedule. Targets engaged were bunkers and communication trenches on Bunker Hill, Hill A, and Hill C. Targets on Bunker Hill and Hill A were approximately 1000 to 1200 yards distant from the assault gun's position and were effectively covered during the day's firing. Some 120 rounds were fired slowly and accurately at the three hills, causing severe damage to one dozen enemy bunkers and lesser damage to perhaps as many others, along with many sections of communication trench damage. Observers could see logs and debris flying through the air after the delay-fuzed rounds exploded inside their targets.

The assault gun force then withdrew in the order of: 155mm SP, M16 and security squad. Immediately after all elements cleared the area, approximately eight rounds of light artillery, which was later identified as 76.2mm Soviet-type howitzer shell, landed over a scattered area near the outpost road pass. This shelling was evidently for the purpose of registration.

The original plan called for firing on the following day, but in view of the shelling, it was decided not to occupy the same position two days in a row, but to skip a day. The Chinese were equally as patient and they did no firing on the second day either. On the third day the same organization was maintained and the same positions occupied by the assault gun force—without incident. The M16 crossed its IP at 0500 hours and was in position at daylight, to follow the same plans as previously.

The 155 began firing at just after 0800 hours, directing approximately fifteen to twenty rounds at targets on Bunker Hill and Hill C with encouraging results. It was noted, however, that the Chinese soldiers had, during the past two nights, reconstructed many of the previously destroyed bunkers—or so it appeared. Listening posts had reported hearing work progressing during the darkness and air OP's had sighted stockpiles of bunker logs collected on top of the hills, in spite of heavy harassing artillery fires which had been placed on the damaged targets during both nights. The industrious Chinese had repaired much of the visible damage.

After fifteen or twenty rounds had been fired, the enemy began shelling the 155 position and the nearby area. Fragments identified the rounds as 122mm Soviet-type. It was a low velocity weapon, as the sound arrived in time to take cover before the round landed. Some of the rounds were of a lighter caliber, or else the Chinese mixed fuze delay and quick, causing the difference in sound. We suspected the latter as we found no 76.2mm fragments. An interesting point here can be observed about

heavy artillery. An observer adjusting such rounds will make his initial corrections to get onto his target with fuze quick since the bursts are easier to pick up. As soon as possible, he will switch to FD for its more destructive effect. If he has several thousand yards between him and his target, he will often be surprised to see his FD rounds strike, throwing up huge amounts of dirt and refuse, but still fail to hear the sound when he expects it, only suddenly to feel his own bunker shudder from the ground-transmitted shock wave—the sound being almost entirely muffled inside the earth.

The shelling continued for about two and a half hours, with rounds arriving in salvos of two, three and four at such a spacing as to indicate at least two guns firing. The infantry remained in their security positions which they had scraped out the first day, just to be ready for such a contingency. They all simply ducked down in their holes and waited. Lieut. Smink and the infantry lieutenant were standing in the road when the shelling began. When the first round landed short, they both went up on the hill beside the machine gun position to see what was going on. As soon as they determined that they were being shelled, they descended the hill and sought suitable cover near the M16. The accuracy of the shelling improved with each volley. There were varying periods between volleys of from two to three minutes to considerably longer.

After the shelling had gone on for over two hours, developing to such accuracy that it was necessary to suspend firing of the 155, it was decided to march order. One round fell so close to Colonel Backes' foxhole that the shell fragments destroyed his map board and severely damaged the observing instrument. Colonel Backes had earlier taken a crater azimuth himself and radioed this back to the 37th FDC and to Second Division Artillery where an unsuccessful aerial search mission was laid on in an effort to locate the enemy guns. Counterfire based upon the colonel's crater azimuths and the sound azimuths of other observers was placed on several likely areas by the division artillery with no noticeable effect. So, it was decided to move the gun out when an appropriate lull came.

The evacuation occurred about 1300 hours and in proper order. The infantry security force had no transportation so the M16 was used to carry them out. One lightly wounded man from the 155mm gun crew was the only friendly casualty.

The defiladed position for the track was well selected for the crew was able to sit out the shelling in a ditch beside their vehicle. Rounds landed within seventy-five yards, scarring the ground and trees nearby, but no damage occurred to the vehicle.

Lieut. Smink's track did not fire a single round. The vehicle was moved back to its main line position after waiting behind the outpost line in a safe assembly area until dark, along with the 155mm SP.

An interesting sidelight to this action occurred that same night when the Chinese dispatched a patrol to the SP's firing position and deposited propaganda leaflets in the area where the gun had been. They were on the general themes of sorrow of loved ones back home and the rigors of winter service in Korea.

"He also serves who stands and waits."

Retirement in Rhyme*

Editor, THE JOURNAL:

Current events have stimulated the following "Out of Active Service" with apologies to Rudyard Kipling and his poem "Back to the Army Again":

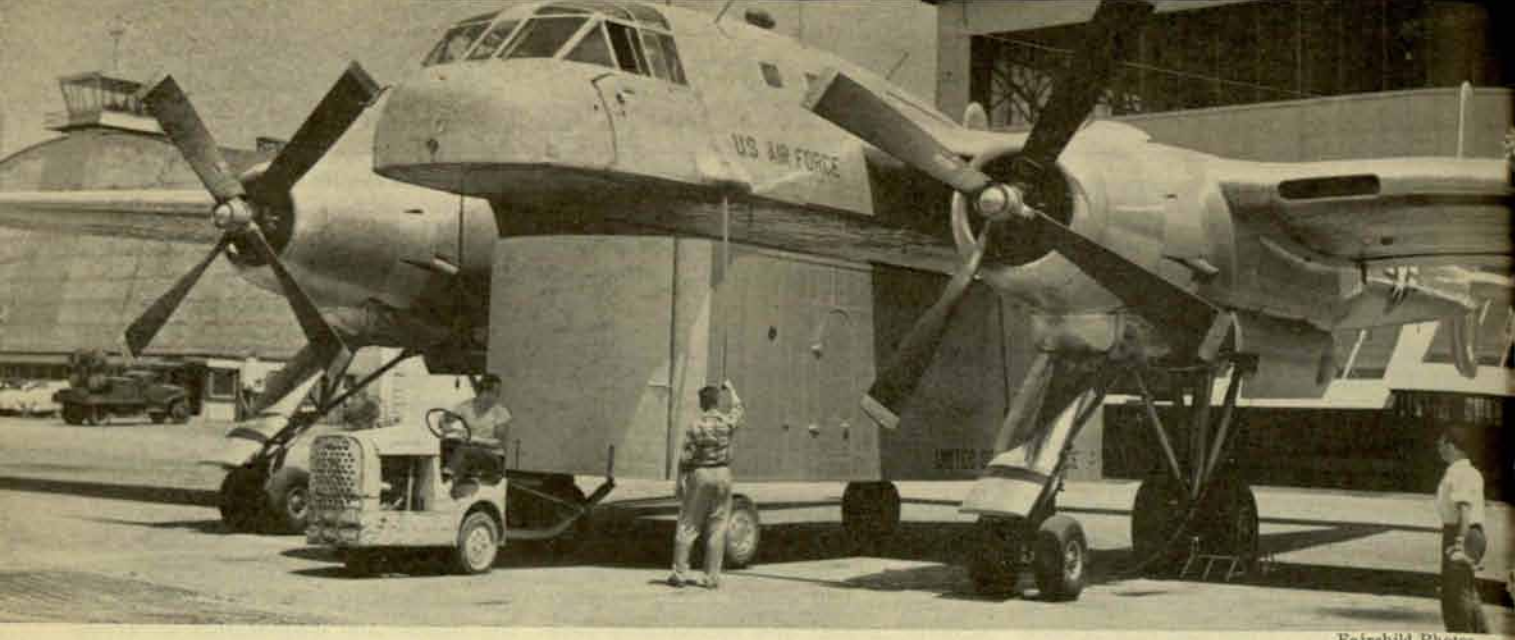
I did my thirty years' service. The Pentagon said: "Good day—
You'll please to come when you're rung for, and here's your retired pay;
Three-quarters of your active—and blooming generous, too;
And now you can make your fortune—the same as your generals do."
The Secretary expressed his appreciation—a paragraph on this dwelt,
For "many years meritorious service" and a loss which "will be keenly felt."
The form letter ended with a kind assurance—a departmental approbation—
That a desire for earlier retirement would "receive every consideration."

A man of seven and fifty that hasn't learned of a trade—
Beside "Retired" against him—he'd better be never made.
I tried my luck for a quarter, and that was enough for me,
And I thought of the military prep schools, and I thought I'd go and see.
The "head" asked some questions, then he winked his other eye,
He said to me, "Why aren't you a general, the same as the other guy,
Seventeen years as a louie, My God, were you dumb!", said he,
"And you expect me to be interested, you with only a colonelcy."
I bit my tongue and thanked him, but felt knee high to a duck—
A civilian wouldn't know that promotions were often a matter of luck.
I used to be proud of the Army and thought it quite a career,
But realized now how I'd muffed it—no use to cry in my beer.

I remembered my years in the Army, before promotion was fast and on time;
When colonels had two grades above them, and a captain was considered sublime;
When rank had both responsibilities and privileges, and a brief case was unknown;
When the Pentagon was not in existence, and could not be considered as home.
But now in the present day scramble—promotions, decorations and such—
When colonels have five grades above and below them, and not considered as much;
There's something wrong with the system—no matter how hard a man strives;
The majority will end in the middle and that makes a mess of their lives.
Youth is now in the saddle—the "old men" are pushed aside;
The young are eager and restless—are getting into their stride;
But they too will soon have thirty, together with five years in grade;
Then the "old men" can laugh and chuckle and watch as they also fade.

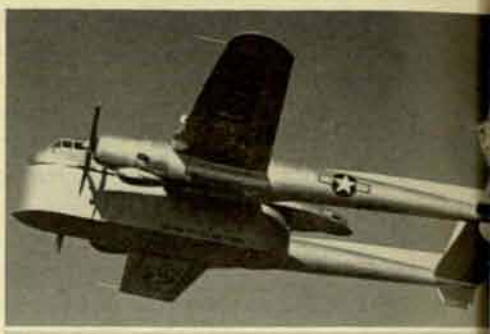
—*"Thirty and Five"*

*Reprinted from 18 Oct. issue *Army-Navy Air Force Journal.*



Fairchild Photos

NEW FLYING TRAILER

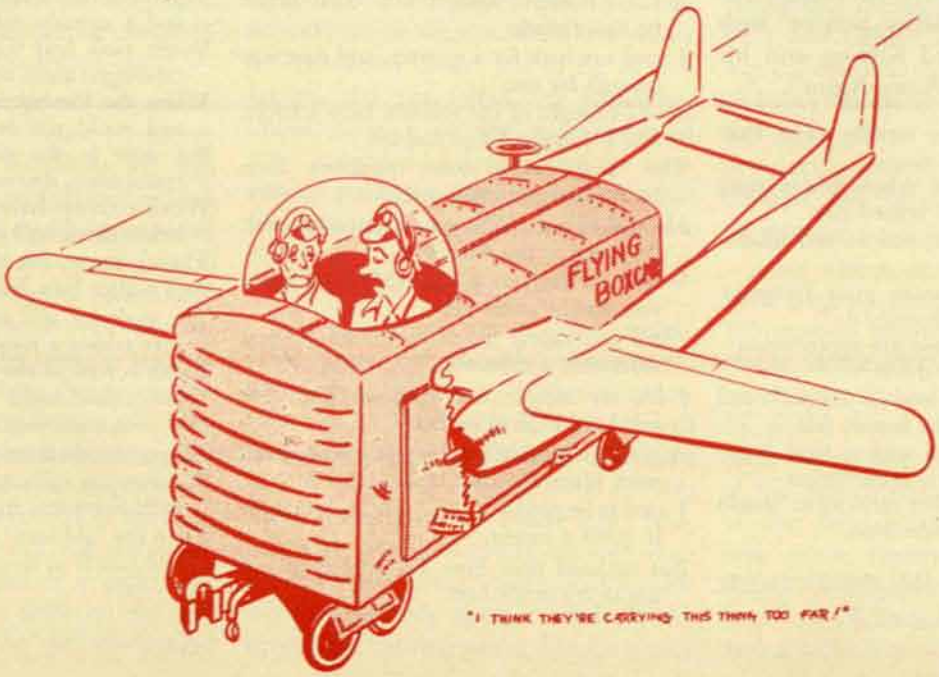


Looking more like a trucker's rig than an airplane cargo compartment, Fairchild's new Flying Trailer took to the road recently to prove that it is equally at home on the highway and in the air.

Resemblance of this roadable air-cargo pack to a conventional freight trailer is so close that motorists hardly gave the pod a second glance during tests on highways and secondary roads.

Designed as a detachable cargo compartment for the unique Fairchild XC-120 Pack Plane, the Flying Trailer represents a new concept in military and civil air cargo transportation. A further development of the XC-120's original pod, the versatility of the Flying Trailer hinges on its adaptability to both ground and flight situations.

In military use, it can be loaded with as much cargo as a C-119 Flying Boxcar, attached to the XC-120 in a few minutes, and flown to forward combat areas. Upon landing at advanced bases or airstrips, the Flying Trailer can be hitched to virtually any military vehicle and hauled to front-line troops. Extreme maneuverability and high-speed over-the-road characteristics may render it especially valuable from a logistics standpoint in supporting and air-supplying ground operations.



HEAVY DROPPING AUTOMATIC WEAPONS

By CAPT. CHARLES E. VANDERVORT

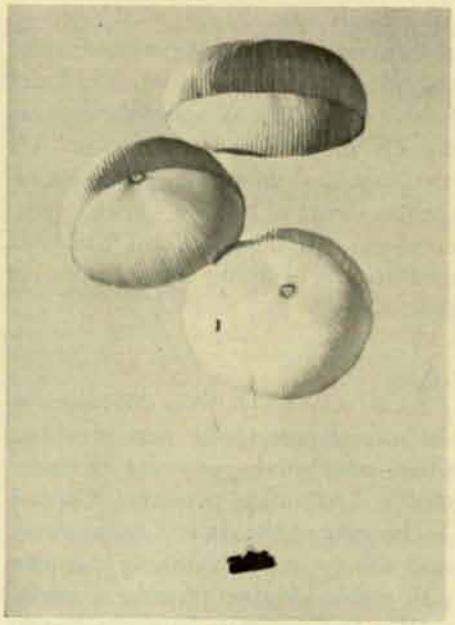
On 24 May 1950, the 88th Airborne AAA Battalion of the 11th Airborne Division, at Fort Campbell, Kentucky, was initiated into the intricacies of heavy dropping antiaircraft equipment. Previous to the actual drop, 1st Lt. (now Captain) Daniel R. Moriarty organized and trained a small group which included SFC Ralph W. Oldham—the only member presently assigned to the battalion—in loading and lashing techniques to be used. One plane, a C-82, was used and one 40mm gun, M2A1, and one ¼ ton truck, each lashed to its own heavy drop platform comprised the load.

This first experience was a success in that the equipment was brought to earth without damage; however, due to procedures in effect at the time covering the removal of lashings which secured the load in the plane, a premature exiting of the 40mm gun occurred. This set up the normal chain reaction—the extraction parachute for the second load being placed on the first load—and the ¼ ton truck was also dropped at the same point. Instead of the equipment coming to rest on the designated drop zone, a farmer's wheat field in the vicinity of Hopkinsville, Kentucky received the "bundles."

It was determined as a result of this that loads should remain secured within the plane until just prior to drop time so as to reduce the possibility of any reoccurence of an incident of this type.

A second heavy drop was made during the latter part of August 1951 with both the 40mm gun and the multiple machine gun mount M55 being used. Two of each and four ¼ ton trucks were prepared for dropping, using two one hundred foot canopy T-11 parachutes for each 40mm gun and one each for the M55s and trucks.

Equipment was dropped on the Yamoto drop zone and all arrived on the ground ready for use with the exception of one M55 which sustained damage to the power charger unit and sight caused by landing impact. As a result of this exercise the use of two one hundred foot canopies for each M55 heavy dropped was recommended and approved. Also, additional lashings were considered necessary to anchor the power charger more securely to the mount.



Three 100-foot parachutes are used to Heavy Drop a quadruple .50 caliber machine gun.

This exercise was held on two separate days with Battery B handling the details of loading, lashing and dropping half the equipment with the remainder of the battalion as spectators; and Battery C performing the same functions with the balance of the equipment, thus giving as many as possible the practical knowledge of loading and lashing techniques.

On 15 November 1951 a battalion operation was conducted. Each battery utilized one C-119 in heavy dropping one load, and monorailing fifteen bundles on a second lift. In this operation four ¼ ton trucks, one 40mm gun and one M55 multiple machine gun mount were dropped.

At Camp Drum, New York, during Operation Snow Fall, Battery C, operating as a part of the 511th RCT, successfully dropped four 40mm guns and four M55s. Snow was light and presented no difficulty in this operation. The weapons were deployed in defense of the drop zone after landing and were subsequently used throughout Operation Snow Fall.

The 40mm guns in use by the battalion have been modified by the removal of the oil gear units—a saving in weight of upwards of 400 pounds; however, all drops of 40mm guns except the Snow Fall operation, were made with the oil gears still mounted on the platform of the 40mm gun.

Although relatively few heavy drops have been made, success has been apparent from the first and these weapons can be successfully and safely dropped when the need arises.

U.S. Army Photo

M/Sgt. Byron Hodges and 1st Lt. E. L. Peck display a wooden model of the recently awarded 88th Airborne AAA Battalion's crest. In crimson and gold, the Artillery colors, the winged projectile and case indicates airborne artillery.

READY TO FIRE ON D-DAY*

NINETY National Guard nondivisional antiaircraft artillery battalions ready to fire on D-Day—that's what the Army is shooting for now.

The need: urgent.

The plan: "workable," agree those primarily responsible for the air defense of the Nation.

It involves:

1. Assignment of a definite mission, a definite defense site, to every unit.

2. Integration of the Guard gunners' D-Day missions into the over-all antiaircraft and air defense of key potential enemy bomb targets.

3. Streamlined, specialized training—emphasis on each man's ability to perform his special job—"today, tomorrow or the next day the unit may have to fire its first round against an enemy aircraft."

The Guard's place in the "big picture" was unfolded at a highly-classified Pentagon conference last month. Invited in for a briefing were the Adjutants General of States having units involved. Those who conducted the briefing were three who carry major responsibility: Lt. Gen. Maxwell D. Taylor, Deputy Chief of Staff of the Army for Operations and Administration; Lt. Gen. John T. Lewis, CG, Army AA Command; Maj. Gen. Raymond H. Fleming, Chief, National Guard Bureau.

Each AG knows the story of the plan insofar as his own State's units are concerned; each may inform the subordinate battalion commanders of the particular battalion's own mission.

It was, as General Fleming put it, "the first time in my memory that the Army has been willing to tell us what the initial mission of each unit will be when it enters the active military service of the United States."

"I know of no subject which, in our own plans and preparations for postwar, causes more deep concern than the air defense of the United States," declared General Taylor. Up against the grim facts of "astronomical figures in cost, equipment and manpower" which most possible solutions have involved, are balanced "the terms which the time factor imposes upon us under the conditions of modern war."

General Taylor ticked off progress in AA defense since Korea: establishment of General Lewis' AA Command; spotting of active AA units on actual defensive sites at critical points throughout the ZI; an increase to 110 active AA battalions; and, finally, the inclusion of specific missions for the Guard's nondivisional AA units, so that they can reinforce the existing active units on short notice.

ACKNOWLEDGING difficulties in the way of putting the new plan into effect—among them, provision of equipment and training of personnel—General Taylor assured the AGs; "On the Army staff side we are approaching this plan with a determination to make it work."

"We feel we must have the benefit of these National Guard battalions in a D-Day role," he amplified. "We cannot be content with the number of active units that we can have on-site. If you gentlemen can produce for us 90 battalions that can fire on D-Day, you have made a major contribution to the whole question.

"On the equipment side, our shelves are not as well stocked as we would like; however, we are going to open them to you to the extent that our supply people feel possible in view of our overseas commitments.

"On the side of personnel, you will have to produce the men, the leaders. Like any other plan, this one will be as good as the leaders who provide the direction. You have 90 battalion commanders who will have a real job making this a workable plan. On the other hand, I think those battalion commanders will have the challenge of a specific mission never known before in time of peace. It seems to me the whole concept is thoroughly aligned with the American tradition of the citizen springing out to defend his homeland—in the old days, in his shirtsleeves. (We hope not in shirtsleeves now, with the Quartermaster General on the job.) It is the appeal of this Minuteman concept which convinces us of the feasibility of this plan."

Confident that it *is* "a workable plan," General Lewis realistically opined that "it will not be done easily and that the hardest work will be done at the firing battery level"; that "the unqualified support and faith of the public and the great personal sacrifice by the officers and men who will man the guns are the things that will produce the fighting potential."

"We are not a military-minded people, and, consequently, we do not maintain professional soldiers in numbers adequate for all-out defense," General Lewis explained. "The National Guard and the Reserve have always provided the bulk of our fighting forces. The new situation we now face is that the barriers of time and space have been removed from the defense scene. We must now be ready for immediate defense against attack with little or no warning.

"There is no doubt that the National Guard will respond as they have always done. The Antiaircraft units must be prepared for immediate action. This will require many otherwise spare time hours of the members to be spent on the additional training required. There is no doubt that enough people will make this sacrifice to fill the ranks, if they and the public are presented with the facts.

"These matters have been considered in the plan. Every unit and every man must be given the facts of the military threat, the facts of what must be done to accomplish the defense mission and the facts of the horrible results if we should fail. Knowing these facts, the American public will answer the call to arms."

EMPHASIZING that the job of preparing to accomplish the mission "must begin at the bottom," General Lewis urged a step-by-step progression: "the first gun crew will get the know-how and can then help organize and train another, one battery will help organize and train another, and so on until an effective force is in being. It is better that a battalion have one effective battery than to have four ineffective groups of men."

He promised streamlined training pro-

*Reprinted from the November issue of *The National Guardsman*.

grams. "Each unit has a specific mission," he explained. "For this mission, individuals will be trained to do the job to which they are assigned. There is not sufficient training time to conduct all-inclusive programs designed to produce men that can perform a wide variety of duties and functions. Training must be concentrated on the essentials with the objective constantly in mind that today, tomorrow or the next day the unit may have to fire its first round against an enemy aircraft."

General Fleming, too, acknowledged the time and extra effort involved in rebuilding the Guard's AA units recently returned and returning from active Federal service, and of building strength in the units which remained at home.

In the detailed planning for deployment of available forces, he noted, "wherever possible, units have been grouped for the defense of locations within their own States. Where it has been necessary to assign units to locations outside of their home States every effort has been made to keep State groupings together."

HOUSING: A Problem In EUCOM

There is little or no prospect for concurrent travel to Germany for the dependents of those ordered to EUCOM, according to Lieut. Boyd T. Bashore in an informative article in the November issue of *Combat Forces Journal*.

Even when finally assigned suitable quarters an automobile is essential as your home may be some distance from your unit and commercial transportation is not dependable.

If you are a bachelor, your housing problem is simpler. You'll find BOQ accommodations close to your base of operations although private transportation is still desirable and can be helpful on official business.

It's possible to bring your wife over on a tourist basis at your own expense but that involves living on the German economy and adequate housing will be a headache in any event. Cost of living in the country is cheaper than in the United States but until you are certified for government quarters, there will be no commissary privileges or dependent schooling available to you. Emergency medical care and PX cards are the most you may expect and there will be no refund on the cost of shipment overseas when you eventually receive GI accommodations.

Rapid strides are being made to overcome the housing shortage and EUCOM Headquarters estimate that by Christmas 1952, 91 percent of married personnel will have quarters.

Large amounts of household furnishing are not necessary to be shipped. There is usually sufficient furniture issued to take care of the large items but you'll need cooking utensils, linen, towels, pillows, blankets, etc.

Most electrical outlets in Germany are 220 volts, 50 cycles, comparing with U. S. standard 110 volts, 60 cycles. Better consult an electrician for possible transformers for your deep freeze and other juice burners.

The American Express and Chase National handle banking facilities in most areas, where stateside checks may be cashed. Don't carry many U.S. dollars. They will have to be converted anyway and travelers checks are safer. Your currency in Germany will be in Military Payment Certificates (Scrip), or Deutches Marks.

Remember, in Germany, the occupation days are gone forever. The Seventh Army is now in a tactical situation and field soldiering is the order of the day. Maneuvers and alerts are frequent so plan on field equipment with such suitable conveniences as a Coleman lamp or a foam rubber mattress.

JOURNAL HONOR ROLL CRITERIA

1. To qualify or to requalify for a listing on the Journal Honor Roll, units must submit the names of subscribers and a roster of officers assigned to the unit on date of application.
2. Battalions with 80% or more subscribers among the officers assigned to the unit are eligible for listing, provided that the unit consists of not less than twenty officers.
3. Brigades and groups with 80% or more subscribers among the officers assigned to the unit are eligible for listing, provided that the unit consists of not less than seven officers.
4. Units will remain on the Honor Roll for one year after qualification or requalification.

BOOK REVIEWS

LINCOLN FINDS A GENERAL, Vol. III. By Kenneth P. Williams. Macmillan. 585 pages. $7.50.

The third of Mr. Williams' series on the Civil War deals with "Grant's first year in the West" and like its two predecessors, gives a careful and scholarly presentation of the period covered.

There is a fascinating account of Grant's life prior to the war when he returned to military service after resigning his commission to enter into business.

The characteristics of the commander as he struggled to build a disciplined force from raw material into the battle tested Army of the West are skillfully portrayed as are the weakness of Halleck, McClernand and others whose abilities were outshone by Grant's successes in his carefully planned operations.

The three volumes will find their rightful place in any historical collection beside *Lee's Lieutenants* as major contributions to military history.—R.W.O.

BENJAMIN DISRAELI, Earl of Beaconsfield. By Cecil Roth. Philosophical Library, New York. 178 pages. $3.75.

Disraeli is always spoken of as a Jew, but here is a splendid biography which explains and stresses the nature of his Jewish heritage, how he came to the church of England, the ramifications, complication, and final effects. Scholarly and intriguing.

U. S. ARMY IN WORLD WAR II, Pictorial Record, The War Against Japan. Chief of Military History. Department of the Army. Government Printing Office. 471 pages. $3.50.

This interesting and colorful collection of war photos from the Pacific with brief historical outlines of the trends of action makes a fascinating study.

Pictorial studies of Pearl Harbor in ghastly detail; of the Japanese invasion of the Philippines, the battles and surrender on Bataan and Corregidor.

Guadalcanal, New Guinea; Tarawa, Saipan, Guam; Leyte, Manila, Corregidor recaptured; Palau, Iwo Jima; Okinawa.

China, Burma, India.

A comprehensive story of amphibious warfare.

Military History

The UNITED STATES ARMY IN WORLD WAR II is a history of strategy and tactics, of supply and administration, of planning, training, and combat operations. Although an Army history, it shows the relationship between ground, air, and naval forces in action. Records of Allied and enemy forces are explored in order to present an integrated narrative of the war as a whole.

The thirty combat volumes, which account for about a third of the series, are illustrated with action and terrain photographs and with military maps. All volumes are supplied with charts, tables, indices, and bibliographical aids. In scope, thoroughness, and availability to the public, the series is believed to be without precedent.

Published by Office of the Chief of Military History, Department of the Army.

Published Volumes

	Price
The Organization of Ground Combat Troops	$ 3.25
The Procurement and Training of Ground Combat Troops	4.50
Okinawa: The Last Battle	7.50
Guadalcanal: The First Offensive	4.00
The Lorraine Campaign	10.00
Chief of Staff: Prewar Plans and Preparations	3.75
Washington Command Post: The Operations Division	3.25
Cross-Channel Attack	5.25

TURKISH CROSSROADS. By Bernard Newman. Philosophical Library. 258 pages. $4.75.

Travelogue by a well-known and inquisitive author. Entertaining.

LOVE AND WAR. By Harry de Metropolis. William-Frederick Press. $3.00.

A collection of poems on a wide range of subjects. The author, an artillery major with the 35th AAA Brigade, is a West Point graduate, Class of 1939.

MAIN FLEET TO SINGAPORE. By Captain Russell Grenfell, R.N. Macmillan Co. 238 pages. $3.75.

The fall of Singapore with a dramatic account of the sinking of the *Prince of Wales* and the *Republic*. How, why and the far-reaching results. Also the naval and air battles of Coral Sea and Midway as viewed by a British expert.

NEWS AND THESE UNITED STATES. By Edith M. Bartow. Funk & Wagnalls. 270 pages. $5.00.

The growth of American newspapers and the early struggle for freedom of the press.

ACROSS THE SPACE FRONTIER. Edited by Cornelius Ryan. Viking Press. 147 pages. $3.95.

A $4 Billion space station encircling the globe 1,075 miles high at tremendous speed is visualized and presented by a group of scientists including Dr. Wernher von Braun and Willy Ley.

THE AIR FORCE OFFICER'S GUIDE. By Lt. Gen. George H. Brett and Albert Douglas. McGraw-Hill. $5.00.

THE FORGOTTEN REPUBLICS. By Clarance Manning. Philosophical Library. $2.75.

News and Comment

General Lewis Hospitalized

Lieutenant General John T. Lewis, commander of the Army AA Command and President of the Antiaircraft Association is now in Fitzsimons General Hospital in Denver, where he is undergoing dental surgery and treatment of the throat.

General Lawton Moves To FECOM

Major General William S. Lawton left Fort Monroe November 15 for his new assignment with the Far East Command. He has been the Chief of Staff of the Army Field Forces since February, 1950, when he was assigned to that job by General Mark Clark, who will also be his new commander in FEC.

General Carter in Alaska

Brigadier General Marshall S. Carter departed from Washington in late November for his new assignment as deputy commander of the Army Forces in Alaska with station at Elmendorf Air Force Base.

General Carter has served as the Director, Executive Office for the Secretary of Defense, since 1950 when he came to Washington in that capacity for General Marshall. His last antiaircraft command was with the 138th AAA Group in Japan.

Col. Weddell New Deputy at Bliss

Colonel William A. Weddell was recently designated the deputy post commander at Fort Bliss by Major General Stanley R. Mickelson. Colonel Weddell had previously served with Army Field Forces Board No. 4, same station.

Col. Curtis Joins 53rd Brigade

Col. Kenneth I. Curtis has recently assumed his new duties as executive officer of the 53rd AAA Brigade at Swarthmore, Pa. For the past three years he has served in Ottawa, Canada.

Col. Corkan Accidentally Killed

Col. Loyd A. Corkan, chief of staff under Brig. Gen. Clare H. Armstrong at Camp Stewart, Ga. was fatally injured when he was accidentally shot while hunting recently.

A veteran of both World Wars, Col. Corkan was an educator in private life and a native of Pennsylvania.

56th Brigade Notes

Brigadier General Frederick L. Hayden inspected the on-site positions of the 15th AAA Group in the Boston area during the period 6 to 7 October. The following week he also inspected the on-site positions of the 2d AAA Group in the Niagara Falls area.

Brigadier General Harry F. Meyers presented a bronze star to WOJG Joseph M. Mitchell for meritorious service while serving with the 27th Infantry Regiment in Korea.

On the 24th of October Major General Morris R. Nelson, Eastern Air Defense Force Commander, and Brigadier General Homer Case, who recently assumed command of Eastern Army Antiaircraft Command, were greeted by Brigadier General Harry F. Meyers in Boston and conducted on an orientation tour of the Boston on-site positions.

The brigade participated in the First Army CPX designated as "Exercise Watchdog."

Lt. Col. Paul A. Voyatzis, Commanding Officer of the 336th AAA Gun Battalion and Major John E. Clark, Executive Officer of the 685th AAA Gun Battalion are scheduled to attend the General Staff Officers Course at the Command and General Staff College commencing 4 January 1953.

The troops have been busy recently in the erection of the Jamesway huts at on-site positions.

BACK ISSUES WANTED

By an old subscriber: One copy, each of the following issues of the JOURNAL:

"COAST ARTILLERY JOURNAL"

March-April	1932 (Vol. 75, No. 2)
May-June	1933 (Vol. 76, No. 3)
July-August	1944 (Vol. 87, No. 4)
Sept-Oct	1944 (Vol. 87, No. 5)
Jan-Feb	1945 (Vol. 88, No. 1)
July-August	1945 (Vol. 88, No. 4)

Will pay cash, $1.00 per copy in good condition. Write the editor.

EUCOM AAA COMMANDERS

Brig. Gen. Robert W. Crichlow takes command of the 34th AAA Brigade. With him left to right: Lt. Col. Matthew W. McGuire, commanding 242nd AAA Group; Col. Olaf H. Kyster, 8th AAA Group; Col. Julian Albergotti, brigade executive; Col. Charles J. Diestel, 12th AAA Group. Brig. Gen. Raleigh Hendrix is now artillery officer of the Seventh Army.

Artillery Orders

(Continued from page 35)

McDonald, Craig W. Jr., 420th AAA Gun Bn., Fort Lewis, Washington
McGree, N. C., EUCOM, Bremerhaven
McLeod, Glenwood P., 550th AAA Gun Bn., Camp Stewart, Ga.
Moss, F. H., Far East Command, Yokohama
Nasse, H. E., Far East Command, Yokohama
Price, H. H., Far East Command, Yokohama
Schroeder, George R., Far East Command, Yokohama
Schults, John F., 7689th Hq Gp., USAF, Salzburg, Austria
Simmons, Daniel H., Stu Det Army Language School, Monterey, Calif.
Snead, Joseph A., 466th AAA AW Bn, Camp Cooke, Calif.
Spizzirri, Louis G., 7689th Hq Gp., USFA, Salzburg, Austria
Stelma, Donald J., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Stevens, H. A., Far East Command, Yokohama
Thies, F. L., Far East Command, Yokohama
Turner, Earl A., 99th AAA Gun Bn., Fort Custer, Mich.
Urtes, John N., Stu Det Army Language School, Montery, Calif.
Wall, R. D., EUCOM, Bremerhaven
Ward, John J., 4052nd ASU AAA & GM Center, Fort Bliss, Texas
Weaver, W. W., EUCOM, Bremerhaven
Wittstrom, M. D., Far East Command, Yokohama
Widing, Harry E., USA Alaska, Fort Richardson
Wood, Roy L., EUCOM, Bremerhaven
Woodward, T. F., Far East Command, Yokohama
Yonkers, Arthur J. E., Stu Det AA & GM Br TAS, Fort Bliss, Texas

FIRST LIEUTENANTS

Anderson, Marvin M., 33rd AAA Gun Bn., Fort Bliss, Texas
Andrews, Wm. H., 15th AAA Group, Fort Banks, Mass.
Anlauf, R. F., Far East Command, Yokohama
Barksdale, Abraham B., 4052nd ASU AAA & GM Center, Fort Bliss, Texas
Beardon, James E. II, 7th AAA AW Bn, Camp Stewart, Ga.
Bell, Allan D. Jr., 14th AAA Gun Bn., Fort Myer 8, Virginia
Boisvert, G. A., EUCOM, Bremerhaven
Bowden, Hollis A., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Cameron, W. L., Far East Command, Yokohama
Conrad, Edward E., 51st AAA Gun Bn., Fort Dix, N. J.
Deweese, Robert E., Jr., 20th AAA Gun Bn., Fort Lewis, Washington
Donaho, Eddie L., 4052nd ASU AAA & GM Center, Fort Bliss, Texas
Dubbert, Louis F., 7689th Hq Gp USFA, Salzburg, Austria
Franzola, John J., 459th AAA AW Bn., Fort Cronkhite, Calif.
Gibson, Wm. G. II, EUCOM, Bremerhaven
Glandorf, James H., 685th AAA Gun Bn., Fort Devens, Mass.
Grant, Lloyde A., Stu Det AA & GM Center, Fort Bliss, Texas
Gromsky, John, 74th AAA Gun Bn., Indiantown Gap, Penna.
Hare, Jean M., Stu Det AA & GM Br. TAS, Fort Bliss, Texas
Headley, Garland W., Far East Command, Yokohama
Herbert, Morris J., Stu Det AA & Gm Br TAS, Fort Bliss, Texas
Hilu, Sam, 182nd AAA Gun Bn., Indiantown Gap, Penna.
Holt, Thomas A., 8658th AAU AAA Maint. and Instr. Det., Rulslip, England
Huff, Chester A., 718th AAA Gun Bn., San Francisco
Johnson, C. R. Jr., EUCOM, Bremerhaven
Jones, C. D., EUCOM, Bremerhaven
Kelley, G. J., Far East Command, Yokohama
Kendree, Ulmont R. Jr., 369 AAA Gun Bn., Fort Hancock, N. J.
Kolster, Jim H., 554th AAA Gun Bn., Camp Stewart, Ga.
Larson, Lyle R., 89th AAA Gun Bn., Fort Meade, Md.
Lenhart, Paul E., 504th AAA Gun Bn., Fort Custer, Mich.
Lockhead, Earl J., Stu Det AA & GM Center TAS, Fort Bliss, Texas
Lowe, Wm. A., Far East Command, Yokohama
Lowman, Richard D., 13th AAA Gun Bn., Camp McCoy, Wisc.
McCormick, Otto L., 549th AAA Gun Bn., Camp Stewart, Ga.
Mollan, Donald W., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Muellier, Morris W., 4052nd ASU AAA & GM Center, Fort Bliss, Texas
Nolan, Wm. A. Jr., 80th AAA Group, Fort Totten, N. Y.
North, Edward L., 464th AAA AW Bn, Camp Roberts, Calif.
Nowak, Frank S., 13th AAA Gun Bn., Camp McCoy, Wisc.
Olson, Richard W., 518th AAA Gun Bn., Camp Hanford, Washington
Palmer, Marshall T., 459th AAA AW Bn, Fort Cronkhite, Calif.
Patrick, Ulrie B., 531st AAA AW Bn, Fort Bliss, Texas
Pfister, J. C., EUCOM, Bremerhaven
Rasmusson, Harlon A., 418 AAA Gun Bn., Camp Hanford, Washington
Richardson, W. K., Far East Command, Yokohama
Roberts, Milford G., 2nd AAA AW Bn, Fort Hood, Texas
Ryberg, Robert W., USA Antilles, San Juan, PR
Seymour, Joe J., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Smith, Bob V., 4052nd ASU AAA & GM Center, Fort Bliss, Texas
Smith, James P., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Stubbs, Beverly W., 19th AAA Gun Bn., Fort Dix, N. J.
Toellner, Henry M., Far East Command, Yokohama
Tolman, William J., 7689th Hq Gp USFA, Salzburg, Austria
Vogel, John O., 34th AAA Gun Bn., Fort Totten, N. Y.
Whatley, J. W., EUCOM, Bremerhaven
Wessels, H. A., EUCOM, Bremerhaven

SECOND LIEUTENANTS

Aldridge, F. E., Far East Command, Yokohama
Ashby, B. K., Far East Command, Yokohama
Bacon, Robert H. Jr., 3420th ASU The Psy War Center, Fort Bragg, N. C.
Barber, R. E., Far East Command, Yokohama
Barnard, J. D., EUCOM, Bremerhaven
Beckman, A. H., Far East Command, Yokahama
Biglin, W. W., EUCOM, Bremerhaven
Boates, J. R., Far East Command, Yokohama
Bortko, E. J., EUCOM, Bremerhaven
Bosenberg, Robert F., EUCOM, Bremerhaven
Boettiger, D. L., EUCOM, Bremerhaven
Brady, John E., 35th AAA Gun Bn., Ft. Meade, Md.
Browning, J. W. Jr., Far East Command, Yokohama
Brucks, A. G., Far East Command, Yokohama
Brucham, R. J., Far East Command, Yokohama
Burnett, R. E., Far East Command, Yokohama
Carter, Ulysses B., 35th AAA Brigade, Fort Meade, Md.
Chakes, T. J., EUCOM, Bremerhaven
Choate, B. F., EUCOM, Bremerhaven
Comisky, William T., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Dillon, Alfred M., Stu Det AA & GM Br TAS, Fort Bliss, Texas
Disseler, R. T., Far East Command, Yokohama
Dusinberre, John W., Far East Command, Yokohama
Edwards, P. R., EUCOM, Bremerhaven
Ehlert, R. A., Far East Command, Yokohama
Fasone, J. G., Far East Command, Yokohama
Foster, F. M., EUCOM, Bremerhaven
Fritzinger, R. A., Far East Command, Yokohama
Fuhrman, L. C., Far East Command, Yokohama
Gardner, C. P., EUCOM, Bremerhaven
Gilbert, R. L., EUCOM, Bremerhaven
Givas, Arthur S., 4052nd ASU AA & GM Center, Fort Bliss, Texas
Glass, J. A., Far East Command, Yokohama
Griswold, G. B., Far East Command, Yokohama
Guzdziol, R. J., Far East Command, Yokohama
Harmon, H. D., Far East Command, Yokohama
Hayes, L. Z., Far East Command, Yokohama
Hehman, L. P., Far East Command, Yokahoma
Howe, William E., Jr., Far East Command, Yokohama
Hughes, D. A., Far East Command, Yokohama
Kline, G. N., EUCOM, Bremerhaven
Kruse, C., Far East Command, Yokohama
Ladas, Ludwig N., USA Alaska, Fort Richardson.
Lane, R. C., Far East Command, Yokohama
Lenoir, G. P., Far East Command, Yokohama
Matthews, J. E., Far East Command, Yokohama
McCready, C. B., Far East Command, Yokohama
McFarlane, D. C., Far East Command, Yokohama
McGregor, A. C., Far East Command, Yokohama
McInnis, George W. Jr., Far East Command, Yokohama
Penn, W. A., Far East Command, Yokohama
Pomerantz, I., EUCOM, Bremerhaven
Reeder, J. F., EUCOM, Bremerhaven
Rider, Leonard, Far East Command, Yokohama
Robinson, W. G., Far East Command, Yokohama
Saunders, J. P., Far East Command, Yokohama
Smith, F. D., Far East Command, Yokohama
Vanselow, John C. Jr., EUCOM, Bremerhaven
Williams, D. I., Far East Command, Yokohama

Antiaircraft Journal Index

Volume LXXXXV, 1952

Jan.-Feb., 1—March-April, 2—May-June, 3—July-Aug., 4—Sept.-Oct., 5—Nov.-Dec., 6

1-24 Indicates Page 24, January-February Issue

AUTHORS

No. and Page

Aaron, John S., Corporal 1-18
Allen, Leonard S., Lt Col 6-31
Allen, Terry, Maj Gen 2-32
Aquilina, Raymond F., Capt 3-32
Barth, George B., Brig Gen 2-26
Bender, Arthur H., Col 1-27
Bjorklund, Floyd H., Capt 5-22
Brown, William F., Capt 4-28
Carter, Villa, Major 2-34
Connelly, Francis M., Major 2-16
Currie, A. A., Lt Col 3-31
Dennen, Charles A., 1st Lt 2-39
Edmunds, James M., Lt Col 1-30
Eichling, Robert E., Capt 1-11
Farber, Charles F., Capt 2-20
Favret, Andrew G., Capt 6-21
Flora, Robert L., Corporal 5-24
Fraser, Joseph B., Brig Gen 3- 5
Fye, Robert W., Capt 6-32
Genero, Peter P., Major 3-24
Haller, William S., Capt 6-26
Hamlin, Leland V., 1st Lt 4-30
Harkins, Donald E., 1st Lt 2-37, 3-20, 5-31
Hatt, Don, Sergeant 1cl 1-42, 4-31
Henry, Charles E., Lt Col 1- 9
Hiscock, James M., Capt. 3-16
Hogan, Robert L., Lt 5-38
Irvine, Willard W., Maj Gen 3- 2
Jackson, Harry R., Maj 3-29, 6-17, 6-18
Jansen, Frank J., Capt 4-26
Kearful, Jerome 2-19
Kirk, Alan G. 1-39
Krekorian, Edmund A., 1st Lt 1-20
Lawson, A. T 1-49
Leonard, Jonathan Norton 1-33
Lutes, LeRoy, Lt Gen 2-2, 3-6, 4-2, 5-2, 6- 4
Marquat, William F., Maj Gen 1-2, 2-8, 3-12
Mattox, Robert H., Major 3-25
McCarthy, M. R., Major 2-17, 4-19
Melanson, Joseph E., Jr., Capt 2-31, 4-22
Metz, Thomas M., Col 6-29
Moore, James M., Lt Col 5-13
Nicolson, William H., Lt Col 4-24
Oberlin, B. G., Major 3-36, 4-33, 5-28, 6-25

No. and Page

Orman, Leonard M., Lt Col 5-21
Owen, Richard W., Lt Col 4-39
Patterson, C. G., Col 2-41
Phillips, T. R., Brig Gen 2-11, 4-9, 4-10
Popovics, John, Capt 1-12
Powers, Patrick W., Capt 4-12, 5-35
Pritchard, Denzil L., 1st Lt 3-25
Rand, H. P., Major 3-27
Rawcliffe, William F., Capt 1-23
Rogers, Roy P., Capt 5-29
Romano, Frank J., Capt 4-27
Rutherford, Robert J., Major 1-46
Rutledge, Paul W., Maj Gen 2-13
Rutledge, Reuben J., 1st Lt 4-18
Schmidtberger, Loren F., Lt 5-41
Schweidel, K. R., Lt Col 3-18
Small, Ballard B., Capt 1-15, 5-9, 5-15, 6-37
Tobin, William J., Sergeant 1-43, 2-36, 5-44
Torian, J. G., Private 1cl 6-18
Trussell, John B. B., Lt Col 2-22, 4-15
Vandervort, Charles E., Capt 6-41
Wuest, William J., Col 4-35, 5-32
Wyckoff, Theodore, Major 1-32, 2-39, 4-18, 5-40
Young, Blaine, Capt 2-40

TITLES

A

AAA AW BN (SP), with the 15th 2-20
AAA Brigade, Cost Consciousness in the 34th 5-40
AAA Brigade, Training in the 35th 2-34
AAA Air Defense, National Guard in 3- 5
AAA Officer Candidate School 4-22
AAA RTC, AW Training in the 5-24
Air Defense more Difficult for Russia than for US 2-11
Antiaircraft Airlift 1-43
Antiaircraft Artillery School, The Far East 4-24
A Simplified Trial Shot Chart 3-31

B

Brigade, With the 35th AAA 1-46
Bunker Busting—In the 15th AAA AW Bn 3-22

No. and Page

C

Calibration Fire 3-32
Civilian Auxiliaries 2-13
Combat Leadership 2-32
Combat Patrol, The SP Platoon Supports A 5- 9

D

Diesel Generators 4-26

E

Exercise Helpful 2-41
Exercise Snowfall, 88th Airborne Bn 2-40

F

Farewell, Hail and 5-44
Field Artillery, Radar for 3-27
Field Artillery Role, Shooting with Corps in the 3-25
Fire Control System, SCR-584 2-16
Firing Practice, Simulated 6-31
Fort Bliss, Officer Candidate School at 2-31

G

Ground Support, Self-Propelled Battalion in 1-15
Guided Missile Group, The First 6-21
Guided Missile Guidance 6-32
Guided Missile Propulsion 5-35
Guided Missiles, The Aerodynamics of 4-12

H

Heartbreak Ridge, The 82nd at 3-16
Heavy AA Artillery, The development of 4-32, 5-32
Heavy Dropping Automatic Weapons 6-41
History General Porter Makes 2-19

I

Idea, Shooting at an 1-30
Indo-China: Outpost of Anti-Communism 4-15
Infantry, In Support of the 1- 9

J

Japan, RCAT's in 4-30

K

Korea, Antiaircraft Artillery In 1-2, 2-8, 3-12
Korea, Self-Propelled Antiaircraft in 1-20
Korea, The First Days in 2-26
Korea, With the 7th Div in 5-13

M

Mars, Birds of 1-33
Meteorology for AAA 3-29
Mountain, Square Rock 3-20

N

Nazi, Great, An AAA Bn Guarded the 4-39
Night Firing 3-24
Non-Resident Instruction, Department of 3-36

No. and Page

O

Operation Orphan 1-23

P

Portobel Machine Gun Trainer, The 4-18

R

Radar Operators 5-21
Radiozonde 6-17
RCAT's, Watch your 2-39

S

SAAA, Manorbier 4-19
SCR 584, Radar Tips 5-22
Steel Core, The invisible 1-49
Summer Camp, 1952 AAA ROTC 5-29
Supply, World War II 3-6, 4-2, 5-2 6- 4
Supply: World War II Reorganization for 2- 2
Supply for the Self-Propelled Bn 1-11

T

Target Selections, Aids to 2-17
Telephone EE-Eight, You and Your 4-28
The Army, the most difficult job in 5-38
The Shelling Report 5-15
The Soviet Union, Impressions of Life in 1-39
The Wolfhounds, Baker Battery Supports 1-12
Tracer Expedient 4-27
Training, Canal Zone 1-42
Training Exercise Hardrocks 6-29
Training Literature 4-33, 5-28, 6-25
Training, On-Site Physical 5-31

U

Unification Disappointing, Short in Unity Savings 4- 9
United States, Antiaircraft Artillery in Air Defense of the 3- 2

V

Viewmaster, Plotting by 2-36
VT Fuses, A trial shot for 1-27

W

War Clouds 4-10
"Whistling Dick," The Saga of 2-22
Wind Determination, Simplified 6-18

UNIT ARTICLES

Second Division, Bunker Busting in the 6-37
24th Division AAA 1-18
34th AAA Brigade Sponsors Youth Center 1-32
40MM Gun, Indirect fire with the 6-26
53rd AAA Brigade 5-41
56th AAA Brigade 2-37
65th AAA Group in the field 4-31
140th AAA AW Battalion 3-18

Handbook and Manual for the NONCOMMISSIONED OFFICER

For the man in this picture, and for those who intend to be noncoms, here is a new kind of book, written *for* the key men of the Army.

Here is the book that tells the noncom what to do—if he doesn't already know—how to do it, when to do it, and why to do it. And all this in clear, direct, exact language that is easy to read and leaves no room for doubt.

This book has been designed to help the man who *is* a noncom, to instruct the soldier who hopes to become a noncom, and to inform the officer who must advise, instruct, and check on his assistants. There is absolutely no padding in this big book, and every bit of information in it has been completely checked by experts for accuracy, clarity, and timeliness.

Handbook and Manual for the NONCOMMISSIONED OFFICER covers such vital topics as Leadership, Orders, How to Teach, How to Study, Social Conduct, Spit and Polish, Military Justice, Relationships with Your Men, How to Train Your Men, Promotions and Reductions, Things Your Men Will Ask You, Personal Affairs, and much more.

Order your copy today to be sure of the latest and best information.

Cloth, $3.50 Paper, $2.50

There Had To Be BATTERY DUTIES

By LT. COL. ROBERT F. COCKLIN, Arty-NGUS, and MAJOR MARK M. BOATNER, III, Inf.

Company Duties has sold in the thousands—it *is* the book which tells where every man fits into the company and how he can do the best job possible.

Artillerymen clamored for the same book, tailored to fit Artillery needs. At last it is ready—the book that every battery officer, every artillery noncommissioned officer and every battery office needs.

Written colloquially, written from experience, and written so it can be understood, *Battery Duties* is the answer to the eternal question in the battery organization—who does what, and *how.*

Cloth $2.50 Paper $1.50

ORDER FROM

Antiaircraft Journal

631 Pennsylvania Avenue, N.W. · WASHINGTON 4, D. C.

"LITTLE BULL"

Power Megaphone

Patent Applied for

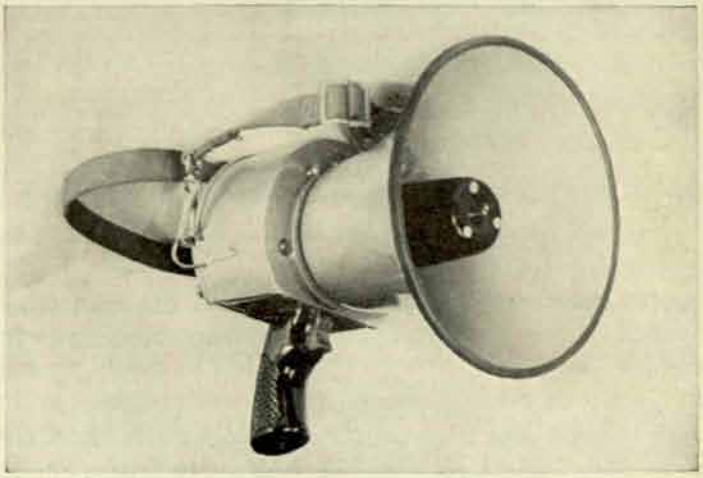
*Ideal For The Range Officer

*Command Control in Garrison or Field

*An Aid to the Instructor

*Voice Control at Formations

*Useful at Athletic Events



- **INSTANT TRIGGER ACTION**
  Press the Switch and Talk No Warm-Up Required
- **RANGE**
  Effective Up to ¼ Mile
- **WEIGHT**
  Only 7 lbs. Complete
- **POWER SUPPLY**
  6 Standard Flashlight "D" Batteries Only—Inexpensive —Available Everywhere
- **DIMENSIONS**
  Horn — 9½ in. diameter
  Unit Complete — 11 in. high
- **BATTERY LIFE**
  Intermittent Operation . . . 8 hrs. per day for (3) Three Weeks. Approximately 120 to 150 Hrs.
- **LIST PRICE — $124.00**

ORDER FROM

Antiaircraft Journal

631 Pennsylvania Avenue, N. W. WASHINGTON 4, D. C.